STEERING TRANSFORMATIVE ENERGY EFFICIENCY AND CONSERVATION IN BRITISH COLUMBIA, CANADA

by

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Abstract

In this thesis I assess the strength of efforts by the Government of British Columbia and BC Hydro to steer transformative energy efficiency and conservation (TEEC) in BC's built environment between 2005 and 2012. TEEC implies a level of energy savings that requires major changes over the next 10 to 40 years in not only the physical components of the built environment but also in day-to-day routines and patterns of life. An underlying assumption of the thesis is that in order to learn about, develop and implement the kinds of initiatives needed to achieve TEEC an accelerated system of policy and technology innovation is required.

In carrying out my research, my particular focus was on assessing the influence of governance practices on efforts to achieve TEEC and on the outcomes that these practices lead to. To do this, I developed a theory-based evaluation framework to assess the effectiveness of existing governance approaches to steer socio-technical transitions. The underlying premise of the theory is that a reflexive governance approach to steering transitions is more likely to lead to a stronger transition context which over time increases the likelihood of a transition being achieved.

To this end, the thesis singled-out eight system conditions that I argue are needed to build and maintain the kind of momentum needed to realize long-term transformational change in complex socio-technical systems. These eight conditions were then used as the basis for assessing the strengths and weaknesses of the Province's and BC Hydro's efforts to steer TEEC.

When I compared the strength of the transition conditions being created in each case study against the governance approach used, I found a link between the use of reflexive governance practices and stronger transition conditions. Based on this assessment 15 recommendations were advanced for how to improve the governance of TEEC in BC's built environment. What is more, these findings suggest that any effort to pursue TEEC will need to also be accompanied by a shift to a more reflexive approach for steering transformational change.

Preface

Portions of Chapter 5 and 6 pertaining to local government climate activities are based on research carried out by UBC graduate student Lisa Westerhoff and Thomas Berkhout. All elements of the research were shared equally. The results of this study are published as:

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List of Abbreviations

BC	British Columbia
BCUC	British Columbia Utilities Commission
CPR	Conservation Potential Review
DSM	Demand-side measures
EC&E	Electricity Conservation and Efficiency Advisory Committee
EE	Energy efficiency
EEC	Energy efficiency and conservation
EEBS	Energy Efficient Buildings Strategy
GWh	Gigawatt hours
GWh/yr	Gigawatt hours per year
IEP	Integrated Electricity Plan
IRP	Integrated Resource Plan
LTAP	Long-term Acquisition Plan
MEM	Ministry of Energy and Mines
MWh	Megawatt hours
TEEC	Transformative energy efficiency and conservation

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At the heart of this thesis are the stories of two entities trying to achieve ambitious levels of energy efficiency and conservation in British Columbia: BC Hydro's Power Smart Division and the Energy Efficiency Branch of the BC Ministry of Energy and Mines. Although the conclusions of this thesis push them to do more, the desire of the people within these organizations to advance TEEC in BC is unwavering. I thank both of them for taking a chance and opening their doors to a critical evaluation of their efforts to date. I hope that the completion of this thesis marks only the beginning of our conversation.

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Dedication

To Claire, my beautiful partner in everything that is wonderful in life.

It is true that the ideal is the ultimate in beauty and joy our imagination can produce. The ideal can never in its entirety be translated into reality. It always eludes our grasps, always recedes into the future. And yet it must never be lost sight of. There may be a temporary compromise with reality, but never at the cost of the ideal. The striving for it must never cease. Everything must be done to bring the ideal nearer.

- Dutch-Canadian Journalist Pierre Van Passen, *Day of Our Years*, 1939

Chapter 1: Transformative Energy Efficiency and Conservation

1.1 Framing the Problem

Energy is at the centre of how we live and organize the day-to-day practices of our societies. The proliferation of cheap fossil fuel and centrally generated electricity over the last century have enabled humanity, particularly in highly industrialized countries to grow economically, demographically, technologically, and spatially more rapidly than any other time in history (1998). However, with these benefits also come costs. By the 1970s, a number of negative side-effects of the modern energy system were beginning to be experienced and critically questioned (such as rapidly rising energy costs, energy security and environmental degradation and risk).

Moving in parallel with this growing public awareness about the consequences of the modern energy system, were emerging ideas and practices of energy efficiency and conservation. One of the most developed of these ideas was Amory Lovins' (1977, p.:25) "soft energy path". The soft-path "combines a prompt and serious commitment to efficient use of energy, rapid development of renewable energy sources matched in scale and in energy quality to end use needs, and special transitional fossil fuel technologies. In contrast, the conventional "hard energy path" "relies on rapid expansion of centralized high technologies to increase supplies of energy, especially in the form of electricity" (Lovins, 1977:25) . Unlike the hard-path which relies largely on "technical fixes", the soft path includes both "technical fixes" and "lifestyle" changes (Lovins, 1977:32). In addition to improving energy efficiencies by minimizing energy lost through its conversation from one form to another (e.g., thermal to electricity, electricity to kinetic), it also sought to minimize the aggregate energy throughout required to fulfill energy services needs by matching energy sources to the appropriate scale and the quality of energy required to fulfill those energy services (e.g., space heating, mobility, food preservation).

Although Lovins suggestion to move America's energy system onto a soft energy path was not taken up by the country's lawmakers, the idea of planning for and intentionally pursuing energy savings from efficiency and conservation measures did gain prominence in the 1970s and early 1980s. By the late 1980s, many jurisdictions in North America were pursuing some form of any energy resource acquisition strategy which involved the "techno-economic fitting (and retrofitting) of more efficient devices/machines into both new and existing buildings designs and productions process" (provided that it was more cost-effective to meet demand in this way than it was to generate new supply) (Blumstein, Goldstone, & Luztenhiser, 2000). The bedrocks of this strategy were utility and/or government demand-side management programs that are closely aligned with formal integrated energy resource plans. Such demand-side management programs operate largely on the

logic of providing energy users with incentives to entice them to voluntary make more energy efficient decisions.

By the latter part of the 1980s and most of the 1990s, concerns about a number of the energy-related issues raised in the 1970s subsided. However, in the late 1990s and 2000s they reemerged with one significant addition, climate change. Until this point, most of the concerns associated with the existing energy system did not extend beyond national borders. Climate change, however, moved these concerns to the global scale and raised the potential outcome of maintaining the existing energy path to catastrophic. For the first time, then, there are serious questions around the continued wide-scale use of fossil-based fuels, the work horses of industrialized society , throughout the world.

Taken as a whole, contemporary concerns about the modern energy system are driving unprecedented efforts by governments and utilities to squeeze more out of energy savings than ever before[1] - and for good reason. According to the climate change scenarios included in the International Panel on Climate Change's (IPCC) Fourth Assessment Report, "[t]he scenarios that report quantitative results with drastic CO2 reduction targets of 60–80% in 2050 (compared to today's emission levels) require increased rates of energy intensity and carbon intensity improvement by 2–3 times their historical levels" (2007: 172). A 60-80% reduction in GHG emissions is important because it is the level of reductions predicted for stabilizing the rise in the global average temperature between 2.0-2.4°C (International Panel on Climate Change, 2007). A rise beyond this range sees rapidly accelerated rates of species extinction, widespread coral morality, vast stretches of coastal flooding, increased water stress for hundreds of millions of people and increased morbidity and mortality from heat waves, floods, and droughts.

Achieving the levels of energy savings required to reduce emission by 60-80% by 2050 will not be easy. The problem, though, is not a lack of technology. According to the International Energy Association's (IEA) *World Energy Outlook 2012*, four-fifths of the existing cost-effective energy efficiency potential in buildings and more than half in industry remains untapped (International Energy Agency, 2012). For this reason, the 20-year "Efficient World Scenario" prepared by the IEA differs from the existing development path not according to the technologies that it assumes will be made available but by the policies it assumes are used to advance the best known technologies and practices. So although technological advances are without a doubt important, just as important as developing new technologies is ensuring that existing ones are being fully utilized. Running in parallel to these technological changes, although not given much direct attention by the IEA report,

[1] In the EU, for example, members states are pursuing a 20% reduction of primary energy use by 2020 (relative to the five year national average from 2001-2005) as part of the EU's effort to reduce GHG emissions by 20% from 1990 emissions levels by 2020

will be lifestyle choices that affect how energy and energy-service technologies are ultimately used (Lovins, 1977; Shove, 2003).

1.2 Built Environment Energy Services Regimes

In this thesis, I am specifically interested in challenges associated with achieving energy savings in the built environment. The built environment consists of houses, buildings and the communities they form. Globally, buildings account for approximately 33 per cent of all of the energy consumed (International Energy Agency, 2012) and 8% of greenhouse gas emissions (International Panel on Climate Change, 2007). In Canada, they account for approximately 50 per cent of all energy consumed (Natural Resources Canada, 2009) and 11 per cent of greenhouse gas emissions (Environemnt Canada, 2012).

Over the next 50 years, Canada's population is predicted to grow by more than 55 per cent from 33.7 million to 52.6 million (Statistics Canada, 2010). In Metro Vancouver (2013), the most heavily populated area of British Columbia, the rate of population growth is expected to be even greater, almost doubling from 1.2 million to 2.2 million by 2041. For the built environment, this population growth means not only added pressure on the existing building infrastructure but major new building construction as well over the coming decades. As the lifespan of buildings crosses decades, achieving the level of energy savings in the built environment suggested by the IPCC and IEA will mean a concerted effort is needed to improve efficiency and conservation not only for new buildings but throughout the existing building stock as well.

One challenge of doing this in the built environment lies in the fact that the resources needed to utilize these technologies and practices are widely distributed among a highly decentralized and independent network of actors. Unlike the supply-side of the existing energy sector, where a small number of energy producers sell their energy to an even smaller number of transmission and distribution firms, the number of actors selling and buying technologies and services that influence how energy services are fulfilled in the built environment is enormous. In many ways, each community and each building within a community represents a unique node where ideas need to come together with the resources needed to build, change or maintain a built form. Once built actors living and working within these forms will then demand energy services[2]. Taken as a whole, these actors, institutions, and technologies represent what I call the built environment energy services

[2] For buildings, these ideas and resources flow from architects, developers, manufacturers, financial institutes, and trades people who contribute to building them, as well as the owners, managers, and service providers who maintain them. For communities, they flow from the local governments who are responsible for allocating and delivering a community's shared resources and services as well as the collection of consultants, service providers, municipal associations, more senior branches of government and interest groups that advise on and support them in the delivery of these services.

regime. To transform this regime to a super-efficient and low-carbon one will require the mobilization of resources toward these ends at each decentralized nodal point. Making things even more complicated is that for the most part each of these points is largely independent of the others. These market characteristics suggests that to achieve high-levels of energy and carbon reduction in the built environment some form of more distributed decision-making will likely be needed in addition to the centralized policy measures suggested in the IEA's (2012) report.

In addition to these market impediments, the economic, behavioural and cultural changes needed to make a successful transition are potentially enormous (Shove, 2003). Because of the degree of changes to well entrenched ways of doing things, a strong resistance to these changes is likely. Given the market, cultural, and political challenges facing a transition to sustainable energy services, the long-term planning and decision-making processes used to steer the transition will be critical to its success. More specifically, I want to know: How should transformative energy efficiency and conservation be steered in the built environment?

1.3 Transformative Energy Efficiency and Conservation in British Columbia Canada

In the province of British Columbia (BC) two separate initiatives are accelerating the savings sought from energy efficiency and conservation measures in the built environment. The first is BC Hydro's aspirational target, announced in 2007, to meet all of its forecasted 40% increase in demand for electricity over the next 20 years with demand-side measures. This level of savings is consistent with the electricity intensity improvements for the United States that are used in the IEA's Efficient World Scenario. The second initiative is the Province's legislated commitment to reduce its GHG emissions by 33% of 2007 levels by 2020 and 80% of 2007 levels by 2050. The 2050 target is in line with the level of greenhouse gas reductions that the IPCC predicts are needed to stabilize a rise in global temperatures to between 2.0-2.4°C. Given the projected importance that carbon *and* energy intensity improvements will play in achieving such a long-term GHG reduction target, I can say that both of these targets imply radical reductions in the amount of energy that is used to fulfill energy-related services (such as illumination, heating, and mobility) in BC over the coming years.

Putting these targets into practice will require changes not only to individual day-to-day energy use but also to the technologies, and institutions that bound these behaviours. On the demand side, this means I need to build new dwellings with greater energy efficiency and, just as importantly, build neighbourhoods that are designed to reduce energy use and promote 'livability'. This includes building new buildings more densely (reducing energy needs), and building neighbourhoods that take advantage of integrated energy system delivery, and are designed to promote mixed use (live near where you work) and to promote walking, cycling and transit use, rather than private vehicle use. Where densification occurs, conjunctive development of shops and workplaces, and coordination with

alternative means of transportation (like walking, cycling and public transit) all have significant potential to influence energy use, particularly transport-related energy use (see, for example, Girling and Kellett, 2005; Condon, 2008). On the supply-side, neighborhood-scale densification also means it is more viable to operate district energy systems.

Looking specifically at BC's targets, Dusyk et al (2009b, p. 388) hypothesize that achieving the level of energy savings needed to achieve them will require not only transformational changes in the socio-technical systems within which energy services are fulfilled (e.g., buildings, communities, day-to-day practices) but also in the governance approaches used to try to achieve these changes:

> This type of transformative action requires shifts from discrete goals and initiatives to more integrative and systemic approaches, and from independently reducing energy use and throughput toward altering the development path and promoting sustainability.

To date, there is significant evidence to support the need for transformational changes in socio-technical systems to achieve the kinds of ambitious goals sought in British Columbia. However, there is little evidence-based research to support the argument that achieving these goals is also closely coupled with the governance approach used to try to achieve these reductions. As such, it is the intention of this thesis to provide a preliminary evidence-based answer to the following research question:

> Do transformative levels of energy savings and intensity improvements also require more integrative and systemic approaches to energy governance?

By integrative and systemic approaches to energy governance I mean a more networked and emergent approach to how and by whom energy resources are planned, developed and used. To answer my research question, I will take an in depth look at the efforts being taken in British Columbia to achieve the ambitious carbon and energy intensity reduction goals set by the Province and BC Hydro. What I am particularly interested in are the governance approaches being used and the type of outcomes that these approaches are leading to. However, given the existing uncertainty as to whether or not achieving transformative energy efficiency and conservation (TEEC) involves a dual transition of socio-technical and governance systems, for the time being I will limit my definition of TEEC to the socio-technical aspects of this transition (as described above).

Looking more closely at British Columbia, the need to approach energy efficiency planning differently in light of the ambitious objectives discussed above was recognized to a certain extent by

the adoption of a multi-level energy efficiency and conservation strategic framework by BC Hydro in 2007 and a "market transformation" energy efficiency policy strategy by the BC Ministry of Energy and Mine's in 2005 and again in 2008. Unlike conventional resource acquisition oriented demand side management (DSM), which primarily tried to motivate individual-level technological or behavioural change (e.g., information and incentives for high efficiency lighting), these new approaches seek to permanently change market conditions and social norms (e.g., phasing out inefficient lighting in the market and society); the aim of these measures is to influence entire ranges of energy use options in order to bias the decisions made by groups of individuals (e.g., developers, manufacturers, business, residential consumers) toward energy conservation and efficiency.

Although the level of activity in BC is very encouraging, it is difficult to know how effective these efforts are in terms of expanding the number and type of transformative energy savings measures that are being explored, developed and implemented in the province. Because the efforts to achieve these long-term goals are still in a relatively early phase of development, my focus here on the underlying activities being taken to achieve energy and carbon reductions rather than on measuring the reductions themselves (e.g., energy savings and greenhouse gas emissions). This is important to know because without the capacity to coordinate a major ramp up of market and societal energy savings measures over the next decade, it is unlikely that the ambitious long-term targets of the BC government and BC Hydro will be realized. Given the level of energy savings sought from BC's built environment, I ask the three guiding research questions:

1. How well is the existing built environment energy services regime working to achieve the transformative energy efficiency and conservation objectives set out by BC Hydro's long-term DSM Strategy and the Province's 2020/50 climate change goals?

2. From a governance perspective, what is preventing or at least slowing transformative energy efficiency and conservation in B.C.?

3. How might the energy efficiency and conservation governance regime be organized to increase the capacity of agencies to achieve transformative energy efficiency and conservation in order to increase the likelihood of achieving BC Hydro's and the Province's long-term transformative EEC objectives?

In the section that follows I show the path that I have followed to help me find evidence-based answers to my research questions.

1.4 Description of the Thesis

In Chapter 2 I review literatures of sustainability, structuration, socio-technical change, and sustainability governance to help me develop a better understanding of the dynamics affecting socio-technical transformations as well as approaches to try to influence the outcome of these instances of change. Through this review, I come to understand enduring transformative change as both a horizontal exercise of building and expanding innovative arrangements of sustainability ideas and authoritative and allocative resources (i.e., niches), as well as a vertical exercise of prompting change by gaining legitimacy and structural support for these innovative niches and scaling them up over time by increasing their structural pervasiveness. In terms of efforts to steer this process toward sustainability I make a distinction between two approaches to governance – modernist governance and reflexive governance – and develop the hypothesis that the latter is more appropriate for steering transformational change toward sustainability.

In Chapter 3, I develop a generic evaluation framework to carry-out a theory-based evaluation for assessing the effectiveness of existing governance approaches to steer transformative change in places where sustainability transitions are trying to take root. The framework uses the conditions that I argue in Chapter 2 are critical for supporting transformative change in socio-technical systems. Critical conditions identified include system pressures bearing on the regime; the formation of a socio-technical niche; the capacity of this niche to create a shared vision among its membership, build legitimacy, and mobilize resources; the creation of innovative sustainability systems through the creation of new knowledge, the formation of niche-markets, and advocacy; and a strategic capacity to not only scale-up niche innovations beyond the realm of niche markets to that of the regime but to also increase its powers in order to continue to expand its activities. More specific to this thesis, the framework will be used in Chapters 6 and 8 to assess the effectiveness of efforts in British Columbia to steer transformative energy efficiency and conservation between 2006 and 2012. I use a theory-based evaluation approach as opposed to one based on the physical outcomes of efforts to steer TEEC to date because the early phase of change that these efforts are currently in means that their physical impacts have not yet had sufficient time to be experienced.

Next, in Chapter 4, I provide my rationale for using a case study method and describe in detail the research methods used to collect data. Using a mixed-method approach (observations, interviews, and document analysis), the data were collected between September 2007 and January 2013 with the qualitative summary of these data presented in Chapters 5 and 7.

In Chapter 5 I describe efforts taken by the Province of British Columbia to advance transformative energy efficiency and conservation in the built environment over a 10-year period, beginning in 2002 and ending in 2012. My description of these efforts is divided into three distinct policy phases: 2002-2006 ("dabbling with a market transformation"), 2007-2009 ("climate mania") and 2010-2012 ("shifting priorities"). In keeping with the thesis's multi-level perspectives of transformational change and power, each of these phases is in turn divided into three subsections: The Policy Landscape, The Energy Efficiency and Conservation Regime, and TEEC Niches in British Columbia. From this longitudinal and multi-level description, I identify both the sources and responses to transformative change that the Province faced over the past decade.

In Chapter 6 I assess the efforts of the Government of British Columbia to advance transformative energy efficiency and conservation (TEEC) in the built environment as described in Chapter 5. My assessment is based on conditions found to support transformational change that were developed in Chapter 3. After assessing the state of each of the framework's eight conditions in turn, I provide an overall assessment of the system's current capacity to steer such a change, allowing me to answer the thesis's first research question (at least as it pertains to the Province): How well is the existing built environment energy services regime working to achieve the transformative energy efficiency and conservation objectives set out by BC Hydro's long-term DSM Strategy and the Province's 2020/50 climate change goals?

In Chapters 7 and 8, I use the same method as that followed in Chapters 5 and 6 to describe and assess efforts taken by BC Hydro to steer TEEC from 2005-2012. Similar to the Provincial case study, my description of these efforts is divided into three different periods: 2005-2006 ("ramping up demand-side measures"), 2007-2009 ("The New Climate Agenda"), and 2010-2012 ("Vision Quest"). A considerable amount of the description focuses on the activities that took place around an internal TEEC policy-niche created by BC Hydro in 2006. The nuclear of this niche was the stakeholder Energy Efficiency and Conservation Advocacy Committee which met multiple times each year between 2006 and 2012.

In Chapter 9 I answer the remaining to research questions. First, from a governance perspective, what is impeding the pursuit of transformative EEC actions in B.C.? To answer this question I will analyze the regime data described in Chapters 5 and 7, to see if and where it explains the assessment results from step three. To do this, I identify the hard-governance infrastructure used by each of the efforts to steer TEEC and then analyze how these infrastructures influenced TEEC outcomes. Based on this analysis I then develop 15 evidence-based proposition to answer the thesis's third major research question: How might the regime be organized to remove or circumvent these

barriers in order to increase the likelihood of achieving BC Hydro's and the Province's long-term TEEC objectives?

In the thesis's final chapter, as a way of summarizing the thesis's findings, I present my answers to the thesis's major research questions asked in Section 1.3 of this chapter. I then discuss the thesis's theoretical and applied contributions before concluding with suggestions for future research.

Chapter 2: The Governance of Socio-Technical Transitions toward Sustainability

2.1 Introduction

This chapter presents the rationale for using a sustainable transition governance approach for conducting research on the intentional transformation of large-scale socio-technical systems *toward sustainability*. The idea of transforming socio-technological systems as a path to sustainability is a relatively new one. It emerged from two separate streams of academic questioning in the late 1990s (e.g., Berkhout F., 2002). The first was a growing dissatisfaction with the ability of discrete technological solutions to address persistent sustainability issues. The second was the application of an institutionalist lens to the phenomenon of technological change (René; Kemp, Schot, & Hoogma, 1998; Rip & Kemp, 1998). This perspective led researchers to view technological change not as isolated event but as ones that emerges out of webs of co-evolving structures and actors, operating at different levels of influence: micro (discrete technologies), meso (socio-technical systems), and macro (societal). By the beginning of the 2000s, the Dutch government started to look seriously at intentional socio-technical systems innovation as a key strategy to realizing its ambitious long-term *sustainability goals*, particularly in the field of energy (René Kemp & Loorbach, 2005; René Kemp, Rotmans, & Loorbach, 2007; Kern & Howlett, 2009).

Over the past decade a robust transitions research community has emerged, originally in the Netherlands but increasingly in numerous other countries as well (particularly the United Kingdom and Germany) (Sustainability Transitions Research Network, 2013). This body of work is concentrated in two areas of research: understanding socio-technical systems and their patterns of change and the governance and politics of socio-technical change. In addition to these literatures, critical to understanding the dynamics of transitional change is the relationship between agents hoping to achieve change and the governance structures within which these efforts are embedded.

With this in mind, the thesis's conceptual framework is drawn from i) sustainability studies; ii) structuration theory, iii) socio-technical transitions, and iv) sustainable transition governance.

2.2 Overarching Paradigms

Before I build my concepts of socio-technical transitions and sustainability governance, I will first present the two theoretical paradigms that I use to view them with. The first paradigm, procedural sustainability, is intended to help the reader place my perspective of transitions within the broader sustainability literature. The second, structuration theory, is included here as a conceptual tool to help me work through the seemingly self-contradictory idea of simultaneous patterns of social stability and change in which sustainability transitions are deeply set.

2.2.1 Procedural Sustainability

This dissertation is couched within the idea of sustainability. Probably the most commonly cited definition for sustainability is from the World Commission on Environment and Development's (WCED, 1987, p. 43) report, Our Common Future. According to this report, "[s]ustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Although the commission's report states that no single blueprint for sustainability exists, it does conclude that both economic growth, which adheres to the "broad principles of sustainability", and the provision of equitable opportunities are essential elements of any plan.

The WCED report, commonly known as the Brundtland Report, is certainly not without controversy. Common criticisms of the paper include that it provides too vague a concept of sustainable development; its places too much reliance on continued economic growth and technological efficiencies; it fails to address alternatives to industrial development; and it is a tool intended to reinvigorate centralized technocratic approaches to development (J. Robinson, 2004; Sachs, 1999). Despite the reports apparent shortcomings, it is important to this discussion because of the significant influence it has had on the issue of sustainability since its release.

In line with ideas developed within and after the release of *Our Common* Future, (such as John Elkington's (1997) three-legged stool concept of sustainability), Robinson and Tinker (1997) suggest that sustainability is based on the mutual attainment of three broad imperatives:

- The *ecological imperative* is to stay within the biophysical carrying capacity of the plant.
- The *economic imperative* is to provide an adequate material standard of living for all, and
- The *social imperative* is to provide a system of governance that propagates the values that people want to live by.

Taken as whole, these imperatives are intended to ensure that anthropological activities do not exceed the biophysical capability of the earth to support a sufficient material standard of living for *all* humans, nor do they jeopardize the values by which they choose to live. Implicit within this definition of sustainability is the idea that such a sustainable balance between these three imperatives is not only desirable but possible (J. Robinson, 2008). This in turn has led to extensive efforts to identify what the "global" parameters of sustainability are. In a study of the different perspectives of sustainability held by leading sustainability "scientists", Miller (2013) refers to this view of sustainability as universalist or thin sustainability.

Although these universal concepts of sustainability are fine at one level of consideration, in practice, sustainability is ultimately defined and pursued at the local level. As such, Robinson (2008) argues that in addition to these more universal "substantive" definitions of sustainability, there are

countless local definitions of it as well which are developed through procedural exercises of learning about and trying to work out what it means to be sustainable.

This many perspectives view of sustainability is in keeping with a line of argument that sees sustainability as an "essentially contested concept" (Jacobs, 2006). An essentially contested concept is one where there is a general agreement about its importance and appropriateness in society but in its application must rely on a shared normative understanding of it as it can never be fully realized or objectively defined (Gallie, 1956). Art, justice, and democracy are all examples of essentially contested concepts. As a way of demonstrating the appropriateness of placing sustainability within this order of concepts, Connelly (2007) cleverly mapped out many of the contesting interpretations of "sustainable development" . The point of his exercise was not to write-off discussions about sustainability as pointless but rather to keep conversations about sustainability going which might otherwise shut down out of frustration or disagreement. Working from this premise, Ehrenfeld (2008, p. 2) suggests that the closest we might be able to come to a shared definition of sustainability is that it is "the possibility that human and other life will flourish on the Earth forever".

With this contested perspective of sustainability in mind, Robinson offers a "procedural" definition of sustainability as "the emergent property of a conversation about desired futures that is informed by some understanding of ecological, social and economic consequences of different choices" (J. Robinson, 2004; J. Robinson & Tansey, 2002; J. B. Robinson, 2003, p. 381). Sustainability, then, is something that emerges out of practice. It is a socially constructed idea that is built, maintained, and changed through countless and ongoing interactions between local actors, scientists and other experts, as well as other actors with an interest at stake.

However, it is important to also not lose sight of more universal dimensions of sustainability as well. Indeed, in a summary of established basic ideas about sustainability since the release of the Brundtland Report (at least as they pertain to sustainability assessment), Gibson (2006, p. 172) includes the insight that "[t]he notion and pursuit of sustainability are both universal and context-dependent". As such, bridging the gap between the universal and the local is an ongoing theme of sustainability studies (Miller, 2013; Wiek, Ness, Schweizer-Ries, Brand, & Farioli, 2012). In terms of how this knowledge is bridge, Miller (2013) identified two general approaches of linking knowledge to action: 1) The "knowledge first" approach which emphasizes actions based on the development and general diffusion of scientific knowledge (e.g., Cash et al., 2003) and ; 2) The "process-oriented" approach which actively involves itself in and conducting research on social and technological processes (e.g., Loorbach, 2007; J. B. Robinson, Burch, Talwar, O'Shea, & Walsh, 2011; Rotmans, Kemp, & Van Asselt, 2001). Rather than a one way pipe, the objective of science in this light is to create new knowledge with those people involved in and directly affected by decisions-making

Regardless of the approach used, an important word of caution is that although such universal inputs and even participation can help to create more sustainable knowledge about a local issue, key considerations will still boil down to local specific factors (e.g., ecosystem, institutional capacities, and public preferences). Science, in other words, is an important but not the only input into how sustainability will be defined and acted upon. So while research and debates can and should continue about the sustainable balance between social, ecological, and economic imperatives, from a practical perspective, then, sustainability is a normative concept that will emerge from the local.

2.2.2 Structuration Theory and Transformational Change

In this section, I develop the theoretical lens of transformational change that I will use to address the concepts of socio-technical transitions and sustainability governance. To do this, I start with Anthony Giddens' (1979, 1984) structuration theory which was developed in the field of sociology to explain the relationship that exists between social structures and human agency. The underlying premise of this theory is that although structures influence the actions taken by actors, actors, by exercising their agency, also reinforce, influence and change structures. The term Giddens gives to this back and forth relationship is duality. According to Giddens, in order to understand the process of building, reinforcing and changing structures, (what he calls *structuration*), one must look to the places where actors interact both with one another and with structures.

In structuration theory, a "structure is regarded as the rules and resources recursively implicated in social reproduction" (Giddens, 1984, p. xxvi). By this definition, the application of rules and resources by social agents as they carry out their day-to-day social activities is central to the constant recreation of structures. Rules for their part are conceptualized as 'normative elements' which sanction modes of social conduct as well as a deeper set of 'codes of signification' which relate to our constitution of meaning.

In a review of Giddens' structuration theory, Sewell (1992), makes the case that the term "rules" is too easily misinterpreted to mean formal rules such as regulations and standard operating procedures (he argues that formal rules are better represented as a resource). Instead he proposes that the concept of *schemas* – the informal and not always conscious cognitive patterns, metaphors or assumptions that people use to explain complex reality and personal experiences – comes closer to what Giddens' argues for.

Resources, the second major structural category, is similarly broken down by Giddens (1984, p. xxvi) into two types: "authoritative resources, which derive from the co-ordination of the activity of human agents" and "allocative resources, which stem from control of material products or of aspects of the material world". Structures, then, are created only when schemas and resources mutually reinforce and sustain one another over time. Maintaining structures, then, is done by

maintaining the mix of rules and resources that recreate them. By the same logic, structural change is realized when a new mix of rules and resources are created and then recreated over time.

Actors are the second main component of structuration theory. Central to the idea of actors is the notion of agency. Agency is "the capability of the individual to 'make a difference' to a 'preexisting' state of affairs or course of events. An agent ceases to be such if he or she loses the capability to 'make a difference', that is, to exercise some sort of power."

But how do actors become agents? According to Sewell (1992: page number) "agents are empowered by structures, both by the knowledge of cultural schemas that enables them to mobilize resources and by the access to resources that enables them to enact schema". Actors, in other words, become agents when they are able to activate structures to achieve a particular outcome. Resources are activated when an actor uses things such as money, personnel or tactics to achieve a certain outcome. Schema, meanwhile, are activated through the use of argument and persuasion. Arts and Tatenhove (2004) call the effective use of resources and schema, an agent's organizational and discursive capacity. This capacity implies a kind of horizontal relationship between actors, resources and schema, and their capability to make a difference.

In the above paragraph we see how structuration theory links power to agency. Agency implies a kind of horizontal flow of power because the agent's capacity to act is determined in part by her ability to align and activate resources and schema. Power, however, can also be the capability to unwittingly constrain the actions of others (Callon & Latour, 1981; Lukes, 1974). This speaks to a more hierarchical dimension of power. What Latour and Callon (1981) call 'black boxes": the things that are no longer questioned because they are taken-for-granted. In the first explanation of power provided above, power is afforded to agents and in the second is afforded to structures. Giddens attempts to bridge this gap by arguing that although structures bind what we do, they also provide the context in which change is able to take place. From the perspective of structuration theory, then, structures can both constrain and enable agency.

Finally, linking actors to structures is what structuration theory refers to as interactions. Interactions are understood as the broad range of contexts where actors, drawing upon rules and resources, interact with one another (Giddens, 1984: 26). It is through these interactions, which are themselves informed by sets of structures, that actors go about the work of building, maintaining, or changing structures. It is through these interactions, in other words, that structures become dynamic.

Bringing all of these pieces together, Arts & Tatenhove (2004, p. 347) provide the following definition of power:

> Power is the organisational and discursive capacity of agencies, either in competition with one another or jointly, to achieve outcomes in social practices, a capacity which is however co-determined by the structural power of those social institutions in which these agencies are embedded.

This multi-dimensional perspective of power has long history in the social sciences (e.g., Clegg, 1989; Dyrberg, 1997; Giddens, 1984; Lukes, 1974; Weber, 1964). To try to capture this co-determinant relationship, a number of theorists have argued that it is useful to think about structures as three nested levels of influence with structural determinacy increasing with each successive level (e.g., Arts & Tatenhove, 2004; Clegg, 1989; Dyrberg, 1997; Healey, 2006a; Ostrom, 2005).

The first level reflects the episodic interactions that take place between agents who consciously exercise their resource and discursive capacities to attempt to achieve particular outcomes. This represents the space where decisions are made, policies and programs developed, and new ideas explored. Arts and Tatenhove (2004) call this the site of 'relational power'.

The capacity of agents to influence the outcome of these interactions, however, is not shared equally among the actors participating in them. This is because the collectively organized rules-of-the-game under which these interactions take place and the disproportional distribution of allocative and authoritative resources means that some agents will be positioned more favourably than others in these interactions not because of personal attributes but because of organizational ones. Arts and Tatenhove (2004) call this dispositional power to reflect the way that organizational structures routinize how and what agents interact with each other in different types of settings. This has the effect of structurally reinforcing the relational power dynamics that exist within these episodic interactions.

The third level of power reflects the broadly accepted cultural norms and values that shape the nature and conduct of agents. Arts and Tatenhove (2004) call this structural power, more commonly thought of as 'culture' (Healey, 2006b; Ostrom, 2005).

The three-levels are highly interdependent and interact simultaneously with one another. Through the back and forth interactions of agents agency, power, and structures change over time. However, the rate of change is argued to differ for each level, with relational-level changes taking place relatively rapidly, organization-level changes over a more moderate timeframe, and cultural level changes occurring over very long-term periods of time (i.e., decades) (Arts & Tatenhove, 2004; Ostrom, 2005).

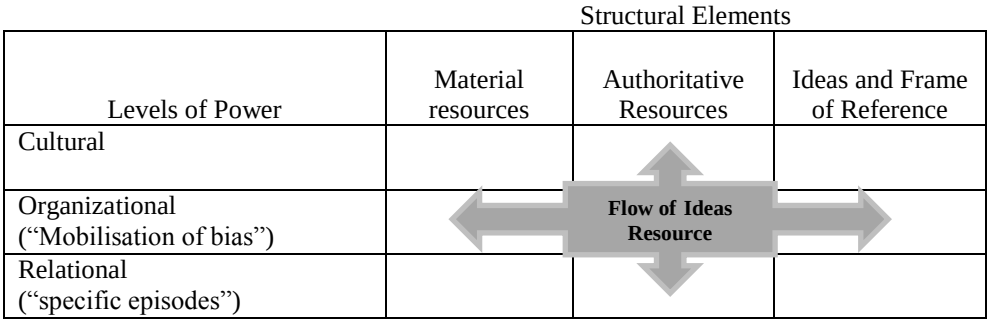
A Multi-Level Perspective of Transformational Change

Working with Giddens' structuration theory and the multi-level perspectives of power discussed above, Patsy Healey (2003) developed a multi-level framework to explain transformational change in local urban governance processes. In Healey's framework, the three structural levels of power are called: specific episodes, which represent the spaces where day-to-day human interactions take place (relational-level power); the 'mobilisation of bias' in governance processes (organizational-level power); and culturally embedded assumptions and habits in governance cultures (cultural-level power). She is also careful to make a clear distinction between episodes of interaction, which align with commonly accepted regime governance processes, and what she calls "episodes of innovation", which do not align easily with commonly accepted governance processes. She also introduces the possibility of dual sets of dispositional powers: those that guide episodes of innovation and those that reinforce more routine episodes of interaction.

Next, Healey argues that each of the three levels of her framework consists of agents and "the binding flow of resources" that link agents and structures. Thee three types of resource flows identified by Healey are: the flow of material resources, the flow of authoritative resources and the flow of ideas and frames of reference, what Sewell (1992) calls schemas. When integrated together in a relatively stable pattern over time, these flows of resources form the structures that bind the actions and opportunities realized by different groups of individuals in particular places and times. To be transformational, she argues episodes of innovation must not only provide new ideas and frames of reference but they must also engage and eventually collaborate with actors in arenas that control material and authoritative resources. In such a way, new structures can emerge which may challenge existing regime-based governance processes.

Healey (2006b) adds, though, that building structures horizontally is not enough to sustain a transformation. To endure, transformative innovations must eventually scale up vertically to become organizational routines as well as reflect cultural assumptions about appropriate governance agendas and practices (See Figure 2-1). In this light, a transformation is both a horizontal exercise of building, securing, and integrating ideas and frames of reference with authoritative and allocative resources, as well as a vertical exercise of prompting change, building legitimacy and scaling up innovative arrangements of ideas and frameworks and resource flows. It is important to remember, though, that the relationship between levels is two-ways. Actors exercising their agency in episodes of interactions, in other words, can and do influence organizational processes and broader cultural structures.

While somewhat complicated, Healey's framework of transformational change, provides me with a dynamic theoretical framework to follow and identify the different actors, resources, and interactions that collectively make up transformational change efforts. As such, it will be used to guide my look at both the multi-level perspective of socio-technical transitions (Section 2.3) and transition governance (Section 2.4).



(adapted from Healey 2006)

Figure 2-1 Healey's Framework of Transformational Change

2.3 A Multi-Level Perspective of Socio-Technical Transitions

In this section of the chapter, I first present the idea of the multi-level perspective (MLP) of change as an overarching concept of the patterns of transition for socio-technical systems. Following this general overview, I next use the language of structuration theory to give a more detailed understanding of what is taking place within transitions. Finally, armed with a fuller understanding of the nature of socio-technical transitions, I suggest a conceptual framing of the underlying conditions needed to support socio-technical transitions.

Looked at in its simplest form, a socio-technical system is an arrangement of technological artifacts, institutions i.e. rules and routines, and actors that together make up societal functions such as transportation, energy, housing, and health care (Frank W. Geels, 2004). In recent years a theory called the multi-level perspective (MLP) has been developed to explain historical patterns of transformational changes in large socio-technical systems (Frank W. Geels, 2004; Frank. W. Geels & Schot, 2007; Rip & Kemp, 1998).

The MLP consists of three nested levels: the landscape, the regime, and niche. At the centre of the MLP is the socio-technical regime; it represents the dominant way that a particular societal function is delivered. Large-scale, centrally generated electricity from hydroelectric, thermal and nuclear sources is an example of a dominant energy regime.

A level up from the regime is the landscape which represents the broad arrangement of cultural norms, technological infrastructures, and biophysical systems that together shape our collective notions of what a societal function is and how it should be delivered. Continuing with my energy example, landscape variables include large-centralized infrastructures (at least for electricity and natural gas); expectations about energy that it be affordable, reliable, easily accessible, safe, and, increasingly, clean from a greenhouse gas perspective; and biophysical factors that range from the local all the way up to the global.

The third level of the MLP, the niche, lies below the regime in the framework. The niche, like the regime, aims to fulfill a particular societal function but it represents an alternative way of delivering it to the existing regime. District energy (decentralized, locally generated and used energy) is one example of an alternative niche that is attempting to fulfill the same societal function as the large-scale and centralized electricity regime but in a significantly different manner.

Using the MLP as their backdrop de Haan and Rotmans (2010) introduce three patterns of socio-technical system change to describe and compare how socio-technical transitions take place: empowerment, reconstellation, and adaptation. Empowerment is a bottom-up pattern of change that takes place when a relatively small niche emerges or an existing one gains power and eventually presents itself as a strong alternative to the dominant niche. Reconstellation represents a top-down pattern of change. In this case, a new socio-technical arrangement or an existing one comes to prominence through strong landscape-level influences that exist outside of the regime such as government policy. The final transition pattern developed by de Haan and Rotmans, adaptation, takes place when the existing regime changes itself by either interacting or merging with other regimes or niches and in so doing is better able to fulfill its expected societal function. Although explained separately, De Haan and Rotmans (2010) are careful to point out that in reality these three patterns are intertwined with one another and play out simultaneously.

While the MLP provides a compelling overview of the overarching elements and patterns of socio-technical transitions, it provides few details of what takes place within each of these levels as a transition progresses. Without such knowledge it is difficult to know when, where and how one might be able to influence such a transition.

2.3.1 Looking Inside Socio-Technical Transitions

As discussed above, Geels (2004: 903) reduces the list of variables within a socio-technical system to three interrelated dimensions: technologies; human actors, organizations and social groups; and rules and institutions. As no single literature is expansive enough to satisfactorily explain all of the major elements that make up a socio-technical system, I have looked to literature in the fields of technological change, science and technology studies (STS), and new institutional theory (NIT) to

examine how each of these dimensions change and interact with one another to create a process of system innovation. Although each of these paradigms speaks more directly to one specific dimension of system innovation than the others (technological change to the technology dimension; STS to the human actors, organizations and social groups dimension; and NIT to the rules and institutions dimension), they all share a perception of change as a dynamic process, filled with tension, competition and uncertainty. In addition, they also agree that system innovation is rare and represents a sharp break from the norm, which is characterized by a multitude of successive incremental changes to dominant system structures over long periods of time. Furthermore, these literatures, like the broader transitions literature, sees system innovation taking place over four major phases: destabilization, take-off, acceleration, and stabilization.

Destabilization signifies a period of rising tension for change within the existing socio-technical system which until this point in time was relatively stable. The change literature shows that pressure for change is usually driven by some kind of shift in the regime's environment rather than from within e.g., a disruptive scientific or technological finding (Anderson & Tushman, 1990; Freeman & Louçã, 2001), a shift in cultural values with respect to how the regime should function (Callon, 1991) or a shift in the governing political agenda (Oliver, 1992). When this happens the regime is forced to seek a new way of doing things which will realign it again with its environment. If it fails to adapt to its new environment, its risks being replaced by one that can. While pressure from the external environment is the more typical way for a regime to become destabilized, persistent internal constraints that hinder its continued development may also cause regime actors to seek new arrangements. Such constraints are dubbed "reverse salients" by the large technical systems literature (Hughes, 1983).

Take-off begins when action is taken to develop alternative socio-technical arrangements that are intended to challenge the now destabilized system. This phase is typified by accelerated innovation and a strong sense of competition between alternatives that are all seeking to be legitimized as a viable solution to addressing the regime's existing system-level troubles. In the early stages of fermentation there is a high level of diversity both in terms of proposed solutions and actors, a period that Grübler (1998:51) refers to as a "chaotic 'snake pit'". As the stage matures the number of competitors begins to diminish as certain solutions are deemed less viable than others.

During this phase of change, alternatives compete according to their technological and economic merits (Anderson & Tushman, 1990; David, 1985) as well the ability of actors to build and convince others of a desirable vision around them (Bijker & Law, 1992; Callon & Latour, 1981; C. R. Hinings, Greenwood, Reay, & Suddaby, 2004). Furthermore, alternatives arrangements may come in many different types and sizes. For example, it could be a discrete regime component (i.e.,

technology, institution, or actor arrangement), a subsystem of the regime, or even an alternative regime. Transitions, then, should not be thought of as fixed in terms of space or geography (Rotmans & Loorbach, 2010) - what seems stable at one level may be considered unstable when looked at from another level.

Regardless of the scale or source of change, competition in the take-off phase centres on legitimizing one set of claims over another. From a technological change perspective, these claims can be objectively determined on the laboratory floor and marketplace. A science and technology studies perspective, meanwhile, argues that the viability of one solution over another is a socially constructed "fact" that is subjectively created through legal (Bowker, 1992), political (Bruhèze, 1992; Law & Callon, 1992), and industrial arenas (Bijker & Law, 1992; Misa, 1992). However, it is important to point out that, whatever, one's perspective on change, the level of social determinism of socio-technical change is tempered to a certain extent by the technologies (Grübler, 1998; Hughes, 1983, 1994; René Kemp, 1994; Rip & Kemp, 1998) (1983, 1994) and institutions (Cooper, Hinings, Greenwood, & Brown, 1996) that precedes it .

Take-Off gives way to *acceleration* when all but a very small number of alternative socio-technical arrangements remain to compete for dominance with one eventually emerging as the new standard. As a standard becomes increasingly established structural type changes within the regime become much more evident and are adopted at an accelerated rate as the process of learning, diffusion and embedding of new ways of doing things gains momentum. The stakes at this point are very high as only one solution will eventually be adopted as the new standard. As such, the focus of actors operating in the acceleration phase of system change shifts from developing and legitimizing new ideas and innovations to gaining key political, social and institutional support for what is now a mature alternative solution (Anderson & Tushman, 1990; Bijker, 1992; C. R. Hinings et al., 2004).

The fourth and most enduring phase of system innovation is *stabilization*. Stabilization develops as the consensus around what constitutes the system's standards strengthens and eventually becomes a taken-for-granted socio-technical arrangement. Innovation still takes place within this phase but it is incremental in nature, enhancing specific components of the existing socio-technical system rather than developing more radical alternatives to it. Unlike the three phases that precede it, where actors play an active role in constructing technological, institutional and organizational structures, this phase is largely driven by durable structures that bound agency (Callon & Latour, 1981; DiMaggio, 1988; Latour, 2005; Nelson & Winter, 1982). Stabilization ceases when the system is destabilized, opening it once more to disruptive economic and performance opportunities and systemic inconsistencies and controversy.

When I bring this review of socio-technical transitions back to the multi-level perspective of power developed in Section 2.2.2, we can now see how many of the elements at play in each of the four phases of socio-technical change fit within this multi-level and multi-resource view of structures (See Table 2-1). Most of the sources of increasing regime tension experienced in the predevelopment phase come from co-evolving, culturally-based structural powers that emanate from the landscape-level such as the relative change in the price of goods or processes (material resource flow), shifts in political policy direction (authoritative resource flow), or changing public sentiments about the appropriate impacts of an activity (ideas resource flow). These landscape-level changes prompt a response by niche-level actors to develop innovative ideas and attempts to align these ideas with the authoritative and allocative resource flows that are needed to bring them to fruition. Countering these episodes of innovation, though, are the regime-based organizational powers that continue to reinforce not only its existing physical and institutional structures but also the regime's underlying assumptions about how a societal-function should be fulfilled. Grin (2006) calls this tendency for the structures of incumbent regimes to resist non-incremental change "fight back". To overcome this resistance, niche actors rely on their relational powers to interact strategically not only with one another but also through multiple higher-level arenas in order to gain legitimacy and to try to better align landscape and regime resource flows with those of the niche.

From this description above we can see that a central element to socio-technical transitions is power, both the power to change and the power to resist change. In this light, Avelino and Rotmans (2009, p. 562), propose a power-centric definition of transitions:

> [W]e redefine a transition as a long-term and non-linear process in which deconstructive and constructive forms of power are exercised in such a way that old resources are replaced with new resources and a new distribution of resources is established at a societal level.

By looking into the black box of transitions, then, we see that any effort to steer a socio-technical transition will need to address multiple dimensions of power. If transformational change is indeed what is sought, efforts to steer this change need to ensure that the agency to create the desired change is enabled not only within innovation niches but also by the organizational and cultural structures within which they are embedded.

In addition to this more general point of consideration for transitions efforts, there are also a couple of lessons specific to sustainability transitions that I can draw from this look inside the multi-level perspective.

Table 2-1 A Multi-level Perspective of Power In Socio-Technical Transitions

		Structural Elements		
Socio-Technical Level	**Type of Power**	**Authoritative Resources**	**Material Resources**	**Ideas & Frames of Reference**
Landscape	Cultural	The web of political, legal and social knowledge, practices and institutions that shape how a societal function is fulfilled.	The web of economic conditions, technologies and infrastructures that shape the direction of material resources used to build and maintain societal functions.	Widely held cognitive beliefs about how different societal functions should be fulfilled.
Regime	Organizational	Regime-based positions of authority, expertise, and regulative and normative institutions that are reinforced through recursive day-to-day routines and assumptions.	Regime-based technologies, infrastructures and finances follow a path-dependent flow.	Regime-based discourses that supports the dominant system vision and values that are empowered by the flow of authoritative and material resources into structures reflecting these visions and values.
Niches/Episodes of Innovation	Episodic	Niche actors attempt to create new regulative and/or normative standards that align with innovation through interactions in legal, political and industrial arenas.	Niche actors attempt to create economic and qualitative superiority through laboratory and marketplace interactions.	Niche actors attempt to build legitimacy and consensus around alternative vision through interactions with landscape and regime actors.

To start is the issue of scale. Each of the three literatures that I reviewed distinguished between at least two orders of change in socio-technical systems: first order change that reflects change that takes place within an existing regime (i.e., the arrangement of technologies, actors and institutions that make up a societal function); and, second order change represents a shift to an alternative regime. Until relatively recently, efforts to achieve sustainability focused largely on finding first-order solutions. However, in recent years, more and more emphasis is being placed on the need to realize second-order change (Berkhout F., 2002). If the stakes of sustainability efforts increase, so too will the number of stakeholders who have the potential to be affected. Not surprisingly, then, Smith et al (2005, p. 1497) see the issue of sustainable socio-technical transitions as fundamentally a question of power: "[t]he greater the extent to which pressures for a particular form of change diverge from the norms and rules of the incumbent regime, the more acute becomes these issues of power". By this they mean the organizational power of the regime that is embedded

and reinforced through its authoritative and material resource flows, as well as its underlying ideas and frames of reference.

Finally, sustainability transitions need to be considered with a perspective of co-evolution. Based on their 250-year historical perspective of technological change, Freeman and Louçã (2001) stress that each major new wave of innovation eventually came to prominence not simply because of the economic opportunities new technologies presented but because they successfully co-evolved with broader economic and social movements. In other words, the emergence of a new technological innovation is in itself insufficient to lead to socio-technical systems change if it is not also intricately intertwined with appropriate social innovations. Given the broad scope of elements involved in socio-technical transitions, efforts to define and move toward more sustainable futures need to ensure that a similarly broad scope of change is taken into consideration. In the section that follows, I will look at the specific conditions that led to one sustainability-oriented niche, the renewable energy sector in Northern Europe, to address the challenges facing sustainability transitions.

2.3.2 Take-off of a Sustainable Energy Regime

Looking at the four phases of socio-technical transitions described above, we can see how the early efforts to steer transformative energy efficiency and conservation (TEEC) in British Columbia that were described briefly in Chapter 1 likely fall somewhere between the phases of "destabilization" and "take-off." As being able to answer how a TEEC transition should be steered is the primary objective of this thesis, I now take a closer look at one growing sustainability niche to see what lessons can be learned about the types of conditions that contributed to its success thus far.

The specific niche that I am going to look at is the renewable energy sector in Northern Europe whose emergence was well studied by Jacobsson and colleagues (Jacobsson & Bergek, 2003; Jacobsson & Bergek, 2004; Jacobsson & Johnson, 2000). According to these authors, a coordinated response was a key condition that allowed the renewable energy sector to develop its knowledge and technological know-how as well as to build the technical, social and political legitimacy that was needed to overcome resistance by the incumbent electricity regime which was at times intense.

Looking at what they call the "formative stage" of the transformation process (what I have referred to as the "take-off" phase), they found that four conditions in particular led to the industry's emergence and the eventual strengthening of the resources needed to respond to pressures exerted on it. These four conditions are: institutional changes, market formation, the entry of firms and other organizations, and the formation of technology specific advocacy coalitions. Each of these conditions acts as a positive feedback for the other three which if sustained can eventually propel an emerging regime beyond "take-off", toward "acceleration".

Institutional changes are needed to eventually align learning, search procedures by users and suppliers, economic incentives, and development priorities with the emerging regime. For example, in Germany institutional changes that gradually aligned renewable energy more closely with the country's broader energy system were early science and technology policies to induce a diverse range of 'knowledge creation' in renewables; financial incentives (most famously the electricity feed-in law (EFL)); and the streamlining of permitting requirements.

Although institutional changes were important to the gradual growth of a renewable energy market within Germany, the creation of a niche renewable market – first by standards and later by the EFL – was critical to the regime's development and proliferation. Without such protective measures it is unlikely that the regime would have been able to grow as rapidly as it did under the looming shadow of the country's incumbent nuclear and thermal regimes. The formation of a niche renewable market provided space for new learning, increased legitimization, expanding constituency, and improved economic performance.

The stability and opportunities created by the first two conditions encourages the entrance of new actors and organizations to an emerging regime. These actors bring with them an expanded set of knowledge and resources which further increases the regime's learning potential and economic competitiveness (Jacobsson & Bergek, 2004). Particularly important is the formation of 'prime movers' within the niche (Jacobsson & Johnson, 2000). Prime movers represent powerful actors or groups of actors who are able to promote the emerging socio-technical arrangement by building awareness about it, strengthening its legitimacy, making investments in it, and diffusing its technologies and practices across the supply network.

In addition to these economic benefits, the growing set of actors involved in Germany's renewable energy regime, along with other organizations such as environmental interests and supportive politicians added to the regime's overall social legitimization and strengthened its advocacy coalition. Although public support for the development of renewables has been historically strong in Germany, especially after the Chernobyl nuclear meltdown, the existence of a strong renewable energy advocacy coalition was critical to pushing forward increasing measures of institutional change and market formation. In their assessment of technological system transformation, Jacobsson and Bergek (2004, p. 821) contend that such "coalitions need to be formed and engaged themselves in wider political debates in order to gain influence over institutions and secure institutional alignment."

By putting both of these explanations of socio-technical transitions into the multi-level perspective of power developed in Section 2.2.2, I can now argue what broad set of horizontal and vertical conditions are needed to support transitions (see Figure 2-2). To start, pressures that are

largely created by changes in landscape structures, call the appropriateness of the existing socio-technical regime into question. This in turn can prompt a search for alternative arrangements by actors within the regime as well as in niches. However, these are not the only source of pressure. In addition to landscape pressures are the downward imposition of regime-level rules onto the niche as well as the upward push of different niche- and regime-level activities (e.g., advocacy, new knowledge, policy and technical innovations).

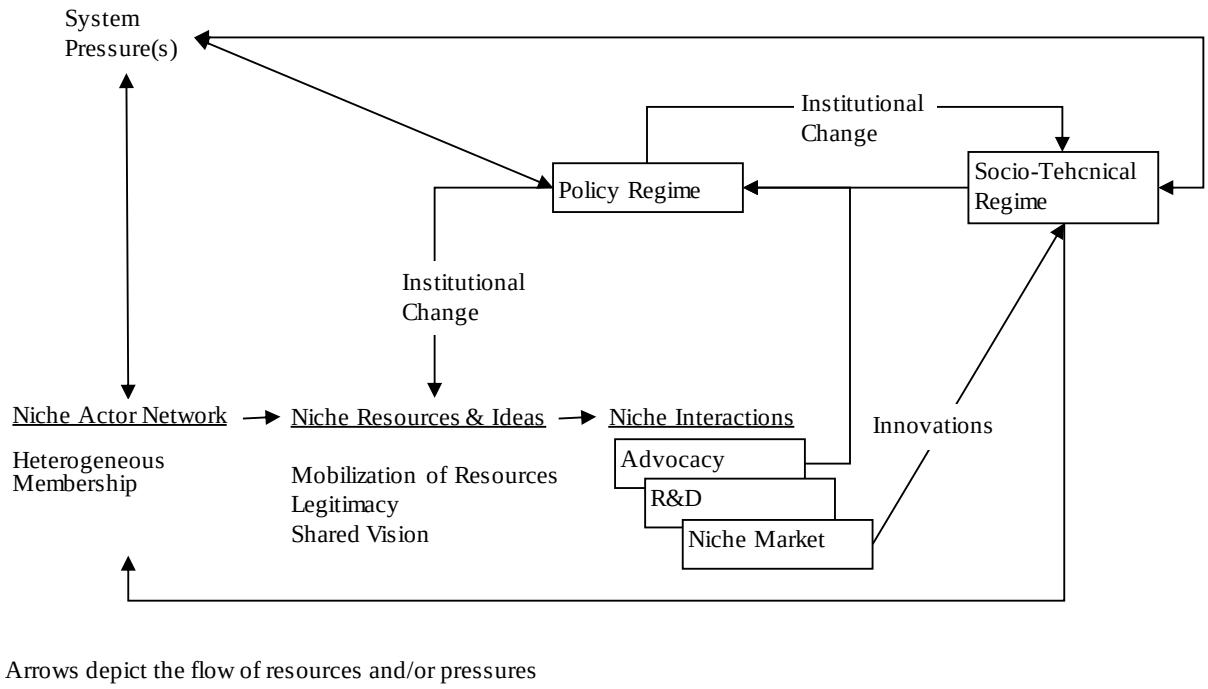


Figure 2-2 Analytic Frame of the Conditions that Support Socio-Technical Transitions

In terms of horizontal niche activities, the creation of new knowledge, the formation of niche markets and advocacy are critical niche-level activities. The carrying out of these activities is done by niche actors who through their access and capacity to coordinate a shared vision, build legitimacy and mobilize resources are able to achieve desired outcomes. Niche actors and resources may come from within and/or outside of the existing regime. The capacity of these actors to coordinate desired outcomes is enhanced by a heterogeneous membership. The niche, however, does not exist in isolation. How these activities are carried out and by whom will be at least partially influenced by the degree and type of support the niche receives from the regime- and landscape-levels. However, to be successful, transition agents must not only demonstrate a capacity to create innovative sustainability

structures and advocate for institutional changes, they must ultimately demonstrate a strategic capacity to scale-up niche innovations beyond the realm of niche markets to that of the regime.

2.4 Sustainability Transition Governance

Governance is used in many different ways within the academic literature. Rhodes (1996), for example, identifies six separate uses for the term: the minimal state, corporate governance, the new public management, 'good governance', a socio-cybernetic system, and self-organizing networks. Mayntz (2003), meanwhile, traces the genealogy of the term through three stages: a top-down perspective of 'steering' in the 1960s and 70s, 'modes of governance' (e.g., hierarchical, market & networks) in the 1980s and 90s and a network perspective of steering collective goals as an emerging interest at the turn of the 21st century. My use of governance comes closest to the network perspective of steering as described below by Roseneau (2003, p. 13) as it, in essence, encompasses the other two:

> [T]he core of governance involves rule systems in which steering mechanisms are employed to frame and implement goals that move communities in the directions they wish to go or that enable them to maintain the institutions and policies they wish to maintain. Governance is not the same as government in that the rule systems of the latter are rooted in formal and legal procedures, while those of the former are also marked by informal rule systems.

Healey (1997), argues that governance involves two critical roles. The first is outcome oriented (e.g., the development of policies, programs, social movements,, product and practice development, and technological innovation), what Roseneau calls goal implementation; the second is articulating the purpose of governance and making strategic decisions about the direction to take and key actions to get there, what Roseneau calls goal framing. Supporting both of these roles is the analysis of the issue being addressed.

In addition to defining governance by its outcomes, Healey (1997) also differentiates between 'hard' governance infrastructures and "soft" governance infrastructures. Hard governance infrastructures are the cultural and organizational level structures that were discussed in Section 2.3. "Soft" governance infrastructures, meanwhile, are the actual episodic spaces and places where decisions are made by actors who interact with one another in a manner that is consistent with hard governance arrangements, rules and resource flows. Roseneau's (2003) explanation of governance largely reflects a 'hard infrastructure' perspective. By also thinking about governance as decision-making processes which are embedded within hard institutional and resource structures, Healey argues that it is easier to reveal how higher-order structural powers bind the interactions and agency of actors operating within soft governance processes.

By way of example, if I link these ideas of governance back to the understanding of sustainability that I developed in Section 1.2.1, we can see how ideas about the processes that are used to derive and pursue local definitions of sustainability – normative goal setting, knowledge creation through negotiation, emergence, integration and participation - are reflective of a hard governance infrastructure. These hard governance structures, meanwhile, are intended to "bind" actors operating at the local level toward certain kinds of sustainability-oriented interactions. These interactions reflect procedural sustainability's soft-governance infrastructure.

Although this example demonstrates the governance characteristics of procedural sustainability, it tells me little about where it sits within the broader sustainability transition governance literature. To help situate it, in the remainder of this section I take a detailed look at two approaches to sustainability governance: modernist sustainability and reflexive sustainability.

2.4.1 Modernist Governance

The modes of governance most commonly associated with advanced industrial societies are hierarchy and market. Prior to the 1970s, "government" was traditionally viewed as a strong and unified, centralized, bureaucratic hierarchy which, looking out for the welfare of its populace, autonomously planned and delivered universal social policies to the citizenry (Merrien, 1998). Operating parallel and more or less independent of government was the market which, motivated by self-interest and the pursuit of profit maximization, produced and delivered the goods and services to the marketplace that the government did not. Since the 1970s, the range of goods and services provided to society by the market has grown, in many cases blurring the clear demarcation that once existed between state and market responsibilities (Kooiman, 1999; Merrien, 1998; Peters & Pierre, 1998; Stoker, 1998). This shift is closely tied to the neoliberalist ideology that swept through industrial states in the 1980s and 1990s (Dean, 1999). In what Healey (2006a) calls a criteria-driven approach, governments, using a rational-planning approach, still establish the broad framing of policy and program goals but these goals are implemented by private or semi-private market actors whose actions are constrained through a mix of regulatory structures and financial (dis)incentives.

From this description we see that rational planning plays a powerful role in setting the policy goals and establishing implementation guidelines for both hierarchical and market governance. Rational planning, according to Voß (2004), assumes both the uniqueness of truth and universality of knowledge. With these two assumptions at play, social problems can be solved by clearly articulating a goal or desired outcome, carefully analyzing both the constraints limiting the realm of possibilities and the alternative actions for obtaining the desired outcome, and finally choosing the right set of instruments or strategies to obtain this outcome. The planner, in this light, is committed to developing empirically-based and rationally-deduced policy choices but is neutral as to the desired ends of these

choices. However, to develop the direct cause-and-effect explanations needed to work out social problems and solutions, complexity is simplified by narrowing down both the scope of the problem and the variables that affect it. Values, meanwhile, enter the system via politicians who, through the logic of representative democracy, act in the public interest (Healey, 2006a). Using this understanding of modernist governance, I next show how one highly influential model of sustainability transition governance maintains many of the underlying assumptions of modernist governance and discuss the implications of this approach when it comes to sustainability transitions.

A Modernist Take on Sustainability Transitions Governance

Sustainability transitions governance looks explicitly at the challenge and means of steering transformational change toward sustainability. Implicit in the idea of "steering transformational change" as opposed to more incremental change is the assumption that there is a capacity to influence long-term and large-scale change toward a desired or normative outcome. Smith et al (2005:1494) boil the determinants of this capacity down to two "quasi-evolutionary" processes: the "[s]hifting selection pressures bearing on the regime" (i.e., pressures for disruptive change); and the capacity to coordinate the resources needed to respond and adapt to these pressures.

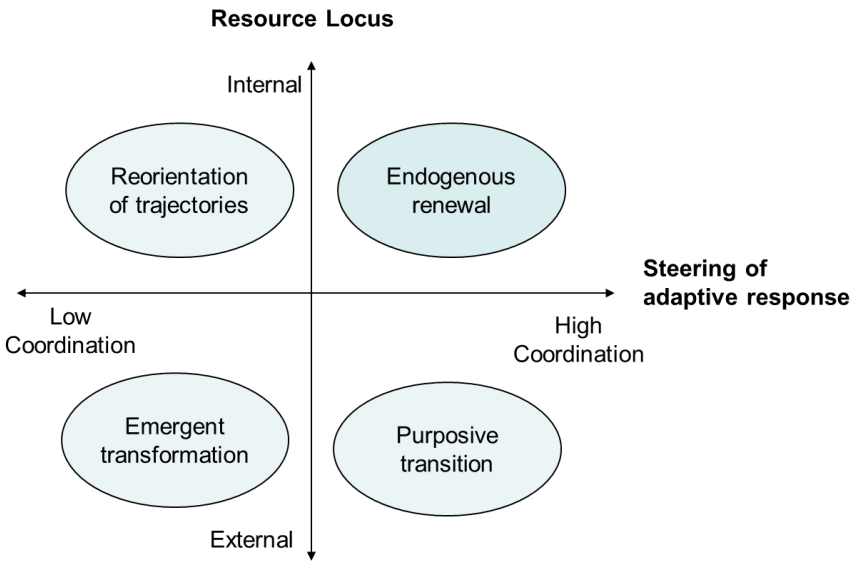
As discussed in section 2.3, pressures for transformational regime change, can come from a number of different sources and scales (i.e., landscape, regime or niche). Regardless of the source, Smith et al (A. Smith et al., 2005, p. 1492) argue that in order to spur a transition, selection pressures need to be "articulated towards a particular problem or direction of transformation". "[W]ithout this articulation of selection pressures, the conditions for systems innovation do not exist."

If selection pressures are coherent and explicit enough, actors operating inside and outside the effected regime will try to adapt to them. According to Smith et al (2005), key determinants of the inherent adaptive capacity to respond to these pressures are: 1) the development and availability of resources to respond and 2) an ability to coordinate or steer a response. Of the five resources that the authors list as necessary for adapting to selection pressures, four represent tactics for creating, developing and scaling-up new ideas, technologies and practices to the marketplace (i.e., new knowledge via research and development, favourable market expectations, positive external economies of scale and niche marketplaces). The fifth resource is largely a catchall for the kinds of material and authoritative resources that are needed to see these tactics through (e.g., capital, competences, input materials and political support).

Factors, meanwhile, that are argued to influence the ability of actors to coordinate or steer a response to selection pressures include the distribution of resources among a network's members, the interdependency of these members, the existence of a shared vision among a network's members

about an appropriate objective for change and measures for pursuing it, and favourable landscape-level economic and legal conditions. So whereas the availability of resources is more or less a list of interwoven ingredients that are needed for a transition to take place, the ability to coordinate responses speaks to the question of whether sufficient agency and power exists to provide and use these ingredients.

When these two sets of factors of a system's adaptive capacity are placed in a two-by-two matrix (see Figure 2-3), four ideal types of transition contexts can be distinguished: reorientation of trajectories, endogenous renewal, emergent transformation, and purposive transition. By identifying the degree of coordination to selection pressures and the locus of adaptive resources that exist within a socio-technical system, "[t]he art of governing transitions becomes one of recognising which context for transformation prevails, and which drivers offer the best leverage for guiding change in a desirable direction" (A. Smith et al., 2005: 1498).



Adapted from Smith et al 2005

Figure 2-3 Transition Contexts as a Function of Degree of Coordination to Selection Pressures and the Locus of Adaptive Resources

In Table 2-2, we see how each of the four transition contexts line up in terms of major governance challenges and possible strategies for overcoming these challenges. Assuming that the prevailing transition context can be identified, steering these transitions should largely be a matter of identifying where capacity gaps exist and bridging them with appropriate policies to prompt and enable actors operating within these contexts to pursue sustainability transitions. This relatively straightforward approach, however, is based on several major but unacknowledged assumptions,

namely, it assumes that actors involved in a transition process have 1) a clear vision of where they want to go; 2) the power and political support needed to start taking actions to get there; and 3) the knowledge required to both assess the prevailing context and to make the kinds of decisions needed to start transitioning socio-technical systems in the desired direction. Each of these assumptions are consistent with the description of modernist governance discussed above. In other words, it is a transition governance framework that is built on the hard governance infrastructures of modernism. However, the appropriateness of modernist approaches to solving complex systems-oriented problems, such as a sustainability transition, has been called into question in recent years.

Table 2-2 Governance Ramifications of Different Transition Contexts

Transition Context	Response to Pressures	Locus of Adaptation	Governance Challenges	Possible Transition Governance Strategies
Re-orientation of trajectories	Uncoordinated	Internal	Ensure a sustainability trajectory is followed and maintained.	Selection Pressures: Strong and explicit sustainability regulatory objectives
Endogenous Renewal	Coordinated	Internal	Persistent influence of path dependence on innovation searches.	If positive sustainability gains: monitor progress. If negative sustainability gains: direct regime intervention is required.
Emergent Transformation	Uncoordinated	External	Sustained and high levels of uncertainty about the kinds of innovations that emerge.	Selection pressures: Clear articulation of sustainability objectives Resources: Improve internal adaptive response capabilities
Purposive Transition	Coordinated	External	Build and maintain network cohesiveness	Selection pressures: Clear articulation of sustainability objectives Resources: Improve external adaptive response capabilities

Features of Sustainability Not Addressed by Modernist Governance

In their introduction to the edited book *Reflexive Governance for Sustainability*, Voß and Kemp argue (2006) that there are at least five conditions of sustainability that make modernist governance poorly equipped to address it: First, they argue that implicit in any set of sustainability goals is a tolerance for a particular level of risk and a preference for one set of outcomes over another, requiring trades-offs to be made between different values such as social justice, economic prosperity and ecological integrity. Although scientific knowledge and rational decision-making can help to inform my thinking and decisions about risk and the value trade-offs that exist between different

desired outcomes, acceptable risk levels and value trade-offs will differ between individuals and groups of individuals, as well as over time. Given the pluralistic and temporal conditions that are associated with pursuing sustainability, the setting of sustainability goals will necessarily be endogenous to any transformation process rather than objectively deduced and imposed by those doing the planning. (Adler & Adler, 1994)

The second condition of sustainability that challenges modernist governance is that it (like socio-technical transitions) is the outcome of the co-evolution of heterogeneous elements across multiple scales. In other words, it is highly dynamic and complex system that requires a broad set of knowledge to try to understand never mind influence Modernist governance and its rational planning approach, meanwhile, are founded on the logic of reductionism which leads to disciplinary thinking and problem solving that is guided by the system's functions as opposed to the system itself.

Third, the degree of change implied by sustainability and the long-term time scale required to see it through means that there is necessarily a high level of uncertainty and ignorance about transformation dynamics and the effects of trying to influence the direction of these dynamics. Rational planning, though, is based on the assumption that with enough of the right kind of knowledge, problems can be understood and linear strategies developed to solve them with a high level of certainty. One way uncertainty is reduced is by making it exogenous to the problem. The limitation of this approach is that little progress is made on those issues that are deemed to be uncertain.

Fourth, paths leading to sustainability will fundamentally require major changes to many of the cultural, economic and technological arrangements that form the structural foundations of modern societies, resulting in high societal impacts. Although no one can say for certain what paths these changes may follow, deciding on and trying to work toward a desired direction is fundamentally a normative endeavour. However, the conventional rational planning approach for trying to look into the future is grounded in the present because it relies extensively on the projection of current trends forward. By definition, a transformation is a split from the past. As such, conventional projections are poorly suited to evoke, anticipate, and adapt to the scale of changes required to shift to sustainable development paths.

The final condition of a sustainability transformation that Voß and Kemp (2006) argue modernist governance is poorly suited to address is that the capacities to influence transformation are distributed among actors. As a result, implementation necessarily requires persistent interactions between a broad range of actors and interests, operating across multiple scales and sectors. Rational planning, though, is based on a presumption of a division of responsibilities in society between the general populace, policy-makers or planners and decision-makers or politicians.

In summary, the "hard-governance infrastructures" of modernist governance are poorly suited to addressing sustainability, a 'wicked' problem with high-levels of complexity, uncertainty, controversy, and societal impacts over long periods of time. If pluralism and controversial systemic problems are unavoidable conditions of a transformational shift toward sustainable socio-technical systems, the approach to transition governance that is suggested by Smith et al (2005) is inadequate if it does not also address these more meta-order governance issues. To help fill in my understanding of how these types of issues might be addressed, I turn next to the literature on reflexive transitions governance.

2.4.2 A Reflexive Governance Approach to Sustainability Transitions

The concept of reflexive governance is closely associated with Ulrich Beck's (1992) risk society or reflexive modernization theory. Reflexive modernization, according to Beck, is born out of the many experienced and perceived risks (such as nuclear radiation, climate change and air pollution) associated with so called advances of the modern era. In overcoming the traditional bounds of nature, modern society now risk destabilizing nature. Part of reflexive modernization, then, is the re-realization that we are part of nature and what we do must be considered in terms of the risk it presents to destabilizing it.

A reflexive governance approach to sustainability transitions governance is based on the hypothesis that in addition to enabling the adaptive capacity of agents seeking to achieve such a transition, there is also a need to overcome the structural powers that the present development path holds over achieving more sustainable futures. The underlying elements of these arguments are represented in what Voß and Kemp (2006, p. 4) call reflexive governance:

> Reflexive governance implies that one calls into question the foundations of governance itself, that is, the concepts, practices and institutions by which societal development is governed, and that one envisions alternatives and reinvents and shapes those foundations.

This concept denotes a hard-governance infrastructure that is both fluid and dynamic. By definition, it starts by calling into question the foundations of our existing systems of governance. In this way, "modernization is becoming its own theme" (Beck, 1992, p. 19).

In a second loop of reflexivity, new structures of governance begin to emerge. Over time, these structures are also called into question and based on these reflections either maintained, adapted, or replaced. As a central objective of these structures is the mitigation of risk, the governance of society is organized to respond to it. It is reflective, in other words, of not only what is but what may be by asking questions such as: What kind of world do we want? And how do we get

there? However, rather than look to science for answers, the people asking these questions look to themselves. This is because with the rise of risks also came a demystification of scientific and technical expertise. Unlike modernist efforts to answer these questions with scientific expertise, they are answered through normatively based values and ethics.

The Hard-Infrastructures of Reflexive Sustainability Transitions Governance

With these notions of reflexive governance in mind, Voß and Kemp (Voß & Kemp, 2006) advance a set of reflexive strategies intended to address the features of sustainability outlined above. Although not intended as a definitive list, it is generally representative of what is found within the socio-technical and socio-ecological transition literatures (e.g., Folke, Hahn, Olsson, & J, 2005; René Kemp, Parto, & Gibson, 2005; Loorbach, 2007; Olsson et al., 2006; Pahl-Wostl, 2007; Rotmans et al., 2001; Rotmans & Loorbach, 2010; A. Smith et al., 2005; van der Brugge, 2009). By aligning each of these strategies with the critical roles of governance - goal formulation, system analysis, and strategy development/implementation - we can start to see where and how reflexive governance can be practically applied for sustainability (See Table 2-3). In the remainder of this section I describe briefly each of these strategies.

From Table 2-3, we see that in order to move forward on any action, a general agreement is needed by the actors involved in a sustainability decision-making process about the goals that they want to ultimately achieve (John B. Robinson, 1988; J. B. Robinson, 2003; Voß & Kemp, 2006). Loorbach (2007, p. 92) argues that developing a shared "agenda" is a key element in sustainability governance because it is "a means to achieve coherent network- and coalition-building." Coherent networks and coalitions, in turn, lead to a more stable environment for shared objectives to be pursued over the long-term. What is more, given the deep embeddedness of existing institutions and actors, visioning is argued to be a critical because it creates space for arrangements and solutions to be discussed and nurtured outside of the pull of existing institutions (Grin, 2009). As discussed above, establishing sustainability goals involves value trades-offs between a broad range of actors and interests and over an extended period of time. Despite the dynamic nature of these goals, the knowledge and values informing them will necessarily represent a particular time at a particular place. To balance these two characteristics of sustainable goal setting, the process of setting and achieving these goals needs to be ongoing and the goals themselves must be approached as both ambiguous and moving targets (Voß & Kemp, 2006).

Table 2-3 List of Strategy Elements of Reflexive Governance

Roles of Governance	Features of sustainability related to roles of governance	Reflexive governance approach to roles of governance	Modernist governance approach to roles of governance
Goal formulation	Sustainability goals involve value trade-offs, are endogenous to transformation	Iterative participatory goal formulation	Value-laden goal setting done by elected representatives with input from unbiased planning and issue-specific experts.
System analysis treatment	Co-evolution of heterogeneous elements across multiple scales (society, technology, ecology)	Trans-disciplinary knowledge production	Problem simplification through functional differentiation
	Uncertainty and ignorance about transformation dynamics and effects of intervention	Experiments and adaptivity of strategies and institutions that is balanced with a capacity to make decisions and produce outputs.	Uncertainty is treated as exogenous to the problem. Analysis limited to the part of the problem that is predictable and relatively well understood. Linear strategies and institutions.
	Path-dependency of structural change, high societal impact	Anticipation of long-term systemic effects of measures	Anticipation of short-term component effects of incremental measures
Strategy implementation	Capacities to influence transformation are distributed among actors	Interactive strategy development	Division of responsibilities in society between the general populace, policy-makers/ planners and decision-makers/politicians.

Adapted from Voß & Kemp (2006)

Second, as sustainability is necessarily the outcome of a co-evolution of heterogeneous elements across multiples scales, it requires knowledge to be produced that can contribute to this type of change. As such, in addition to more conventional disciplinary knowledge, there is a strong need for transdisciplinary knowledge production as well (J. B. Robinson et al., 2011; Salter, Robinson, & Wiek, 2010; Voß & Kemp, 2006). Robinson (2008) argues that transdisciplinary knowledge production is founded on five key characteristics:

1. Problem-based (follows problems that arise more from fundamental dilemmas or crises in society rather than through disciplinary journals or academic discourse)
2. Integration of disciplines and theoretical and methodological boundaries

3. The research process is dynamic as it is driven by interactivity and emergence
4. Reflexivity to draw out contradictory and competing claims
5. Strong forms of collaboration and partnerships between "experts" and those actors who are experiencing and trying to address the dilemma or crisis.

This differs considerably from more conventional practices of applied interdisciplinary research which tends to maintain a more traditional divide between the researcher as "expert" and the research subject. Furthermore, it is easy to see how these ideas of transdisciplinary knowledge creation align easily with the ideas of procedural sustainability discussed in Section 2.2.1 (i.e., locally-based, integrative, participatory, emergent, and normative).

In addition to the creation of knowledge, an additional benefit of transdisciplinary interactions are the trust and mutual understanding that they build between participants which in turns strengthens the network's cohesiveness (Rotmans & Loorbach, 2010). Similar arguments have been made in the field of socio-ecological systems management, where transdisciplinary learning and knowledge sharing are argued to be critical elements in sustainability transitions (Folke et al., 2005; Olsson et al., 2006; van der Brugge, 2009).

Third, to reduce the uncertainty that surrounds transformation dynamics and the effects of interventions on these dynamics, space needs to be created for more transformative types of innovation and experimentation to take place and the new knowledge created from these spaces used to adapt existing strategies and institutions (Voß & Kemp, 2006). In addition to reducing system uncertainty, by nurturing protective spaces that are focused on developing alternative non-incremental solutions, the possibility of regime change via creative destruction is increased. While the ongoing temporal nature of sustainability means that these types of experimental processes need to be open-ended, it is also important to ensure that they are infused with selection criteria and priorities that allow for decisions to be made and outputs produced.

Fourth to help overcome the systemic resistance and negative impacts of changes related to a sustainability transition, processes that attempt to steer sustainability need to have the capacity to anticipate the long-term systemic effects of different change strategies (René Kemp et al., 2005; Loorbach, 2007; Rip, 2006; J. B. Robinson, 2003; Voß & Kemp, 2006). To be effective, anticipatory information should not only anticipate where existing trends may lead us (forecasting) but also permit us to see what steps need to be taken in order for alternative visions of the future to play out (backcasting) (Loorbach, 2007; John B. Robinson, 1988). Providing such a link between our current actions and their potential future consequences not only creates a greater sense of urgency around the short-term actions that we take but it also creates opportunities for new knowledge about these sustainable futures to emerge.

Finally, since the capacities to influence a sustainable transformation outcome are broadly distributed, implementation necessarily requires persistent interactions between a broad range of actors and interests, operating across multiple scales and sectors (Voß & Kemp, 2006). In terms of form, there is strong support in the literature for sustainability to be pursued via networks as opposed to expert-oriented hierarchies (Grin, 2006; René Kemp et al., 2005; Lafferty, 2004; Charles E. Lindblom, 1999; Lundqvist, 2004; Meadowcroft, 1999; O'Toole, 2004; Petschow, 2005; Rip, 2006; Rosenau, 2003); where networks are generally defined as "self-organizing, interorganizational" entities (Rhodes, 1996:652; 1997). The primary reason for this argument is that while the rational-planning process that is indicative of modernist governance is well suited to solving problems that are more incremental in nature and already well understood by experts (King, 1993), they are poorly suited to solving problems that are fraught with complexity, uncertainty and a diversity of interests (Jessop, 1998) – all attributes associated with achieving long-term sustainability. Network governance, on the other hand, relies upon a "continued commitment to dialogue to generate and exchange more information (thereby reducing, without ever eliminating, the problem of bounded rationality)" that is found in rational-planning models (Jessop, 1998:35).

Pursuing Sustainable Socio-Technical Transitions with Reflexive Governance

When I compare the modernist governances approach to the challenges presented by sustainability to the reflexive governance strategies discussed above (Table 2-3), it is evident that the reflexive governance is far better suited to addressing the uncertainties associated with sustainability. So given the high-levels of complexity, uncertainty, controversy, and societal impacts that are associated with the sustainable transitions of socio-technical systems, I hypothesize that although the "hard-governance infrastructures" of modernist governance are arguably well suited to addressing 'tame' problems and even some 'messy' ones (such as substituting one form of centrally generated electricity for another), they are poorly suited to addressing sustainable transitions (King, 1993). Instead, I propose Voß and Kemp's (2006) five strategy elements of reflexive governance as a more appropriate frame-of-reference for the "hard-governance infrastructure" needed to steer a sustainability transition.

But how does reflexive governance stack up against the issues of power that the socio-technical change and structuration literatures show are critical lynchpins in large-scale change? More specifically, there are two critical issues of power that transition governance needs to address. The first has to do with establishing the discursive and organizational capacities of agents seeking to build structures of sustainability. The second issue of power is the inherent imbalance of power between

those actors who reside within the existing way of doing things and those who are pushing for alternative visions and socio-technical arrangements.

As to the first of these, in Section 2.2.2 I argue that enduring transformative change is both a horizontal exercise of building, securing, and integrating sustainability ideas and frames of reference with authoritative and allocative resources, as well as a vertical exercise of prompting change, building legitimacy and support for transition governance processes and scaling up innovative arrangements of ideas and frameworks and resource flows. If supported with allocative and authoritative resources, reflexive governance could provide the organizational and discursive resources needed to support "soft-governance infrastructures" where actors come together in episodic spaces and places for learning about, experimenting with, developing and scaling-up alternative arrangements for fulfilling societal functions that are more in line with sustainability than existing socio-technical regimes.

In terms of addressing the second issue of power, if transformative change is what is ultimately desired, the governance of this change needs to ensure that ideas and knowledge from outside of the existing regime are strongly positioned to counter the regime's self-reinforcing dispositional powers. This is not to say that actors within the existing regime cannot push for changes, it is just that these regime-led changes will generally tend toward incremental stability rather than transformational change. Of course how far alternative arrangements get will depend in part on the strength of landscape and regime level support for and/or resistance to them. Reflexive governance tries to address this in at least three ways. First, by purposely pursuing the development of alternative socio-technical arrangements, reflexive governance is also building a structural counter force to the latent path dependent power that is buried deep within existing ways of thinking about and doing things. Second, the deep participation of regime and landscape-level actors is strongly encouraged in all roles of reflexive governance (i.e., goal formulation, system analysis, and strategy development). These actors bring with them important knowledge and legitimacy to the process, they also provide critical links for scaling up new structures and providing resources to innovative niches. Finally, in addition to attracting actors who are interested in building the horizontal structures of niches, alternative niches also attract advocates who over time push vertically on the organizational and cultural levels of power to make the types of institutional changes that are needed to level the niche's playing field with the incumbent regime (Folke et al., 2005; Jacobsson & Bergek, 2004; Jacobsson & Lauber, 2006; Olsson et al., 2006; van der Brugge, 2009). In summary, although reflexive governance does not neutralize the power imbalance between the incumbent regime and alternatives to it, it does at least represent a strategic process by which it might be increasingly reduced over time.

2.5 Analytical Framing of Socio-Technical Transitions toward Sustainability

In this section, I want to link the concept of sustainable socio-technical transitions that was developed in Section 2.3 to the concept of sustainability governance developed in Section 2.4 (see Figure 2.3). Going back to my discussion on governance in Section 2.4, I can say that the conditions supporting a socio-technical transition that were illustrated in Section 2.3.2 represent the "soft-governance infrastructure" of socio-technical transitions toward sustainability (Healey, 1997, 2006a). Although these conditions may emerge independent of any formal effort to steer a sustainability transition, I maintain that they will be strengthened if the episodes of sustainability innovation that they represent are nested within a reflexive "hard-governance infrastructure". In other words, the reflexive governance strategies to address sustainability challenges (Voß & Kemp, 2006) that were discussed above lead to the strengthened "soft-governance infrastructures" of transitions that are illustrated in Figure 2.4. Taken as a whole, these conditions provide transition agents with not only the discursive and organizational capacity that they need to move socio-technical systems toward sustainability but they can also help to counter the path dependent nature of the incumbent regime.

Although the framing of socio-technical transitions provided in Figure 2-4 is a useful heuristic for understanding how hard sustainable governance infrastructures can influence socio-technical transitions, it is important to bear in mind that moving from the left-side to the right side of this figure is a long journey fraught with many challenges, setbacks, and detours, and, given the dynamic nature of sustainability, one that is never fully completed. One explanation for why intentional socio-technical transitions are so fraught with challenge is that the hard-governance structures that these transitions are embedded within are poorly aligned with the hard-governance infrastructures of the systems that they are attempting to change. To help me draw out this line of argument a little further, in the section that follows I go back to the ideas of procedural sustainability and structuration theory.

2.5.1 Getting the Levels Right

There is little doubt that the ideas of procedural sustainability and reflexive governance are closely linked to one another. In many respects, they can be thought of as the "cultural" level ideas that inform sustainability governance practices and interactions (e.g., normative goal setting, participatory processes, emergent knowledge production, adaptive).

Nested within these norms are sets of different strategies and tools (e.g., visioning, backcasting, experimentation) that are intended to help participants who are interacting with one another at the relational level of sustainability governance to create the knowledge needed to understand and address sustainability imperatives within the local context. The five strategies of reflexive governance developed by Voß and Kemp (2006) are examples of such organizational-level

structures. What makes these strategies particularly compelling, though, is that by aligning them with the critical roles of governance (i.e., goal formulation, system analysis, and strategy development/implementation) it is easy to see how they fit within conventional structures of organizational power. That is the level of power where organizational structures routinize how and what agents interact with each other in different types of settings.

Reflexive "Hard" Governance Strategies to Address Sustainability Challenges	Leads to…	Strengthened "Soft" Governance Conditions for Supporting Transformative Change	Leads to…	Desired Long-Term Outcome
Iterative participatory goal formulation Trans-disciplinary knowledge production Experiments and adaptivity of strategies and institutions that is balanced with a capacity to make decisions and produce outputs. Anticipation of long-term systemic effects of measures Interactive strategy development		System Pressures Resources and Ideas: • Shared Vision, • Legitimization, • Resource Mobilization Activities: • Creation of New Knowledge, • Formation of Niche Markets, • Advocacy Actor Network • Heterogeneous membership		Transformed socio-technical system

Figure 2-4 An Analytic Frame of Socio-technical Transitions

Of course the notion of "routine" within a reflexive governance framework needs to be understood as a relatively loose concept. However, from the point of view of the practical application of sustainability governance, the routinization of procedural sustainability is an objective that is too commonly overlooked. While the participation of a diverse set of stakeholders at key points in a sustainability process is ideal, the on-the-ground reality of enacting sustainability agendas and reformulating them over time will be carried out for the most part by community practitioners whether in government, business, or various other organizations. To this end, the five strategies developed by Voß and Kemp (2006) provide some signposts for practitioners as to where the potential organizational powers of procedural sustainability may lie and can start to be built.

In trying to make procedural sustainability more routine, though, it is important to not lose sight of the fact that organizational structures of sustainability governance need to be nested within

the cultural norms of procedural sustainability. The application of transition management in the Netherlands provides a good example of what can happen when the organizational structures of procedural sustainability do not line up with the cultural structures of the overriding governance system.

Transition management is a prescriptive procedural sustainability model that was adopted by the Dutch government in 2000 to help steer its ambitious sustainable energy objectives. Although transition management is firmly rooted in the cultural norms of procedural sustainability, the organizational level adoption of its practices is proving to be challenging. The greatest challenges being faced are coming from the inability of transition management to account for the politics that are involved with the transition process (Meadowcroft, 2005, 2009, 2011; Voß & Bornemann, 2011; Voß, Smith, & Grin, 2009).

To begin with, attempts to move to a more reflexive governance approach have met with resistance and reformulation by those agents who operate within the Dutch government's existing set of modernist governance structures (Avelino, 2009; Hendriks, 2009). What has resulted is a policy approach that lies somewhere in between what was already being practiced and the original transition management concept (René Kemp et al., 2007; Meadowcroft, 2009; Adrian Smith & Kern, 2009).

In addition, the 'reflexive' process is proving to be just as prone to capture from the existing socio-technical regime as is its modernist counterpart. For example, in the Netherlands the transition process has been captured by the incumbent energy regime, even though transition management espouses an open and pluralistic participatory process (Avelino, 2009; Hendriks, 2009; Meadowcroft, 2009).

In terms of addressing some of these power imbalances and questions about the democratic legitimacy of transition processes that they raise, Voß and Bornemann (2011) argue that it is necessary to develop specific institutional settings to act as counterbalances to asymmetries of power and attempts to dominant learning processes. In terms of how this would be done, they foresee three possible strategies: build consensual problem definitions and solutions through reasoned argumentation (e.g., Habermas, 1984); use 'frame reflection' to make diverging perspectives explicit in order to draw out the diversity of perspectives and interests related to an issue and that need to be accommodated to find a workable solution (e.g., Schön & Rein, 1994); or use divergent political interests and strategies as a resource for exploring different sustainable development pathways (e.g., C.E. Lindblom, 1965). Regardless of the strategy used, Voß and Bornemann (2011, p. 15) contend that "the crafting of detailed rules of procedure including methods of participant selection and process moderation is required to avoid domination and capture by powerful political interests". It is

important to remember, though, that unless supported by cultural-level powers, the process of crafting such rules is still contingent on the willingness of the existing governance regime to support it.

Looking forward, what the Dutch example demonstrates is that although the routinization of procedural sustainability is desirable, to be effective these ideas will also need to bond with cultural-level structures of governance.

2.6 Conclusion

I set out in this chapter to establish theoretical grounding of the governance of sustainable socio-technical transitions. To start, I look at different concepts of sustainability. When I did this, I saw that at a practical level, sustainability as an emergent and dynamic process of knowledge creation and negotiation that takes place at the local level and which tries to find an integrated balance between desired social, ecological and economic outcomes. This notion of "procedural" sustainability contrasts "universal" notions of sustainability as perfect balanced state between the world's economic, social, and environmental components. Although procedural sustainability does not deny the value of bringing more universal notions of sustainability into these spaces of negotiation, it recognizes that fundamentally sustainability will emerge through decisions and actions that are made at the local level.

The concept of sustainability as a dynamic political arena shares much in common with the concept of socio-technical transitions developed in Section 2.3 of this chapter. Using structuration theory as my analytical framing, I opened up the black boxes of socio-technical transitions with literatures of technological change, science and technology studies and new institutional theory. When I looked inside, I saw that successful transitions are the result of far more than technologies competing on the basis of economic performance. Instead they result from actors competing to stabilize their particular vision of how a societal function should be fulfilled and their preference for the types of technologies, institutions and organizations to fulfill this vision. This is done, in large part, by building legitimacy around their vision and gaining the support of powerful actors. Doing this, though, is not a straightforward task, particularly for emerging niche arrangements because even if landscape- or regime- level conditions are favourable to some degree of change, path-dependence, technological-momentum and institutional sedimentation point to the powerful influence that historical structures continue to play in shaping change.

If efforts to steer sustainability intend to influence the direction of socio-technical transitions, then, they will need to ensure that the agency to create the desired change is enabled not only within innovation niches but also by the organizational and cultural structures within which the regime is embedded. The challenges faced by these efforts will be further compounded by at least two factors: First, the fact that the scale of sustainability-related change sought is increasingly becoming one of a

competition between regimes as opposed to competitions within regimes. As a result, the level of structural fight back experienced by these efforts will likely be very high. And second, given the co-evolutionary characteristics of socio-technical transitions, efforts to steer sustainability transitions will need to strategically interpret and try to address multiple technological, cultural, economic, and social elements at any given time.

The emergence of the renewable energy sector in Northern Europe, though, demonstrates that with the right set of conditions many of these challenges can be successfully negotiated. Drawing from this example as well as my broader look at socio-technical transitions in Section 2.3.2 I developed an analytical frame of sustainability transitions (Figure 2.2). However, this framing provided only a partial conceptual answer to the question of how socio-technical transitions should be steered.

To develop the full concept of sustainability transition governance, I next looked to the governance literature for ideas about how to influence the direction that change takes. More specifically I turned to two approaches of sustainability governance: modernist governance and reflexive governance. My look at modernist governance showed that trying to purposefully steer a sustainable socio-technical transition is not simply a matter of stating long-term goals and tweaking policies and economic signals to encourage actors to move in a desired direction. For one thing, the vision of the kind of system needed to realize these objectives will be contested as will the specific mix of technologies, institutions and actors needed to fulfill the competing visions. What is more, given the vast array of actors, institutions and technologies which collectively make up socio-technical systems, the effort will inevitably need to be one that is collaborative and interdisciplinary if it is to gain the broad set of knowledge and authoritative and allocative resources needed to see it through. Finally, given the uncertainty around the direction of change, the path to achieving the desired change and the co-evolutionary nature of systemic change, the transformational path will necessarily be one that is built on the principles of emergence and adaptation rather than certainty and stability.

The second governance approach, reflexive governance, was based on an opposite set of assumptions, namely, uncertainty, complexity, and transdisciplinary knowledge creation. Rather than providing an answer for what course of action to take to spur a desired transition, it focused on developing a set of procedural strategies to enable sustainability objectives to be clarified, issues analyzed, and strategies developed. In other words, it was procedural in nature. Given my understanding of sustainability and socio-technical transitions as complex and dynamic systems that are fuelled by interactions between actors as well as between actors and structures of power, I

hypothesized that a reflexive governance approach is more appropriate for creating the conditions needed to support socio-technical transitions toward a sustainability agenda (Figure 2-4).

Moving forward, though, it is important to keep in mind that governance practices that are built under a norm of procedural sustainability, (such as the five reflexive strategies developed by Voß and Kemp (2006)), are just as susceptible to issues of power as the socio-technical transitions that they might intend to steer. As such, efforts to steer socio-technical transitions should apply a double lens. While one lens tries to comprehend the socio-technical system, the other lens needs to be just as busy comprehending the governance system that runs parallel to it.

Chapter 3: Evaluation Framework

3.1 Introduction

The transitions literature discussed in Chapter 2 tells me that socio-technical transitions emerge through at least one of three different patterns of change: a voluntary bottom-up replacement of a regime by a niche (*empowerment)*; a voluntary and successful absorption of a niche by the regime (*adaptation*); or a forced top-down *reconstellation* of a regime by powerful landscape-level agents (de Haan & Rotmans, 2010). Although the scaling up of innovative niches plays an important role in all three patterns, it is only in the first pattern that this is achieved solely through direct competition with the incumbent regime.

Behind these patterns of change are different actors who are actively working to both encourage and hinder it. This desire to maintain or change a preexisting state of affairs suggests that the actors engaged in these actions have the agency to exercise the power that is needed to make a difference. However, such agency is co-determined by the capacity of actors to align and put into practice the necessary discursive and organizational structures needed to achieve their desired outcomes and the structural powers of those social institutions in which these agencies are embedded (Arts & Tatenhove, 2004; Giddens, 1984; Sewell, 1992). Given this duality, efforts to steer transformative change need to ensure that the agency to create the desired change is not only empowered within innovation niches but it is supported by organizational and cultural structures as well.

In Chapter 2, I developed an analytical framework of socio-technical transitions that linked the "hard-governance infrastructure" of reflexive governance to the "soft-governance infrastructure" conditions needed to support a socio-technical transition. In this Chapter, my primary objective is to develop an evaluation framework that will allow me to use the framework developed in Chapter 2 to assess efforts to steer transformative energy efficiency and conservation (TEEC) in British Columbia, Canada, between 2005 and 2012 (Chapters 5-9).

3.2 Evaluation Research

The overarching research methodology used by this dissertation is evaluation research. In very general terms, an "evaluation refers to the process of determining the merit, worth, or value of something, or the product of that process" (Scriven, 1991, p. 139). Although evaluation research uses many of the same methods as basic social research, a major difference is the social context in which it takes place (Singleton & Straits, 2005). By its nature, it is assessing the level of success with which individuals, organizations and governments are carrying out their work in order to achieve some pre-stated desired outcome. So, not only is it applied but it is also housed within a potential minefield of political and individual interests. As such, its findings are not only academic in interest but

practitioner based as well. Managing and trying to balance these dual-expectations is something that the research must bear in mind (and sometimes endure) throughout.

From a process perspective, Scriven (1991, p. 139) describes most evaluations as being made up of three key elements: The "identification of relevant standards of merit, worth, or value; some investigation of the performance of the evaluands on these standards; and some integration or synthesis of the results to achieve an overall evaluation or set of associated evaluations". This chapter addresses the first of these elements i.e., the identification of relevant standards of merit. Details about the methods used to address the other two elements will be described in Chapters 4. While the actual investigation of these standards and reporting of my findings based on my investigation are presented in Chapters 5-9.

3.2.1 Formative Evaluation

Generally speaking, the type of evaluation that is carried out will generally coincide with the stage of a policy, program or practice that is being assessed (Singleton & Straits, 2005). To this end, there are typically four types of evaluation that are undertaken: 1) needs and social and social assessment, 2) formative evaluation, 3) program monitoring and 4) program evaluation or summative. The first of these is generally undertaken early in the policy cycle to help understand the scope of a problem and the extent that particular policy or program could be developed to address it. Formative evaluations, meanwhile, are often carried during the policy planning phase (after a decision has been made to develop a program to address a recognized need but before it is finalized or rolled out en masse). The main objective here is to provide relatively quick and general feedback on the programs design while it is still early enough to make adjustments without major disruptions. The next logical stage of a program is it full implementation. At this point, a program monitoring evaluation might be undertaken to ensure that it is reaching the desired population, the services provided are in line with what is desired, and there are adequate resources to carry out the program. Finally, a program evaluation is carried out after the program in question is running long enough for its physical outcomes to be realized and assessed.

As discussed briefly in Chapter 1, in the case of my research I am interested in carrying out an evaluation to assess the "merit" of efforts to steer transformative energy efficiency and conservation (TEEC) in British Columbia (BC), Canada. Given the social, economic, and environmental impacts of extending large-scale energy-systems of just about any variety, an underlying normative premise of this dissertation is that there is already an underlying need for radically improving the energy intensity of energy services. However, as efforts to steer this transition are relatively immature and the transformation itself will likely not be fully realized for decades, the physical indicators for assessing the success of these efforts (such as absolute or

intensity-based carbon and energy reductions) are still relatively limited. With this information in mind, this dissertation pursues a formative evaluation. The intention of the evaluation is to provide feedback on the specific processes being used in British Columbia to intentionally influence transformative energy efficiency and conservation to assess whether they are consistent with achieving this long-term objective.

Although we arrived logically at this type of evaluation based on the timing of TEEC within the broader policy cycle, it is important to mention that this is not the only time or reason that formative evaluations should be undertaken. Indeed, another underlying assumption of this dissertation is that process matters – full stop. This assumption lies in good company with an activist stream of evaluation theory closely tied to the formative approach. Lee Cronbach (1980, p. 86), the education evaluator most commonly associated with this stream, argues that the primary objective of evaluation should be helping, "members of the policy-shaping community deepen their understanding of a program, a social problem, or the decision-making machinery itself". Included in Cronbach's definition of a "policy-shaping community" were decision makers, advocacy groups, educators, the media and interested citizens. From this perspective, the validity of an evaluation should be based on its external value to help improve the polity. This is quite a departure from traditional evaluation approaches which emphasize the direct internal value of this information to policy-makers. Cronbach's perspective, of course, is not without its skeptics (e.g., Hammersley, 1995). However, it continues to play an important role in shaping ideas about the objectives and methodology of evaluation (e.g, Boaz & Hayden, 2002). As it is the desire of this dissertation to not only contribute to the academic literature but to also provide useful information to those interested in advancing TEEC from a governance perspective, a formative approach seems doubly appropriate.

3.2.2 Theory-based Evaluation

Identifying what type of evaluation one will undertake is only the first step in an evaluation strategy for a specific issue. The next step involves selecting the model of evaluation that one will use as the type of model selected has a strong influence on the lens and variables used to assess the interactions being assess. My selection of a model was guided by my purpose of evaluation (Hansen, 2005). Although there are multiple purposes for conducting this work (e.g., knowledge development and organization improvement), the primary purpose is to improve the practice of steering sustainability transitions. In their review of *Evaluation for Practice Improvement and Organizational Learning*, Rogers and Williams (2006) list nine evaluation approaches that are commonly used for evaluations intended to improve practice. The nine approaches are: action research, appreciative inquiry, empowerment evaluation, evaluative inquiry, systemic evaluation, success case method, evidence-based practice, performance monitoring, and theory-based evaluation. Each of these

approaches differs in terms of how they involve practice stakeholders, the scope and scale of practices that they evaluate, the stage of development that they evaluate, and how much they draw on lessons taken from historical successes.

Of these nine approaches, we determined that a theory-based evaluation method was the most appropriate for my study. According to Fitz-Gibbon and Morris (Fitz-Gibbon & Morris, 1996):

> A theory-based evaluation of a program is one in which the selection of program features to evaluate is determined by an explicit conceptualization of the program in terms of a theory, a theory which attempts to explain how the program produces the desired results.

Looking at the use of evaluations in the field of education, Fitz-Gibbon and Morris argue that theory-based evaluation should be used when: 1) the program that is being evaluated is itself based on a particular theory, and/or 2), the program being evaluated "aims toward distant or intangible outcomes." Given that my research is interested in the transformation of socio-technical systems over decades, the latter condition is particularly relevant. In other words, as many of the important consequences of these efforts will not be known for years to come they are not immediately measurable.

Of course, some form of theory, whether explicit or implicit, plays a role in evaluation exercises regardless of the model selected (Singleton & Straits, 2005). What distinguishes theory-based evaluation models from the others is that it is the underlying theory of "cause and effect" that is being evaluated. This is quite a departure from the objectives of most evaluation processes which are more interested in whether or not the desired "effect" is achieved. In other words, the theory-based evaluation opens up the black box of how these outcomes are achieved (or not as the case may be). With the overall goal being to develop what will hopefully be more effective strategies in the future for achieving the desired outcomes (Birckmayer & Weiss, 2000).

As the question about what program features will be evaluated depends on the theoretical lens applied, developing the theory about what types of interactions lead to the desired outcome is a crucial early step in the research process. Although the theory selected is often the same one that the program being evaluated is based on, this does not necessarily have to be the case (Fitz-Gibbon & Morris, 1996).

In the case of my study, the theory I am interested in working through is the one developed in Chapter 2 that argues that reflexive governance practices help to create the conditions needed to support transformative energy efficiency and conservation (see Figure 3-1). A major challenge of this theory is knowing whether or not the desired outcomes are being achieved in the short-term because the duration of change takes place over decades. In cases where the outcomes of a program are either

intangible or so remote in the future that their effects cannot be observed over the relative short duration of the evaluation, Fitz-Gibbon and Morris (1996, p. 180) argue that the theory-based evaluation question needs to become: "Have the variables which theory indicates are crucial to the program actually been operationalized?" This however does little to provide evidence-based answers to my research questions. Given this dilemma of time, I think it is more fruitful to refocus my evaluation's short-term desired outcomes on whether or not the set of system conditions needed to support a long-term transition that were identified in Chapter 2 are in place. Once the strength of these conditions are known, I can then use the theoretical concepts of reflexive governance to untangle the role that hard-governance structures played in producing these results. Just as importantly, I can also use this theory to recommend how existing hard-governance structures might be organized differently in order to further bolster conditions that support socio-technical transitions.

Reflexive "Hard" Governance Strategies to Address Sustainability Challenges	Leads to…	Strengthened "Soft" Governance Conditions for Supporting Transformative Change	Leads to…	Desired Long-Term Outcome
Iterative participatory goal formulation Trans-disciplinary knowledge production Experiments and adaptivity of strategies and institutions that is balanced with a capacity to make decisions and produce outputs. Anticipation of long-term systemic effects of measures Interactive strategy development		System Pressures Resources and Ideas: • Shared Vision, • Legitimization, • Resource Mobilization Activities: • Creation of New Knowledge, • Formation of Niche Markets, • Advocacy Actor Network • Heterogeneous membership		Transformed socio-technical system

Figure 3-1 An Analytic Frame of Socio-technical Transitions

3.3 Evaluation Framework

Although my intention with this dissertation is to evaluate efforts to steer TEEC in BC from a holistic perspective (Chapter 9), before I can do this I need to develop some form of indicators to help me establish a firmer understanding of the strength of each of the different dimensions included in my analytical framing of socio-technical transitions (Figure 3-1). An indicator, in its simplest form, signals the presence or absence of the concept being studied (Earle Babbie, 2007). The indicators

developed for my study are qualitative in nature and are not intended to be used for statistical aggregation (see Tables 3-1 and 3-2).

Table 3-1 List of Qualitative Indicators for the Hard-Governance Approach Used to Steer Socio-Technical Transitions

Roles of Governance	**Reflexive governance approach to roles of governance**	**Qualitative Indicators**
Goal formulation	Iterative participatory goal formulation	• Who sets goals • Level of stakeholder involvement • Ongoing • Firmness of goals once set
System analysis treatment	Trans-disciplinary knowledge production	• Diversity of disciplines involved • Diversity of elements (e.g., society, technology, ecology) included in analysis of problem
	Experiments and adaptivity of strategies and institutions that is balanced with a capacity to make decisions and produce outputs.	• Response to unforeseen circumstances • Institutionalization of experimentation
	Anticipation of long-term systemic effects of measures	• Use of forecasting • Use of backcasting
Strategy implementation	Interactive strategy development	• Processes for strategy development • Final decision-making practices

In Table 3-1, I list the indicators for a reflexive hard-governance approach to steer socio-technical transitions. These were developed from the detailed discussion of reflexive governance in Section 2.4 (as summarized in Table 2-3). I still need to develop a similar list of indicators for conditions supporting socio-technical transitions. As such, in the remainder of this chapter I provide a detailed description of the indicators list included in Table 3-2.

Table 3-2 A List of the Qualitative Indicators for Evaluating the Strength of the Conditions for Supporting Socio-Technical Transitions

System Destabilization	Ideas & Resources	Interactions	Actor-Network
System Pressures • Multiple pressures • Coherency • Translation into actionable issue	Vision (Idea) • Mapping out possibility space • Heuristic for problem identification • Target setting and monitoring • Building niche network • Focus for resources	New Knowledge • Tier of learning identified and pursued • Diversity of perspectives • Diversity of topics explored	Heterogeneous Membership • Diversity of communities-of-learning (networks, applied community-of- practice, advocacy community-of-practice, and epistemic communities) • Diversity of actors in communities-of-learning • Prime mover(s)
	Legitimacy (Authoritative Resource) • Strength of debate • Delegitimizing of existing institutions • Adoption by established actor • Alignment with shifts in multi-level ideologies, structures & power	Niche Market Formation Type of policies used to advance energy efficiency and conservation: • Tier 1: Voluntarism & Information - Diversity and level of commitment • Tier 2: Financial (dis)incentives – additionality of (dis)incentive • Tier 3: Regulated baselines – size of baseline, degree of compliance, and signal of future intentions	
	Resource Mobilization • Timeliness • Distribution of resources among a network's actors • Interdependency of a network's actors	Advocacy • Number of topics taken up and pursued by organization • Time to address issues • Diversity of topics taken up and pursued by organization	

Although most indicators developed for my study are not ranked individually, I made an exception for those indicators used to assess "niche market formation" (Section 3.3.3.2). This decision was made after feedback from my initial analysis showed that some type of formal scaling for policies was required to help clarify for readers why I talked about some types of policies as being strong and others as moderate or weak. While making this change, I tried to develop similar scales for the rest of the indicators associated with the different conditions for supporting socio-technical transitions. However, I found that the benefit of this added definitional clarity obscured the study's analytical flexibility. As a compromise, my rationale and description below of each component's indicators is followed by an example of what I see as a strong signal of a healthy transition condition. I do this to help the reader understand the perspective that I am using to assess each indicator but also to help ground my qualitative evaluation of the individual indicators. To make my evaluation, a brief description of the strengths and weakness associated with each indicator will be compared to the pseudo benchmark.

Finally, to help me make an aggregate evaluation, my description of each component's indicators will then be used as my basis to evaluate the overall strength of each condition included in my analytical framework (See Table 3-3). Based on this evaluation, each condition will be assigned a rank ranging from very strong (A+) to non-existent (F) that reflects its overall strength in terms of supporting TEEC. The rest of the chapter will now define the indicators used to assess the strength of the conditions required to support a socio-technical transition.

Table 3-3 Evaluation Criteria for Conditions Supporting Transformative Change

Strength	Evaluation Criteria
A+	Very Strong – All of the condition's indicators demonstrated characteristics that are similar to the benchmark example given for a strong TEEC indicator.
A	Strong – More than half of the condition's indicators demonstrated characteristics that are similar to the benchmark example given for a strong TEEC indicator.
B	Moderate – Less than half of the condition's indicators demonstrated characteristics that are similar to the benchmark examples given for a strong TEEC indicator and most of the rest were moderately close.
C	Weak – Some of the condition's indicators demonstrated characteristics that are moderately close to the benchmark example given for a strong TEEC indicator.
D	Very Weak – One of the condition's indicators demonstrated characteristics that are moderately close to the benchmark example given for a strong TEEC indicator.
F	No indicators were found to support the presence of this condition

3.3.1 System Pressures

System pressures are not spawned at any one level of a socio-technical system but can be spurred by a wide variety of sources, interests and actors (e.g., the creation within niches of novel socio-technical arrangements, competition felt from another socio-technical regime, the emergence of alternative

‘visions’ of the future, changes in the socio-cultural landscape that put the regime in tension with its changed landscape, public debates targeted at changing socio-technical regimes) (A. Smith et al., 2005). However, identifying what these pressures are is only the first step in assessing their strength to encourage a socio-technical transition. In order for actors to be able to respond to different pressures, they must be articulated in a way that leads toward a particular problem or direction of change. To assess the strength of existing system pressures in BC to transform how energy services are fulfilled in the built environment, attention needs to be given to whether these pressures are coherent enough to evoke actors to seek transformative levels of energy savings and translated into a form that prompts and enables a response by regime and/or niche actors.

Based on this discussion, in Table 3-4 I list the three key indicators that I will use to assess the strength of system pressures. For the variety of system pressures, the strength of the indicator is based on both the range of different types of system pressures (e.g., economic, biophysical, technological, political, institutional) as well as the variety of levels that they originate from (e.g., niche, regime, landscape). The argument being that the greater the type and direction of system pressures experienced, the greater the pressure felt. The strength for coherency, meanwhile, looks at what actions, if any, were taken to address these pressures. Finally, for translation, I will look for justification or rationales being used by actors to help them understand and respond to the system pressures and whether or not any inconsistencies exist between these rationale and/or achieving other organizational objectives.

Table 3-4 Evaluation Indicators for System Pressures

Indicator	***Example of a strong indicator***
Multiple pressures	Multiple pressures in terms of type (e.g., economic, biophysical, technological, institutional) and level of origin (e.g., niche, regime, landscape).
Coherent	Response plan developed, adopted and implemented.
Translation	Rationale used to address system pressures is consistent with both the problem and the organization’s operationalized primary objectives.

3.3.2 Resources and Ideas: Shared Vision, Legitimacy and Resource Mobilization

In Chapter 2, allocative and authoritative resources as well as ideas and frames of reference were identified as the raw ingredients that actors draw upon when interacting with one another in an effort to achieve their desired outcomes. When integrated together in a relatively stable pattern over time, these flows of ideas and resources form the structures that bind the actions and opportunities realized by different groups of individuals in particular places and times. Although numerous ideas and resources will ultimately be required to see a socio-technical transition advance, in my analytical framework I highlight three that the literature tells me are particularly important for furthering this process: a shared vision

(idea), legitimacy (authoritative resource), and resource mobilization (authoritative and allocative resources).

3.3.2.1 Shared Vision

The willingness of different actors to engage in a transition process, speaks to the capacity of these actors to achieve a cohesive network and to build a coalition that is focused on achieving a common objective. A shared vision is a meta-idea that represents the desired future that the actor's participating within a niche are trying to collectively achieve. However, the ability to coordinate an effective response will depend on both the vision's *coherency* and *flexibility*. To help explain the concept of coherency, Smith et al (2005, p. 1507) differentiate between a vision at the early stages of a transformation process and one at a more mature state:

> Indeed, the original vision may be relatively vague and incoherent: simply an orientation or framing of the problem, around which coalitions can begin to form. It is processes of system innovation that can give it shape and solidity terms of an envisaged configuration of artifacts and practices that work in a desired way and deliver certain expectations.[√]

Despite the strengthening effect that a more coherent vision can have, some degree of interpretative flexibility (in terms of their narratives and adaptability to changing circumstances, both material and social) is desired to ensure that the vision is broad enough to widen its appeal to other actors and arenas. If a vision is too flexible, though, it risks breaking down the network's cohesiveness by creating ongoing friction among actors around the network's underlying objectives.

In terms of their effectiveness, more successful visions support at least five important functions in systems innovation processes (A. Smith et al., 2005, p. 1506):

1. Mapping out a 'possibility space' for plausible alternative arrangements for socio-technical functions
2. A heuristic for indicating the technical, institutional and behavioural problems that need to be addressed.
3. A stable frame for target-setting and monitoring progress
4. A metaphor for building actor-networks
5. A narrative for focusing capital and other resources

Given the potential adaptive nature of a vision's coherency and the commonality between the benefits of a flexible vision and the fourth function listed above, my indicators for the strength of a system's transition vision will be based on how well an identifiable vision supports these five functions (see Table 3-5). The strength of the first indicator will be based on the range of possibility spaces mapped

out for achieving the vision. Similarly, the second indicator will be assessed based on the scope of problems identified as needing to be addressed in order to achieve the vision. The strength of the third indicator, meanwhile, will be determined by whether a target for achieving the vision has been set and is being actively monitored. The indicator will look at whether the vision has helped to not only keep the niche stable but to expand it as well. Finally, the strength of the last indicator will be assessed according to the consistency and timeliness of resources to support its development.

Table 3-5 Evaluation Indicators for Shared Vision

Indicator	***Example of a Strong Indicator***
Mapped out alternative "possibility space(s)"	Multiple alternative arrangements mapped out.
Heuristic for problem identification	Broad set of problems that need to be addressed identified.
Target-setting and monitoring	Target set and monitoring is ongoing
Building niche network/flexibility	The vision has helped to maintain niche cohesiveness and has encouraged growth of membership.
Focus for resources	Consistent and timely flow of resources to pursue vision.

3.3.2.2 Legitimacy

Looking at the topic of institutional change from an organizational perspective, Hinings (2004, p. 312) argues that in order for a new idea, practice or way of organizing to reach what he calls the "archetypal status of 'taken-for-granted'" they must first be accepted as legitimate. Given this pre-condition, just as a shared vision represents a meta-idea, legitimacy represents a meta-authoritative resource because with it flow the more tactical authoritative and allocative resources that are needed to pursue a new way of thinking about or doing something.

But what is legitimacy? Suchman (1995) offers the following definition:

> Legitimacy is a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions.

From this definition we see that legitimacy is not something that comes and goes quickly but is rather something that is built gradually over time and is in most circumstances slow to erode. We also see that legitimacy involves at least two types of actors. The first are those who either are carrying out or wish to carry out an action and the second are those actors who authorize the legitimacy of that action.

Legitimacy is gained through a process of legitimation; the process that takes new ideas, organizational forms and practices and links them to the structuring forces of the norms, values, beliefs

and definitions that are held in esteem by those social actors who are closest to the issues in question. For new institutions, factors found to influence a positive legitimation outcome include the adoption by established actors of new innovations (Greenwood, Suddaby, & Hinings, 2002; Leblebici, Salancik, Copay, & King, 1991; Morrill, 2005), multi-level shifts in widely held ideologies, social structures and the organization of power (Holm, 1995), and the emergence of new actors and mature ideas that work toward delegitimizing existing institutional structures (DiMaggio, 1991; Fligstein, 1990). This list of factors from the new institutional literature shares much in common with the factors that Jacobsson et al (2004) identified as advancing the legitimacy of the renewable energy sector, namely, the support of prime-movers, the alignment of selection pressures with the emerging sector, and the formation and expansion of niche actor networks actively advocating on behalf of the emerging innovation.

Preceding legitimation is a process called "theorization" (C. R. Hinings et al., 2004:305). Theorization is where competing actors develop different institutional models to demonstrate the effectiveness of their approach and eventually try to sell these ideas to dominant actors within the system in an effort to get these models to move beyond the 'snake pit' of ideas. If an idea does begin to gain some traction beyond its initial proponents, debates about its appropriateness and that of the existing institution should start to become more and more evident as each side attempts to stake its interests as the legitimate representation of mainstream values, norms and beliefs.

Given the above discussion, in Table 3-6 I list the four indicators to assess the strength of the legitimacy afforded to efforts to steer a sustainability transition. The strength of the first indicator will be measured according to its level of normalization and the debate surrounding its appropriateness. The second indicator, meanwhile, will be assessed based on the maturity of efforts to delegitimize the existing regime. The third indicator's strength will be determined based on its level of integration by an established actor. And the strength of the fourth indicator will be based on the presence of selection pressures (as discussed above) and how well they align with the alternative socio-technical arrangement.

Table 3-6 Evaluation Indicators for Legitimacy

Indicator	***Example of a Strong Indicator***
Strength of Debate	New sustainability-oriented arrangements are being supported and/or adopted with little debate about the appropriateness of these actions
Delegitimizing	Pre-existing arrangements are perceived as inappropriate
Adoption by Established Actor	New sustainability-oriented arrangements adopted by established actor
Multi-level structural shifts (e.g., practices, sector, political)	New sustainability-oriented arrangement aligned with significant shifts occurring across levels.

3.3.2.3 Resource Mobilization

In addition to building a shared vision and gaining legitimacy, agents trying to achieve a sustainability transition must also demonstrate a capacity to mobilize in a timely manner the allocative and authoritative resources needed to pursue the vision of change that they are trying to achieve. A simple but useful question to ask for assessing the success of these agents to mobilize these resources is: Are these agents able to pursue the initiatives that they want to pursue at the rate that they want to pursue them? If not, it speaks to a problem in terms of the capacity of these agents to coordinate the resources needed to respond to selection pressures. To this end, Smith et al (2005) suggest that how resources are distributed among a network's members and the interdependency of these members are useful indicators of their ability to coordinate and mobilize resources.

In terms of how resources are distributed, the more resources controlled by those advocating for change, the more power they will have to coordinate an effective response. Interdependency, meanwhile, refers to how strongly the actors within a network rely on one another to fulfill their own core functions. The more these actors rely on one another, the more interdependent the network is said to be. In a network that is highly independent, coordinating an organized response will be more challenging because any number of actors can reject efforts to change without threatening their own survival. Similarly, in a network that is highly interdependent, it may be difficult for individual actors to push for change without first legitimizing the need for change among its most powerful core members. On the flip slide, a highly interdependent network may move more quickly than a less interdependent one once momentum to change is established.

Based on the above discussion, in Table 3-7 I identify the three indicators to help me evaluate the strength of the mobilization of resources to steer transformative change. The strength of the first indicator looks at how quickly actors are able to pursue initiatives that they identify as important for advancing TEEC. The method for collecting the information for both of this information is discussed in Section 3.3.3.1. For the second indicator, the potential for resources to be distributed to advance TEEC should be greater when a strong TEEC vision is held across a network or in the case of centralized distribution by the actors who reside at the network's centre. Finally, the potential to mobilize resources will be greater in an interdependent network that shares a strong TEEC vision or at least a number of central actors who do. In terms of an independent network, in addition to the TEEC visions of its individual actors, strong selection pressures will likely play a particularly important role.

Table 3-7 Evaluation Indicators and Ranking Definitions for Resource Mobility

Indicator	*Example of a Strong Indicator*
Timeliness	The development of TEEC initiatives is ongoing and timely in terms of how smoothly initiatives flow through different phases of development.
Distribution of resources	Centralized around actor(s) with a strong transformative vision or… Decentralized in a network with a strong shared transformative vision and at least moderate selection pressures
Interdependency of a network's actors	Interdependent network with a strong shared transformative vision or central actors with one or... Independent network with strong shared selection pressures

3.3.3 Niche Interactions

The type of interactions actors engage in are determined in part by the types of outcomes they hope to achieve. In the case of a socio-technical transition, actors are trying to replace, in one way or another, a pre-existing socio-technical arrangement with an alternative one that is deemed, at least by these actors, as more desirable. At a very basic level, achieving this outcome involves the development and scaling-up of new arrangements of ideas, institutions and technologies for fulfilling a societal function. In my analytical framework, I identified three activities that further this process: the creation of new knowledge, the development of niche markets, and advocacy.

3.3.3.1 Knowledge Creation

Knowledge is the framework that I use to interpret, evaluate and incorporate new experiences and information (Stacey, 2001). Each person's knowledge is shaped by a mix of past experience and current values and beliefs. At one level, it is stored in the memory of individuals (i.e., tacit knowledge). However, when this knowledge is made explicit it can be shared and possibly internalized by others through personal interactions as well as embodied in cultural artifacts, models and prototypes or codes and procedures (written or unwritten).

In addition to providing spaces to make knowledge more explicit, personal interactions can also provide a space for new knowledge to be created. As different types of knowledge are made explicit and shared so too can they be integrated and converted into something new and unforeseen (Nonaka, 1994; Nonaka & von Krogh, 2009). In addition to this more emergent perspective of knowledge creation, is a more traditional one that holds that knowledge is created through the collection, analysis and eventual interpretation of "raw" data. This knowledge is then applied by testing its insights. In academia, this latter approach is in line with disciplinary approaches to query where knowledge is created for its own sake rather than to achieve some practical goal (Gibbons, 1994; J. Robinson, 2008). The former approach, meanwhile, is in keeping with transdisciplinary practices of knowledge creation. Knowledge in this light "is intended to be useful to someone, whether industry, government, or society more generally and this

imperative is present right from the beginning. Knowledge thus produced is always produced under an aspect of continuous negotiation, i.e., it will not be produced unless and until the interests of the various actors are included" (Gibbons, 1994, p. 31).

When trying to assess the creation of new knowledge about socio-technical systems I need to ask: Was the kind of knowledge created sufficient to achieve the desired transition? To answer this question I need to know a) what kind of knowledge is sufficient to pursue the desired socio-technical transition, and b) was this knowledge created and applied?

Generally speaking, socio-technical transitions imply a more or less complete rearrangement of how societal functions are fulfilled. So knowledge created to address them needs to not only understand why we do things in a certain way but how might we do them in completely different ways. But how do we know if this level of knowledge is being recognized as necessary much less pursued?

Fortunately, this level of questioning and how it differs from everyday problem solving ties in well to ideas about social-learning in organizations that were developed by Argyris and Schön (1978). These authors differentiate between two different levels of organizational learning, what they call "single-loop learning" and "double-loop learning". Single-loop learning takes place when choices about the action or of the information and knowledge one communicates with others are based on existing mental models about the problem being addressed (Argyris & Schön, 1978; Hargrove, 2008; Huntjens et al., 2008; Keen, Brown, & Dyball, 2005; Paquet, 1999; Stacey, 2001). Although skills, practices and actions are adjusted, the task is still done within the existing parameters. Some examples of single-loop learning in an energy conservation and efficiency context include: introducing a new energy efficiency program or standard to address a market failure issue, adjusting the predicted elasticity of a rate structure, or using a new advertising message to encourage more voluntary conservation.

Double-loop learning begins when actors seek answers to the question: "Why do we do things in a certain way?" (Argyris, 1999: 324). A question that is often asked when the existing approach used to addressing an issue is increasingly recognized as inappropriate for one reason or another (Stacey, 2001). Answering this question, involves not only adjusting one's choice of action or of the information and knowledge that they communicate with others but understanding and changing if necessary the frame of reference or mental model upon which the range of choices are based (Argyris & Schön, 1978; Hargrove, 2008; Huntjens et al., 2008; Keen et al., 2005; Paquet, 1999; Stacey, 2001). Examples of double-loop learning in an energy efficiency and conservation context include: moving toward market transformation strategies (Blumstein, Goldstone, & Lutzenhiser, 2001), shifting from a fuel-specific planning paradigm to an integrated mixed-energy planning paradigm; mitigating DSM deliverability risk by pursuing more of it rather than less of it; and energy services led planning (as opposed to supply-led planning) (Lovins, 1977; John Bridger Robinson, 1982; John B Robinson, 1988).

In recent years several researchers (Huntjens et al., 2008; Keen et al., 2005) interested in the application of organizational learning in the field of environmental management have extended the multiple-loop learning concept to include a third loop. Triple-loop learning works to understand how changes in the regime's structural context and how such changes can influence the range of frames of reference and guiding assumptions used (Hargrove, 2008). "It starts with declaring powerful new possibilities…and then translating them into goals that take people and organisations beyond what they already think and know based on their own or organizational orthodoxies or experience…" (Huntjens et al., 2008, p. 18). It asks questions such as: Why do we do these things? And, are there alternative ways to achieve the desired outcomes? Although triple-loop learning may take place in numerous different ways, it can be supported by visioning and backcasting processes (Loorbach, 2007; John Bridger Robinson, 1982; John B. Robinson, 1988; J. B. Robinson, 2003). Examples of triple-loop learning in an energy efficiency and conservation context include: striving to build a zero-waste society; and developing an energy infrastructure that is centred on district energy systems (Lovins, 1976; Vliet, Chappells, & Shove, 2005).

If I apply these ideas of learning to the multi-level framework, I can see how an issue requiring single-loop learning is one that either was or can be addressed within the existing regime configuration. Double-loop learning, meanwhile, is required for issues that explore or require some significant reconfiguration of one or more major regime components (e.g., institutions, actors or discrete technologies). Finally, triple-loop learning is needed for issues that explore a significant reconfiguration of one or more landscape components (e.g., infrastructure, culture, biophysical system). By this line of argument, efforts to create knowledge about transformative change should reflect these higher-orders of learning as it is through these episodes of learning that existing mental frameworks about how to fulfill societal functions are challenged and new ones potentially created.

So to answer the question: what kind of knowledge is sufficient to pursue the desired socio-technical transition? I can now say knowledge frameworks that allow actors to interpret evaluate and incorporate potential changes to underlying regime and landscape components are sufficient to pursue socio-technical transitions. In addition, episodes of double- and triple-loop learning are indicators of this knowledge being created. However, episodes of double- and triple-loop learning on their own are not enough to ensure sufficiency. Given that sustainability is complex, both in terms of the number and variety of actors and elements involved, the knowledge created will also need to emerge from multiple perspectives and dimensions of the problem. For this reason I will also look at who is advancing new ideas and issues about transformative change and the type of knowledge be created as indicators of sufficient knowledge creation.

While I now have indicators for the kind of knowledge that is sufficient to pursue a socio-technical transition, I still need to know whether it was created or applied. To provide me with a proxy for assessing whether new knowledge was created and applied, I turn to the policy literature which tells me that in order for an emergent issue to be addressed, it must first make it onto the agenda of decision-makers. To this end, it distinguishes between four levels of policy agendas (Birkland, 2001; Cobb & Elder, 1972; Kingdon, 1995): universe, systemic, institutional, and decision. The agenda universe is vast. It refers to all of the ideas that could be brought up and discussed in a society or political system. The systemic agenda, meanwhile, is a subset of the first. It includes all of the issues that are recognized by those people participating in the decision-making process as warranting attention and being addressed within and by legitimate decision-making authorities. The third level, the institutional agenda, is the list of items from the systemic agenda that are actively being considered by authoritative decision-makers. As Howlett and Ramesh (2003, p. 133) put it, the systemic agenda "is an agenda for discussion while the institutional agenda is an agenda for action" The final level, decision agenda, are the items for which decisions are about to be made and actions taken.

For the purpose of my assessment, ideas and issues listed on a systemic agenda are ones that were raised as warranting attention but for which little (i.e., discussion related materials) or no work to address them was carried out. Ideas and issues listed on the institutional-agenda are ones that are actively worked on (i.e., in depth studies, operational action plan, and/or experiments) and considered but for which a definitive decision is not imminent. Finally, ideas and issues included in the decision-agenda column are actively worked on and decisions either have already been made about or are likely to be made within the next year.

In Table 3-8 I list the three indicators used to assess the strength of new knowledge being created to address a socio-technical transformations. The first indicator is based on a general trend of ideas and issues being advanced onto an organization institutional and decision agenda that require double-loop and significant triple-loop learning. Meanwhile, the strength of the second indicator is based on whose ideas and issues are being advanced onto an organization's institutional and decision agenda. While the strength of the third indicator is based on the variety of topics advanced onto an organization's institutional and agendas.

Table 3-8 Evaluation Indicators for Knowledge Creation

Indicator	*Example of a Strong Indicator*
Tier of learning pursued	Most double- and triple-loop issues advanced onto the institutional or decision agendas.
Diversity of perspectives	A relative equal ratio between the number of issues advanced by each actor and the number of each actor's issues on the institutional and decision agendas.
Diversity of topics explored	A relative equal ratio between the number of different types of topics raised and the topics on the institutional and decision agendas

3.3.3.2 Niche Market Formation

Creating innovative ideas, practices and technologies is one thing, diffusing them throughout the marketplace where they will actually be applied to fulfill every day functions is quite another. A major challenge to diffusing new innovations is that in most cases pre-existing markets rarely exist for them or if they do they are too small to support any serious transition effort. To overcome this challenge it is necessary to try to either stimulate growth in whatever little market activity may already exist or to create a new market for the innovation. Key activities involved in shaping niche markets include the marketing efforts of firms, and regulatory measures taken by governments (e.g., procurement policies, pricing incentives, minimum portfolio standards) (A. Smith et al., 2005).

However, to assess the effectiveness of efforts to create a niche market to advance the transformation of the BC's existing built environment energy-use system, in addition to identifying the types of activities that are being undertaken to promote such an outcome, I need to be able to also evaluate the effectiveness of these different types of activities. Fortunately, work by Jaccard (2005) can help. In an evaluation of the effectiveness of different sustainable energy options and policies for encouraging a transition to a sustainable energy systems, Jaccard (Jaccard, 2005) identifies and evaluates six primary policy types: command-and-control regulations; financial disincentives; financial incentives; voluntarism and information; and emissions cap and tradable permit; and niche market regulation.

Command-and-control regulations refers to policies that mandate a specific action or performance level to be achieved in order to be in compliance with government regulation (e.g., equipment energy efficiency standards; building energy efficiency codes; a minimum level of energy use reduction).

Financial disincentives, such as taxes or increased rates, make it more expensive for individual consumers to carry out an activity that policymakers would like to discourage (such as going over a certain energy use threshold or using a particular kind of energy source). F*inancial incentives*, meanwhile, are designed to encourage individuals to voluntary adopt a desired behaviour by reducing their financial cost to do so (e.g., grants, low interest loans, tax credits, public R&D). To have the desired outcome,

though, they must be set at a level that reflects the incremental environmental damage that is trying to be obverted (Jaccard, 2005).

Voluntarism, the fourth energy policy type, relies on campaigns that use information and moral suasion to try to convince individuals to voluntarily adopt a desired practice to satisfy a complex blend of ethical obligation and self-interest. Programs included in this policy type include: advertising, labeling, information brochures, awards, demonstration projects, sponsorship of conferences and the coordination of collective efforts.

The first type of market-oriented regulation discussed by Jaccard (2005) is a *cap and trade permit system*. Like command-and-control regulations, cap and trade requires governments to place a bar on the aggregate output of some kind of activity (e.g., pollution, energy use); what differs is the way that the penalties for exceeding this limit is administered. The basic idea is that individuals and organizations have to pay for every unit of an undesirable outcome that they are responsible for. However, rather than pay the government, these per unit 'rights' to generate the undesirable outcome are bought and sold on an open marketplace. Overtime individuals and organizations are motivated to reduce costs by minimizing the amount of the undesirable activity that they generate. As the per unit price drops because there is less demand for them, the government is able to reduce the number of units trading on the marketplace, thereby reducing the aggregate permissible amount. In the world of energy efficiency and conservation, market-oriented regulation is carried out through what are called 'white certificates'. White certificates represent a certain level of energy savings that occurs below a predetermined threshold. Individual organizations receive white certificates for the portion of their energy use that comes in below a pre-established mandated target. Organizations who receive white certificates in this way can either choose to keep them for their own use or trade them to organizations that need to purchase white certificates because they have exceeded their mandated target.

A second type of market-oriented regulation discussed by Jaccard is the creation of what he calls *artificial niche markets*. The objective here is to require a minimum amount of space in the marketplace for new technologies that might not otherwise be able to compete due to price differentials. By guarantying a certain market share, new entrants and investments in the sector are encouraged, ultimately reducing costs by accelerating the rate of learning and the pace that economies-of-scale are achieved. One example of this policy type is a Renewable Portfolio Standard (RPS). An RPS requires utilities that operate in a jurisdiction to ensure that a minimum percentage of the electricity produced and/or sold in that jurisdiction comes from renewable sources. A similar model, called an Energy Efficiency Resource Standards (EERS), is being increasingly used to ensure that utilities operating within a jurisdiction pursue a minimum level of energy savings through a variety of different measures (e.g., end-user savings programs, transmission and distribution efficiencies, distributed generation, and district energy) (Nadel,

2006). In some cases the utility might pursue these measures themselves; in others they might purchase the savings in the form of white certificates from other market actors.

As Jaccard's research is interested in developing a policy portfolio that will encourage the long-term transition from conventional energy systems to sustainable ones, he evaluates each of these six types of energy policy according to four criteria: environmental effectiveness, economic efficiency, administrative feasibility and political feasibility (see Table 3-9). By using Jaccard's ranking of environmental effectiveness as a proxy of each policy's potential to diffuse sustainable energy practices and technologies, I am able to devise a three tier ranking system to help me assess the effectiveness of the existing set of energy policies being used in BC to advance TEEC.

Table 3-9 Energy Policy Evaluation Summary

	Environmental effectiveness	Economic efficiency	Administrative feasibility	Political feasibility
Command-and-control regulations	Good	Poor	Good	Medium
Financial disincentives	Medium	Good	Good	Poor
Financial incentives	Medium	Poor	Medium	Good
Voluntarism and information	Poor	Poor	Good	Good
Emissions cap and tradable permit	Good	Good	Medium	Medium
Niche market regulation	Good	Medium	Medium	Good

Adapted from (Jaccard, 2005)

In the first tier of policy types are voluntarism and information. Jaccard (2005) argues that although voluntarism is popular with decision-makers and the general public, largely because they are straightforward to administer and unobtrusive, their effectiveness is nearly impossible to measure because they are not tied to any direct action being taken. Having said that, he does concede that there is a time and place for some information campaigns in the early awareness-building days of a broader change strategy.

In the second tier of policies are financial disincentives and incentives. Although these policies, like voluntarism, have no preset minimum level of effectiveness because they rely completely on the voluntary actions of individuals and organizations, they at least create some kind of external push for individuals and businesses to take on a desired practice. Although financial incentives are less desirable

from an economic efficiency perspective, largely due to their potential for encouraging free ridership, they can incent action in very narrow niche markets (e.g., high efficiency residential housing or lighting). Such a narrow focus is more challenging for financial disincentives which tend to cast a broad net across a general set of less desirable activities.

The effectiveness of the remaining three policy types all rank 'good' in terms of their environmental effectiveness. These include command-and-control regulations, emissions cap and tradable permit, and niche market. A main reason why these policies rank higher than the others is because they each require a minimum performance standard to be set and met if some kind of penalty is to be avoided. Of these, straight command-and-control regulations are somewhat less desirable because of their potential to curb innovation if they are too prescriptive (Jaccard, 2005). What is more, if improvements in efficiency are not countered with some kind of increase in energy prices (whether through rates or some kind of energy capping scheme), improvements in efficiency standards and codes may actually lead to a rise in individual energy use because it now costs them less to get a higher level of energy service. This perverse outcome is known as the rebound effect.

To assess the strength with which the existing regime is creating market niches for ideas and actions related to TEEC in BC's built environment, the three tiers of policy measures described above will be used as indicators (see Table 3-10). The strength of the first indicator is based on the level of the energy performance baseline required, the degree to which it is mandatory, and whether signals about future baseline increase are communicated. The strength of the second indicator is based on the degree to which these measures create additional (dis)incentives to reduce energy consumption and whether signals about future increases (in the case of disincentives) are communicated. And the strength of the third indicator is based on both the duration of the measures as well as the degree to which they include efforts to build up an energy services infrastructure in the province.

3.3.3.3 Advocacy

Advocacy is the process by which an individual or a group of individuals tries to influence policy and resource allocation decisions. For this study, I am interested in assessing the ability of individuals and groups to influence ideas and the allocation of resources to advance TEEC. Given this definition of advocacy, I need to ask whether there is evidence of individuals or groups trying to influence energy policy and resource allocation decisions toward transformative energy efficiency and conservation? If there is, what level of success are these efforts having?

I can answer the first question by first identifying the places where TEEC-related issues are emerging and then see what actors, if any, are advocating within these spaces for actions that are intended to lead to TEEC-related outcomes. Assuming that there are actors who are advocating for TEEC, I still need to assess the level of success that their efforts are having in terms of influencing policy and resource

allocation decisions. To help me make such an assessment I turn again to the policy literature's agenda setting concept (Birkland, 2001; Cobb & Elder, 1972; Kingdon, 1995). Agenda setting is the process where alternative issues, problems and solutions gain or lose public and decision-maker attention. Helping to move an issue through this process are advocates commonly referred to as policy entrepreneurs (Kingdon, 1995)[3].

Table 3-10 Evaluation Indicators and Ranking Scale for Niche Market Development

Indicator	*Strong*	*Moderate*	*Weak*	*Zero*
Tier 1 Policies Performance baselines	A least a moderately ambitious energy performance baseline is required and strong signals about the direction and timing of future increases are clearly communicated.	Moderate energy performance baseline is required.	Some baseline is required but it does not necessarily require a change in existing practices to be achieved.	Policy measure not used
Tier 2 Policies Financial (dis)incentives	At least a moderate additional (dis)incentive and strong signals about the direction and timing of future disincentive increases are clearly communicated.	Moderate additional (dis)incentive.	Low additional (dis)incentive and/or limited application for improving energy performance.	Policy measure not used
Tier 3 Policies Voluntarism & information	Longer-term commitment to a mix of information and market foundation building programs[4].	Short-term commitment to a mix of information and market foundation building programs.	Relies purely on information programs.	Policy measure not used

Once I can identify who is advancing what issues, I can then assess the success of these efforts based on the three indicators included in Table 3-11. To assess the strength of TEEC advocacy in BC, I will look at how many of the issues and ideas advanced by TEEC advocates made it onto the institutional and decision-making agendas of BC Hydro and the Province (See Table 3-8). For timeliness, the faster an issue proposed by an advocate makes it onto the organizational agendas of key actors, the more success

[3]In the organizational studies literature, a similar set of actors are referred to as institutional entrepreneurs. (DiMaggio 1988; Greenwood and Suddaby 2006; Hinings, Greenwood, Reay and Suddaby 2004; Maquire et al 2004.)

[4] Examples of market foundation building program include education, training, energy managers

these actors have. Finally, as was the case with my indicators for creating new knowledge, I will also assess the diversity of topics advanced on the organizational agenda to see if there is a preference for some topics over others.

Table 3-11 Evaluation Indicators for Advocacy

Indicator	***Example of a Strong Indicator***
Number of topics addressed	At least half of the issues have made it to the institutional or decision agenda.
Timeliness	Time between issues being first raised and picked up and advanced on the organizational agendas of key actors is relatively short (1 to 2 years).
Diversity of topics addressed	A relative equal ratio between the number of different types of topics raised and the topics on the institutional and decision agendas

3.3.4 Actor-Networks

In this section I develop several indicators to help me assess the strength of the actors and interactions between actors who are trying to positively steer socio-technical transformations. In terms of how transition actors are organized, as discussed in Chapter 2, there is strong support in the governance literature that networks of self-organizing and interorganizational actors are more adept at creating the social learning needed to address complex problems than those that tend to be more hierarchical and expert-oriented (Grin, 2006; René Kemp et al., 2005; Lafferty, 2004; Charles E. Lindblom, 1999; Lundqvist, 2004; Meadowcroft, 1999; O'Toole, 2004; Petschow, 2005; Rip, 2006; Rosenau, 2003). However, it is not as straightforward as saying that networks are good and hierarchical systems are bad for transitions. Indeed, learning can and does take place within hierarchies. What is more, what do we mean by networks? Between networks there can be considerable variation in terms of their intended objectives, type of participants, recruitment, processes of learning and motivations for maintaining network cohesion.

To help make a clearer distinction, I look to the work of Cohendet, Creplet and Dupouët (2001) in the field of organizational innovation. These authors argue that that a critical (and often overlooked) link between individual learning and social learning are the intermediate-level communities, “where in a specific group context, the elementary process of collective generation of knowledge may occur” (Cohendet et al., 2001, p. 306). To this end, they identify five different types of “communities-that-learn” that may co-exist within larger organizational forms. Three of these – functional groups, teams, and networks – reflect a more ‘classical’ representation of communities within an organization, while two of these – communities of practice and epistemic communities – reflect newer concepts (see Table 3-12).

Functional groups are made up of a homogenous membership in terms of their shared general set of values, language, and disciplinary specialty (e.g., finance, marketing, engineering). Given the

disciplinary nature of these groups, they form the basis for the division of labour within organizations. Members are selected by the organization's hierarchy based on their level of competence within the associated discipline. Although new knowledge may be created through the process of carrying-out or improving upon existing organizational tasks, such an outcome is secondary to the task being completed in an appropriate fashion.

Table 3-12 A Summary of the Typical Characteristics of Different Communities-of-Learning

Type of Community	Objective	Membership Mix	Selection of Membership	Membership Pull
Functional group	To fulfill a specific function	Homogenous	Hierarchical	Authority and the division of labour
Team	To fulfill a more complex function	Heterogeneous	Hierarchical	Authority and achieving a common goal
Network	To build a shared agenda or specialization	Heterogeneous	Self-selected but must maintain mutual trust	Desire to gain complementary knowledge
Communities of practice	To improve individual competencies	Homogenous	Self-selected	Mutual commitment to practice and one another
Epistemic communities	To create "codified" knowledge for sharing widely	Heterogeneous but includes a "procedural authority" for validating knowledge	Ability to contribute to body of knowledge being created	Commitment to advancing a particular area of knowledge

In teams, actors with different disciplinary backgrounds integrate their knowledge with one another in order to fulfill a given task. As is the case with functional groups, the primary objective is usually not to create new knowledge although through their interactions with one another, new knowledge may very well be a secondary outcome. Members are generally recruited by a team leader and bound to it through a combination of a common goal (i.e., carrying out an organizational task) and job requirements. How long a team remains together will depend on the task that it needs to perform. For routine tasks, the team may reflect an ongoing community within the organization. In some cases, though, a special project team may be assembled to address a one-off objective. Although most of the regular 'team' attributes still apply to such project teams, they differ in two ways. First, their 'one-offness' means that they are inherently instilled with a higher level of uncertainty in terms of how to achieve the desired objective. And second, they have a limited time frame within which to achieve their goal.

A network is the third and final classical organizational community described by Cohendet al (2001). It is made up of a heterogeneous membership who although are self-selected adhere to a recruitment rule of mutual trust. The objective of a network is to build a 'mutually negotiated specialization' such as renewable energy, fair trade, or sustainable cities. Learning, which is largely

carried out through information exchanges, may produce new knowledge but whether or not the production of this knowledge is intentional will depend on the kind of network being observed. Members are held together by their desire to gain complementary knowledge from one another.

Communities of practice are self-organized systems. By definition this means that they form, evolve and adapt autonomously without any hierarchical influence or predetermination. They consist of people who not only share a common practice but communicate with one another on a regular basis about the activities that they carry out as part of this practice (Lave & Wenger, 1991). The intent of the interactions that take place between members is not to build shared knowledge so much as it is to improve their individual competencies. This competency is built by constructing, exchanging and sharing a common pool of resources (Wenger 1998). Learning and the spread of best practices are more consequences of these activities than explicit objectives. Furthermore, through the act of collectively building something new, members are co-creating a sense of mutual commitment to not only what they are building but to one another as well.

From a political perspective, Holden (2008) likens communities of practice to Sabatier's (1988, 1998) advocacy coalition, a self-selected and autonomous network of people with shared values and perspectives about a particular policy issue, who work to build and advance a shared policy agenda. One consequence of the actions taken by the individuals within such a community to advance their interests is the generation of new knowledge about the issue.

Epistemic communities, the final ones included in Cohendet et al.'s (2001, p. 307) typology, are defined as "a group of agents sharing a common goal of knowledge creation and a common framework allowing the shared understanding of this trend." Unlike communities of practice, then, the primary objective of this community is to create explicit knowledge (i.e., knowledge that can be codified and shared both readily and easily beyond the community that creates it). Another defining element of this type of community is the existence of some kind of 'procedural authority' with the responsibility of ensuring that the community is progressing toward its goal. This authority may be explicit or not, it may also emerge through the interactions of its members or be imposed externally. In performing its task, the authority evaluates the contributions to achieving the community's goal that are made by individual community members. Indeed, an important criterion for recruitment into the network is the ability of an individual to contribute to the body of knowledge that is being deliberately created. Given the ongoing evaluation process, a variety of perspectives, values and notions about the issue are encouraged to ensure that a breadth of knowledge is being considered and constructed at any given time. In addition, rather than constructing new knowledge through a small number of collaborative projects (i.e., "learning by working"), individuals are valued by the community based on the individually accumulated knowledge

that they can add to the body of knowledge being assembled (i.e. 'intended searching'). The community is held together by the commitment of its individual members to advancing a particular area of knowledge.

While these distinctions show that communities that learn can take many different forms, it still does not tell me how well different forms align themselves with the type of learning that is needed to facilitate socio-technical transitions. To do this, I look once again at the work of Jacobsson and his colleagues to see what types of communities were involved with the emergence of northern Europe's renewable energy sector (Jacobsson & Bergek, 2004; Jacobsson & Johnson, 2000; Jacobsson & Lauber, 2006). When I do this, we see that at least three community types played active roles in the sector's emergence since the 1970s: epistemic communities, networks, and communities of practice.

In the formative stage of the niche, a form of *epistemic community* formed around government research and development policies aimed at the 'creation of new knowledge' was particularly important (Jacobsson & Bergek, 2004, p. 830). Programs found to be the most successful were ones that encouraged a large number of actors to pursue a diverse set of technological options. In this case, the procedural authority with the responsibility of ensuring that the community was progressing toward its goal, was the government entity responsible for encouraging through one means or another the building up of knowledge within the targeted field.

In addition to communities capable of creating new knowledge, *networks* where users, manufacturers, suppliers, and government entities could exchange complementary knowledge were also found to play an important role in improving renewable technologies (Jacobsson & Johnson, 2000). Although new knowledge was clearly being created through these exchanges, there was no procedural authority responsible for the goal and validation of this knowledge. Instead, it was through the complementary exchanges of information between varieties of actors that the direction of the sector was ultimately negotiated. Particularly important within the network are powerful 'prime movers' who, because of their ability to exercise both allocative and authoritative resources within and outside of the niche, are well situated to accelerate the niche's legitimacy and development.

More specific to the manufacturing and operation of renewable technologies were interactions between manufacturers and users, in this case, the manufacturers' "learning-by-doing" was complimented by the users' "learning-by-using". Functioning like a *community-of-practice*, these exchange ultimately helped to increase manufacturer competence (Jacobsson & Johnson, 2000).

While the networks described thus far were important for strengthening the internal knowledge of renewable energy niches in European countries, just as important were *communities-of-practice* that advocated for policy measures to increase the niche's stability and capacity to expand. (Jacobsson & Lauber, 2006). In addition to the firms and universities involved in the building of the sector's physical pieces, advocacy coalitions for wind and solar power were formed that included conventional industry

associations and just as importantly was the involvement of actors who saw a connection between the niche and some broader issue or issues that they were trying to advance (such as the environment, economic prosperity, health and safety). So unlike the manufacturer/user community-of-practice which was bound together through their direct experience with a hard technology, this community was bound together by its memberships' shared normative and causal beliefs about these technologies.

This brief look at how the Northern European renewable energy sector emerged shows that in addition to ensuring that a given function is performed or task achieved via functional groups or teams, a socio-technical transition will likely require communities that also create mutually negotiated specialization via networks, increase the skills in a given practice via communities-of-practice, and intentionally produce new knowledge on the issue in question via epistemic communities.

Based on the above discussion, I now have three indicators to help me assess the strength of actor-networks that are trying to positively steer socio-technical transformations (see Table 3-13). The strength of the first indicator will be assessed by the number, level of activity and consistency of 'higher-tier' communities-of-learning. The strength of the second indicator, meanwhile, will be based on the range of actors who are participating in TEEC-related communities-of-learning. And the strength of the third indicator will be based on the level of involvement of committed 'prime movers', working to expand and normalize the niche.

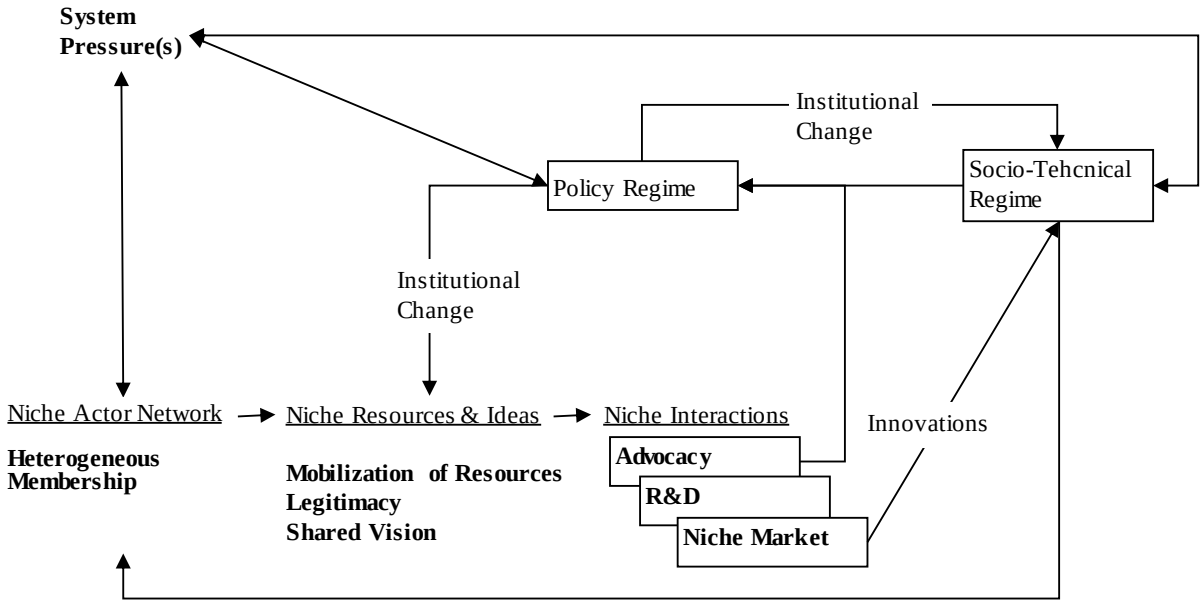
Table 3-13 Evaluation Indicators for Actor Networks

Indicator	***Example of a Strong Indicator***
Diversity of communities-of-learning.	All four higher-order TEEC communities-of-learning are active and ongoing (i.e., networks, application-oriented communities-of-practice, advocacy-oriented communities-of-practice, and epistemic communities)
Diversity	Broad range of energy-services and governance regime actors participating in the different communities-of-learning.
Prime Mover	Prime mover is active in advancing niche both internally and externally

3.4 Conclusion

In this chapter, I established a framework to conduct a theory-based evaluation for assessing the effectiveness of existing governance approaches to steer transformative change in places where sustainability transitions are trying to take root. The theory I use is the one developed in Chapter 2 that argues that reflexive governance practices help to create the conditions needed to support socio-technical transitions (see Figure 3-1). A major challenge of this theory is knowing whether or not the desired outcomes are being achieved in the short-term because the duration of change takes place over decades. As such, I will assess efforts to steer transformative energy efficiency and conservation in BC based on the strength of the set of system conditions that I argued in Chapter 2 are needed to support a long-term

transition (see Figure 3-2). Critical conditions identified include system pressures bearing on the regime; the formation of a socio-technical niche; the capacity of this niche to create a shared vision among its membership, build legitimacy, and mobilize resources; the creation of innovative sustainability systems through the creation of new knowledge, the formation of niche-markets, and advocacy; and a strategic capacity to not only scale-up niche innovations beyond the realm of niche markets to that of the regime but to also increase its powers in order to continue to expand its activities. With the individual components of this framework identified, the rest the chapter was devoted to drawing out the indicators listed in Table 3-2. Once the strength of these conditions are known, I can then use the theoretical concepts of reflexive governance to untangle the role that hard-governance infrastructures played in producing these results. With the evaluation framework now defined, in Chapter 4 I present the qualitative methods that will be used to carry out the study's theory-based evaluation.



Arrows depict the flow of resources and/or pressures
Bolded words are eight conditions included in evalatuion framework

Figure 3-2 Analytic Framing of the Conditions that Support Socio-Technical Transitions

Chapter 4: Methods of Data Collection and Analysis

4.1 Introduction

In this chapter I discuss the methods I used to collect data on efforts within British Columbia (BC), Canada to steer transformative energy efficiency and conservation (TEEC) within the province's built environment. Using a mixed-method approach, these data were collected between September 2007 and October 2012. The qualitative summary of these data is presented in Chapters 5 and 7 of the thesis.

4.2 Case Studies

The intentional steering of entire socio-technical systems toward sustainability is a phenomenon that goes back less than a decade (Berkhout F., 2002). Prior to this the focus was on replacing specific components of existing systems with clean technologies. Given the relative newness of this approach and the fact that sustainability transformations are expected to take decades rather than a few years to complete, empirical evidence about intentional transformation must necessarily draw from transitions in progress. To do this, the study uses a "quasi" comparative case study method. "A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 2009, p. 16). Yin argues that a case study has a 'distinct' advantage over other methods when "a 'how' or a 'why' question is being asked about a contemporary set of events over which the investigator has little or no control". In other words, it is a useful method for analyzing actions situations and their linkages that are more complex in nature. Using these criteria as my guideline, I deem a case study approach is appropriate for my research project on at least two grounds: First, the phenomenon being studied in this proposal is the attempt to construct measures that are intended to achieve British Columbia's aggressive long-term energy efficiency (EE) and goals. However, it is unclear what and how different contextual factors may influence these efforts. Second, the significant regulatory and political environment that surrounds energy planning and decision-making in BC means that this investigation or any other cannot expect any significant direct impact on how energy efficiency and conservation (EEC) is pursued in the province. It is, in other words, beyond the control of the investigator.

When started, this study began as using a single-case rather than a multiple-case study method. At the time, I had "an opportunity to observe and analyze a phenomenon previously inaccessible to" direct "scientific investigation", a closed-door EEC stakeholder process coordinated by BC Hydro (see Appendix A). Yin (2009, p. 46) refers to such cases as "revelatory". In addition to being "revelatory", the case was also a "critical" one because it has a strong potential for "logical generalizations and maximum application of information to other cases" of transition governance in North America, particularly in the field of energy transitions (Bailey, 2007:65). The reason for this potential is because energy planning is a strong institutional field, meaning that it relies heavily on shared routines and standards. These

institutions are necessary in order to ensure the relatively uninterrupted functioning of its complex physical infrastructure and are reinforced through the two professional fields that dominant energy planning - engineering and economics. As a result of energy being a tight institutional field, although the EEC targets being sought in B.C. are arguably among the most aggressive in North America (BC Hydro 2012), it is not unreasonable to conclude that the routines and assumptions for problem solving used in B.C. would also be prevalent in other North American jurisdictions. Furthermore, the geographical bounding of the case study follows numerous socio-technical systems studies (e.g., Frank W. Geels, 2007; Verbong & Geels, 2007) as well as institutional studies (e.g., Greenwood & Suddaby, 2006; C.R. Hinings et al., 2003; Reay & Hinings, 2005).

As the case progressed, though, it became increasingly evident that the efforts to steer TEEC by BC Hydro were influenced by a similar but independent effort being undertaken by the Government of British Columbia. This provided me with an opportunity to not only increase the scope of the existing case study but to also develop a second case study for assessing and predicting efforts to steer TEEC. Although connected, the actors, goals, interactions, and resources driving these efforts were independent of one another. Having said that, in addition to both being in BC, another aspect shared was the desire to achieve ambitious energy efficiency and conservation in the built environment over the coming decades. According to Yin (2009, p. 52), "each case must be carefully selected so that it either (a) predicts similar results (*a literal replication*) or (b) predicts contrasting results but for anticipatable reasons (*a theoretical replication*)." However, as both cases were playing out in real time, I could not say when I decided to add the second whether it was for literal replication or theoretical replication purposes. So I had to operate under the assumption that it was the former. But as it turned out, it was actually the latter (as will be revealed in Chapter 5-9).

4.3 Participatory Evaluation

As noted in the preceding chapter, the application of participatory evaluations has gained momentum over the past thirty years. According to Plottu and Plottu (2009), the two most common rationales for including participants are to improve the utilization of the evaluation and to empower people (e.g., the organization being evaluated, "clients" who receive the goods or services from the organization being evaluated, or other stakeholders s who hold an interest in how a program or practice is delivered). Although my evaluation was for the most part non-participatory, given the interest and potential benefits of such practices, I felt it was important to mention where and how actors did participate beyond opening their doors to me and participating as study subjects. First, both BC Hydro and the BC Ministry of Energy and Mines (MEM), the two organizations at the heart of my evaluation, provided input into the evaluation objectives of the study via a research funding application in 2010 which was supported by MEM and co-funded by BC Hydro. Second, a representative of the BC Ministry

of Energy and Mines (now with a private sector firm) sat on the dissertation's graduate committee since 2010, providing them with an opportunity to not only receive information on a regular basis but to also influence the decisions made regarding the direction of the research. Third, a member of BC Hydro's Power Smart policy group was provided with a draft copy of the BC Hydro case study (Chapters 7-8) several months prior to the writing of the final draft. From this, a number of suggestions were made regarding the accuracy and interpretation of the case study. Finally, it is my intention to present the findings of the study to at least BC Hydro and MEM following the completion of its writing. In addition, I intend to use the dissertation's findings as an opportunity to offer similar presentations to a number of local, regional, and provincial government departments, environmental and sustainable energy non-governmental organisations, utilities, as well as relevant academic institutions in British Columbia. However, at the time of writing, only one such presentation was scheduled (with BC Hydro's Power Smart division). So while the study may not reflect a deep participatory evaluation, it did and does provide at least some level of interaction not only about the case studies but just as importantly about concepts of socio-technical transitions and sustainability governance.

4.4 A Qualitative Mixed-Methods Approach

Understanding the processes and decisions that lead to transformational change is arguably a complex area of research. Although the policies used by governments, businesses, and other organizations can be found in writing (Snider, Hill, & Martin, 2003), the decision-making processes that lead to the formation of such policies and the outcomes that they lead to is frequently carried out with little written documentation. Without detailed archival information to guide the study, conducting research on transition processes would require the use of at least one of the following qualitative research methods: observational research, participatory research, ethnographical research, or interactive research (Earl Babbie, 2001; Neuman, 2003; Palys, 2003).

In keeping with case study and formative, theory-based evaluation approaches, the research will use multiple methods to collect data (Fitz-Gibbon & Morris, 1996; Gillham, 2008; Silverman, 2003; Yin, 2009). The specific methods used were observations as participant, key informant interviews and a qualitative review of historical documentation. Each method is discussed in the sections that follow.

4.4.1 Observer as Participant

The specific type of observational research used by this study is called observer-as-participant (Adler & Adler, 1994: 380). Observer-as-participant is a middle-of-the-road observation approach that affords the researcher space to interact "casually and nondirectively" with members of the process being observed but is not herself an active member. This differs from participant observation approaches where the observer is an active member of what is being observed. It also At the same time, it recognizes that although the researcher is not an active member of the two processes being observed, there are

opportunities that arise (e.g., meeting breaks) that allow the observer to engage in informal discussions with members under observation. Not permitting space for these types of interactions within the research design would create an artificial barrier between the researcher and the process participants.

Although guided by the analytical framework established in Chapter 3, the observations themselves were for the most part unstructured (Bailey, 2007). That is, rather than concentrating their focus on pre-established variables, the observations were used to develop a more detailed description as events unfold of the actors and elements that are having the most influence on the process. For BC Hydro's Energy Efficiency and Conservation Advisory Committee, the notes taken were cross checked against the minutes issued for each of the meetings attended (discussed in Section 4.6.1). As the topic of study was relatively new and covered a wide range of potential issues, this unstructured approach was taken in order to provide the researcher with a realistic and broad a breadth of exposure to the what, how, and why different individuals, institutions and decisions were influencing the actual outcome of these processes. Given this objective, data were collected in the form of typed transcripts taken during meetings rather than tightly defined observation guides and schedules. These data were subsequently coded and categorized primarily based on my analytical framework but also with a mind to emerging themes not well represented within this framework. Gradually these data, along with those collected via historical documents, were worked into a detailed case record for both BC Hydro and the Province that was later used as the starting point for the case study narratives in Chapters 5 and 7 and served as an important directional instrument for my semi-structured interviews.

4.4.2 Semi-Structured Interviews

Rubin and Rubin (1995: 196) call interviews that are interested in exploring "what, when, how, and why something happened", topical interviews. The "something" that I am interested in are the issues discussed and decisions-made for each of the two EEC policy actions being observed. From a methodological perspective, it is suggested that the questioning in topical interviews be actively guided by the researcher (Rubin & Rubin, 1995). However, despite the emphasis on preplanning, the formulation of questions should also be a flexible process that evolves throughout the interview process to ensure that the project is able to investigate ideas and themes as they emerge. The interviews, therefore, follow a standardized, semi-scheduled structure (See Appendix D and E). Gorden (1987: 44-45) categorizes an interview as standardized, "[i]f all of the interviews in a set seek the same information." Semi-scheduled, meanwhile, means that there is some variance in at least one of the following aspects of the interview: "(a) the content of questions related to the central problem, (b) the exact wording of the question, (c) any context to be supplied with each question, and (d) the answer categories, if any, which are to be used."

Purposive sampling was used to select the individuals who were asked to participate in the interviews. Purposive sampling is a nonprobabilistic method that intentionally seeks subjects to be

included in the study based on their ability to meet specified criteria. This intentional sampling contrasts random sampling techniques preferred by deductive research approaches (Palys, 2003).

The two sets of interviews held by the study (described in Section 4.5.2) were both carried out well into the study period. A primary reason for holding these at this point in time was to fill in gaps and clarify data in the study's two evolving detailed case records. The case records were evolving because information was continually being added to them via the data collected through the study's ongoing observations and review of historical documents. These interviews also provided me with an opportunity to draw a more integrated perspective of the different elements of the analytical framework (e.g., actors, interactions, institutions, flow of resources, ideas) as well as to test some of the ideas that were being developed through an analysis of the increasingly mature data set.

4.4.3 Historical Documentation

Running throughout the dissertation was an ongoing review and analysis of historical documentation, largely of energy- and climate-related topics in British Columbia. The different sources of documentation used included, but are not exclusive to: transcripts of public energy consultations, government legislation and regulations, annual reports, submissions made to the British Columbia Utilities Commission, reports issued by organizations involved in built environment energy-use planning, websites, press releases, minutes provided from the meetings of BC Hydro's EC&E Advisory Committee, hard-copies of slide presentations that I observed, and so on.

In many cases, these reviews were simply to help fill in the researcher's knowledge gap about existing and historical energy planning practices, assumptions, and decisions. As energy planning is a highly technical field of practice, it often felt as though this gap, much like the banks of a stream, were slowly but persistently growing in size. Although not coded, some of this information gradually worked its way into the detailed case record. More importantly, though, it permitted the research to not only engage with participants but to gain some measure of legitimacy as I could speak some level of the "language" of energy planning.

In addition to these more personal forays into the historical records, were a number of more intentional thematic searches, some of which are included in Chapters 5-8. These included a review of advocacy recommendations for TEEC, a historical review of government and utility policies and actions pertaining to energy efficiency and conservation in British Columbia since 1980, a list of the interveners and their positions on energy efficiency and conservation who participated in BC Hydro's filings to the BC Utilities Commission, and a running summary of the TEEC-related topics included in the minutes of BC Hydro's EC&E Advisory Committee. Similar to my observations and semi-structured interviews, these data were coded and categorized largely based on my analytical framework but also with a mind to emerging themes not well represented within this framework. In addition to the stand-alone tables created

from these analyses, much of this information was also added to the detailed case record (which by this time was getting rather large).

In short, in addition to helping to validate factual details about what was being observed in meetings and said in interviews, these documents were critical to helping me fill in the broader context within which energy efficiency and conservation planning within BC takes place.

4.5 Case Study Specifics

4.5.1 BC Hydro's Conservation Target Meetings

As discussed in detail in Chapter 7, BC Hydro is British Columbia`s largest electricity utility, serving nearly 95% of the province's population. In late 2007, BC Hydro`s CEO announced the utility's ambitious target to capture all growth in demand with demand-side measures by 2027. My observation of BC Hydro's pursuit of this target began in October 2007 and concluded in October 2012. Over this period, I observed 99 meetings organized by BC Hydro in my role as a participant observer (see Table 4-1). The meetings observed were selected based on my discussions with BC Hydro staff members who were assisting me with the research project. A key element of all of the meetings observed is that in one way or another they included space for participants to discuss how to achieve BC Hydro`s ambitious long-term energy savings goal.

The initial observations were exclusively from meetings held by B.C. Hydro's Energy Efficiency and Conservation Advisory Committee (EC&E) and its associated working groups. At any point in time, the EC&E consisted of approximately 20 members that have been identified by BC Hydro as energy efficiency and conservation stakeholders. The EC&E core membership was made up of senior managers from BC Hydro's Power Smart program, various levels of government, first nations, academia, environmental non-government organizations, customer associations, and several members at large (see Appendix A for a full listing of EC&E members). In addition to core EC&E members, several of the EC&E affiliated working groups included additional stakeholders invited by Power Smart to participate.

Beginning in October 2009, my observations were expanded to include other BC Hydro energy efficiency and conservation planning processes. These observations included meetings that were both internal to BC Hydro as well as ones that brought in external stakeholders. Expanding my observation beyond the EC&E was viewed as important to understanding the case because although the EC&E is affiliated with BC Hydro it does not itself have any decision-making authority. In order to understand what actors are affecting BC Hydro's decisions and what factors are influencing these decisions, a more internal perspective was required.

Table 4-1 List of Meetings Observed for BC Hydro Case Study

Name of Meetings Observed	Number and Type of Meetings Observed	Type of Participants	First Observed	Last Observed
Energy Conservation and Efficiency (EC&E) Advisory Committee	26 full-day sessions. 5 one- to two- hour conference calls	Power Smart senior managers; Power Smart invited stakeholders. Members of the EC&E committee	Sept 2007	October 2012
The EC&E Rate's Working Group	14 half-day sessions.	Power Smart senior managers; Self-selected EC&E members; Power Smart invited stakeholders..	Oct 2007	February 2010
The EC&E Strategic Framework Working Group	12 one- to two- hour conference calls. 2 face-to-face meetings.	Power Smart senior managers; Self-selected EC&E members.	January 2008	March 2010
The EC&E Split Incentives Working Group	1 conference call. 1 half-day session	Power Smart mid-level commercial and residential managers; Self-selected EC&E members Power Smart invited stakeholders.	May 2008	August 2009
The EC&E Government Policy Enablers Working Group	3 one- to two-hour conference calls.	Power Smart mid-level managers; Self-selected EC&E members; Power Smart invited stakeholders.	July 2010	October 2011
Power Smart's DSM Planning Process	4 senior-management planning meetings. 7 full-day workshops 6 transformation scenario development sessions	All levels of Power Smart and BC Hydro managers Self-selected EC&E members BC Ministry of Energy and Mines.	October 2009	August 2010
BC Hydro's Energy Efficiency Code's Retreat	1 full-day workshop.	Mid-level demand-side managers from three energy utilities; BC Ministry of Energy and Mines.	June 2010	June 2010
BC Hydro's Integrated Resource Planning	1 half-day public information meeting.	BC Hydro resource planning staff ; Self-selected electricity stakeholders.	Dec 2010	Dec 2010
Monthly Update Calls	16 one-hour conference calls.	Power Smart senior and mid-level managers; BC Ministry of Energy and Mines senior and mid-level managers.	Nov 2009	June 2012

4.5.2 The Province's Energy Efficient Built Environment Strategy Meetings

In February 2007, the Province of British Columbia announced its ambitious greenhouse gas emissions reduction targets for 2020 and 2050. As part of this broader objective, the BC Ministry of

Energy and Mines (MEM) announced its Energy Efficient Building Strategy (Ministry of Energy Mines and Petroleum Resources, 2007b) to significantly increase the level of energy efficiency in the residential, commercial, and institutional building sectors by 2020. My observation of MEM`s pursuit of this strategy began in October 2009 and concluded in June 2012. Over this period, 20 meetings were observed (see Table 4-2). Three of these meetings were organized by MEM, one was organized by the BC Ministry of Community Development and the Climate Action Secretariat and the remaining sixteen were jointly organized by MEM and BC Hydro. The 16 one-hour conference calls that were observed between MEM and BC Hydro are the same ones that are listed in Table 4-2. They are mentioned in both case studies because issues were brought forward equally by BC Hydro and MEM.

Although none of these meeting dealt exclusively with MEM`s Energy Efficient Built Environment Strategy, they all addressed issues that were closely connected to the strategy. In early 2009, I had hoped to also observe several MEM organized working groups that were intended to directly address different elements of the strategy (i.e., Built Environment Working Group, Industrial Working Group and Road Map Working Group). However, by mid-2009 these Provincial Working Groups were postponed indefinitely.

Table 4-2 List of Meetings Observed for Energy Efficient Building Strategy Case Study

Name of Meetings Observed	Number and Type of Meetings Observed	Type of Participants	First Observed	Last Observed
BC Partnership for Energy Conservation and Efficiency	3 half-day sessions	All level of managers working on energy efficiency at the BC Ministry of Energy and Mines; Senior level managers working on demand-side management from three of BC's major energy utilities	October 2009	March 2011
Monthly Update Calls	16 one-hour conference calls.	Power Smart senior and mid-level managers; BC Ministry of Energy and Mines senior and mid-level managers.	November 2009	June 2012
Energy and Climate Action Resources for Local Government	1 half-day workshop	Mid-level managers from numerous BC Ministries involved in local government climate change initiatives Invited stakeholders from local and regional governments as well as non-government organizations involved in assisting local and regional governments to achieve their climate objectives.	January 2008	March 2010

In addition to these observations, two rounds of semi-structured interviews were held with key informants involved in activities related to the Province`s energy efficient building strategy. The first round of interviews was held with local governments and representatives of organizations working closely with local governments to help them achieve their long-term built environment energy and climate change objectives. These interviews were conducted between June 2011 and October 2011.

Five local governments were selected to represent leaders in climate and energy initiatives, on the supposition that those working the most extensively on such issues are most connected to other actors in the network (Table 4-3). These were selected using a recent province-wide survey of local governments active in setting GHG emissions reduction targets, as well as expert insight from three relevant provincial actors.

Table 4-3 List of Local Governments Included in Case Study

Municipality	Population (2006 census)	General characteristics	Why selected?
Dawson Creek	10,994	North West BC, remote Resource-based economy	2008 Climate Action Plan 2009 OCP included several new policies, including carbon purchasing $100/tonne of emissions carbon fund
Kelowna	106,707	South Central BC Mixed economy	2009 OCP 2005 action items adopted
North Vancouver	45,165	Lower mainland BC Mixed economy	Reached 5th milestone of CCP 2002 OCP, 2005 Action Plan 100 year Sustainability Plan (unofficial)
Saanich	108,265	Saanich Peninsula Mixed economy	$25/tonne of emissions carbon fund Climate Action Plan
Whistler	9,248	Lower Mainland BC Tourist economy	Reached 5th mile of CCP Sustainability Plan 2020

To identify the primary organisations supporting each local government's energy and climate objectives, a survey including the names of 50 organisations that were subdivided into nine categories (e.g., federal government, utilities, non-governmental organisations) was administered to a representative of each of the five local governments listed above. These representatives indicated which organisations were helping them to achieve their built environment energy and climate objectives and specified any additional organisations that were not listed. Semi-structured interviews were also held with these same local government representatives. General themes discussed during these interviews included: 1) elaborating on their local government's energy and climate actions and their relationship with particularly relevant organisations; 2) identifying barriers to current and potential energy and climate actions, and; 3)

discussing potential means for overcoming these barriers and/or accelerating their existing efforts. The average length of each interview was 60 minutes (see Appendix D and E).

Based on the information obtained from the survey and the local government interviews, 15 organisations were identified as playing a major role in assisting one or more local governments to achieve their energy and climate objectives (Table 4-4). Of these, one or more representatives from 13 organisations agreed to be interviewed using a similar framework to that described above. The average length of these interviews was 45 minutes. A total of 22 interviews were conducted.

Table 4-4 List of Local Government Interviewees

Sector	Interviewees	(n=)
Government	*Provincial*	
	• BC Ministry of Environment/Climate Action Secretariat (ME/CAS)	2
	Regional	
	• Capital Regional District	1
	Local	
	• Dawson Creek	2
	• Kelowna	2
	• North Vancouver	1
	• Saanich	1
	• Whistler	1
NGO	*National*	
	• Federation of Canadian Municipalities (FCM)	1
	Provincial	
	• Community Energy Association (CEA)	1
	• Solar BC	1
	• The Pembina Institute	1
	Regional	
	• Fraser Basin Council (FBC)	1
Consultants	*Provincial*	
	• HB Lanarc	1
	• Stantec	1
	• Climate Smart	1
	Local	
	• City Green	1
Utilities	*Provincial*	
	• BC Hydro	2
	• Fortis Electric	1
Total		**22**

The study's second round of interviews was held with provincial government officials between November 2012 and January 2013. Potential participants were selected based on their experience with and ability to talk about the planning and implementation of the Province's energy efficient built environment strategy since 2007. An initial list of potential participants was drafted with the help of the

manager within the MEM who is responsible for the strategy. Based on this initial set of interviews, a second list of potential participants was drafted of individuals brought up during the interview as being critical to the planning and implementation of the strategy but who were not included in the original list of interviewees.

Ten officials were asked to participate in the study, of which nine agreed. The participants came from the following branches of the Province: the Energy Efficiency of the Ministry of Energy and Mines (5 participants), the Building and Safety Standards Branch of Ministry of Energy and Mines (1 participant), the Local Government Branch of the Ministry of Community, Sport and Cultural Development (2 participants), and Integrated Workplace Solutions which oversee the operation of all the provincial government's buildings (1 participant).

Semi-structured interviews were held with each of the representatives which latest no more than 90 minutes (See Appendix F). In the interview I asked two sets of questions. The first set addressed the activities and interactions that they were directly involved as part of the government's Energy Efficient Building Strategy and/or built environment related initiatives tied to the Province's climate agenda. The second set of questions pertained directly to the study's analytical framework. In addition to filling in information gaps and verifying conflicting elements of the case studies, ideas emerging out of the analysis were also discussed as a way to both test these ideas and provide an alternative perspective to them.

4.6 Conclusion

The methods described in this chapter resulted in a maelstrom of qualitative data being collected on the topic of steering transformative energy efficiency and conservation in British Columbia between 2006 and 2012. While this presented ongoing challenges from a data management point of view, it is difficult to imagine how this study could have been undertaken without a mixed-methods approach. The historical documents reviewed and analyzed provided the study with temporal and technical depth. The numerous observations made, meanwhile, gave me a firsthand look at the art and politics of energy planning – something which will not be found in formal texts or readily discussed with "outsiders". Finally, my use of interviews helped me to close information loops, provide added certainty around complex storylines with complicated details and draw out new ways of looking at the problem. Taken as a whole, they allowed me to be physically present in the processes that I was evaluating while also allowing me to defy both time and space from a data-collection perspective. In Chapters 5 and 7, these data are presented as a multi-level, descriptive narrative of the activities, actors, and structures that influenced how TEEC was steered in BC.

Chapter 5: The Pursuit of Transformative Energy Efficiency and Conservation by the Province of British Columbia

5.1 Introduction

In this Chapter I describe efforts taken by the Province of British Columbia to advance transformative energy efficiency and conservation (TEEC) in the built environment over a 10-year period, beginning in 2002 and ending in 2012. After providing a brief overview of BC's energy system for the built environment, I describe these efforts according to three distinct policy phases: 2002-2006 ("dabbling with market transformation"), 2007-2009 ("climate action mania") and 2010-2012 ("shifting priorities").

In keeping with the thesis's multi-level perspectives of transformational change and power, each of these phases is in turn divided into three subsections: The Policy Landscape, The Energy Efficiency and Conservation Regime, and TEEC Niches in British Columbia. I have pluralized the word "niche" in the third subsection to recognize that efforts to transform the use and intensity of energy in the built environment were pursued through two tightly integrated but distinct socio-technical structures – buildings and communities. The primary difference between the two niches is scale. For low-carbon communities, actors are trying to plan, develop and implement activities to accelerate the reduction of greenhouse gas emissions at the municipal scale. One element of this effort is a transition toward super-efficient/net-zero buildings throughout the building stock. However, although buildings are nested within communities, innovations of buildings can and do advance independently of community-level activities. Given this independence, it is important to distinguish between the two.

From this longitudinal and multi-level description, I identify both the sources and responses to transformational change that the Province faced over the past decade. In the chapter that follows, I will use the analytical framework developed in Chapter 3 to assess whether these efforts are leading to the kinds of conditions that support transformational change.

5.2 British Columbia's Energy System for the Built Environment

British Columbia, Canada's most westerly province, is the country's third largest in terms of population (4.3 million) and geographic size (944,735 km^2) (Statistics Canada, 2009). To put its size in context, B.C. is almost four times the size of Great Britain and 2.5 times larger than Japan. A full two-thirds of the population (2.9 million) lives in a small south-west pocket of the province that occupies only 2 per cent of its total territory (BCStats, 2009), leaving the rest of the province very sparsely populated. Over the next 20 years, the province's population is expected to grow to more than 5.7 million people, the majority of this growth is expected to be in the south-west (BC Stats, 2010).

Nearly all of the energy used to fulfill energy services in the province's built environment comes from either natural gas or electricity that is extracted or generated from remote sites within B.C. This

means that in addition to providing an end-use service, these energy sources also have considerable economic development value in the province.

In 2009, 63,211 gigawatt hours (GWh) of electricity was generated in the Province (Statistics Canada, 2011). Of this, nearly 90% (56,446 GWh) came from hydroelectric sources. The remaining electricity was generated largely by burning natural gas. Domestic demand for electricity, meanwhile, was 62,273 GWh, a little over half of which was used in the residential and commercial sectors. The distribution of electricity is dominated by BC Hydro which services electricity to over 94% of the province's population. BC Hydro's operates a highly centralized electricity grid where electricity is for the most part generated at large-scale and remote hydroelectric facilities and then transmitted hundreds of kilometers to where it is used by a mix of residential, commercial and industrial customers.

On the natural gas side, 30,216 gigalitres (GL) was produced in BC in 2009 (Statistics Canada, 2011). Most of the natural gas used in the province is extracted and refined in the province's northeast from conventional gas resources (although the province is starting to promote the development of less conventional sources such as coalbed methane). A single privately-owned transmission pipeline connects northeast B.C. to the more populated B.C. interior and Lower Mainland markets for domestic markets and to the United States where the majority of the province's natural gas is exported to. Domestic demand for natural gas only accounted for 23% of what was produced in the Province. Local distribution is carried out by Fortis BC (which services over 96% of the province's natural gas customers) and Pacific Northern Gas. As with electricity, about half of the natural gas consumed in the Province was used in the residential and commercial sectors.

On paper, key energy policy responsibilities in British Columbia are held by Natural Resources Canada (NRCan), the National Research Council of Canada (NRC), and the BC Ministry of Energy Mines (MEM). However, since significant tensions arose between the federal and provincial governments over national energy policies in the early 1980s, the federal government plays more of a guiding and supporting role in the country's energy sector than a direct legislative one (Doern & Gattinger, 2003; Doern & Toner, 1985). Other than some direct financing of incentive, data collection and research programs, the roles of NRCan and the NEB are generally kept to inter-provincial and international energy policies and legislation. The NRC, meanwhile, is responsible for establishing the National Building Code which is used as a model for provincially-legislated building codes. MEM is responsible for almost all intra-provincial energy supply and demand policy and legislation.

5.3 2002-2006 – Dabbling With a Market Transformation

5.3.1 The Policy Landscape

From 2002-2006, the direction of the Province's built-environment energy regime was guided in large part by the 2002 provincial energy plan, called *Energy for our future: A plan for B.C.* (Ministry of Energy Mines and Petroleum Resources, 2002). The Plan had four major objectives: i) keep electricity rates low and retain public ownership over BC Hydro; ii) ensure a secure and reliable supply of energy for the province's future; iii) create more private sector opportunities to invest in supply-side electricity and oil and gas resource expansion; and iv) maintain or improve local and regional environmental responsibility, including a continued ban on nuclear power sources in BC. Of the 26 policy actions listed in the Plan only four had an explicit demand-side focus. Of these, three related to utility demand-side measures (DSM) (i.e., Policy Actions 9, 21, and 23), and only one, Policy Action 22, spoke to the Province's direct involvement in energy use planning and policy:

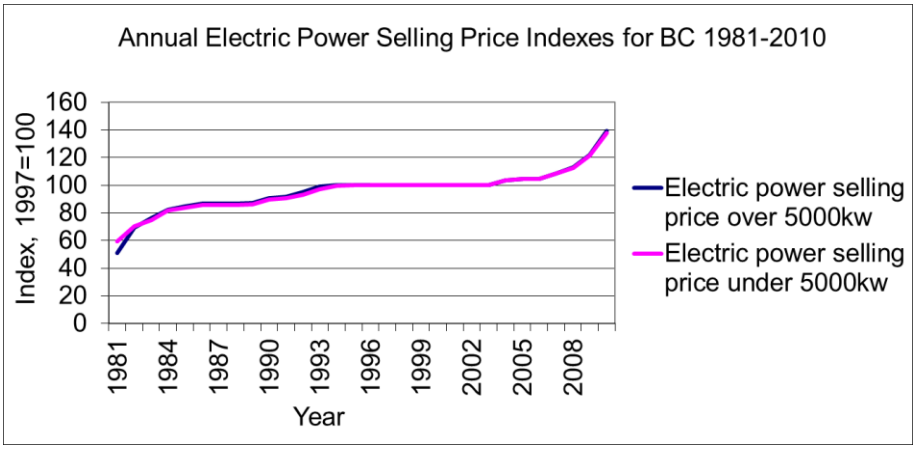
> The Province will update and expand its Energy Efficiency Act, and will work with the building industry, governments and others to improve energy efficiency in new and existing buildings.

The emphasis on utility-led activities in the other three demand-side Policy Actions was indicative of the strong leading role played by energy utilities since the early 1990s for taking measures to influence how energy is used throughout the province.

In addition to this policy direction, during this period we also see the beginning of a relatively sudden rise in the price of both electricity (See Figure 5-1) and natural gas (see Figure 5-2) after nearly two decades of relatively stable lower unit pricing. These rising prices put further pressure on the Province to develop demand reduction measures to help address rising energy consumers' bills.

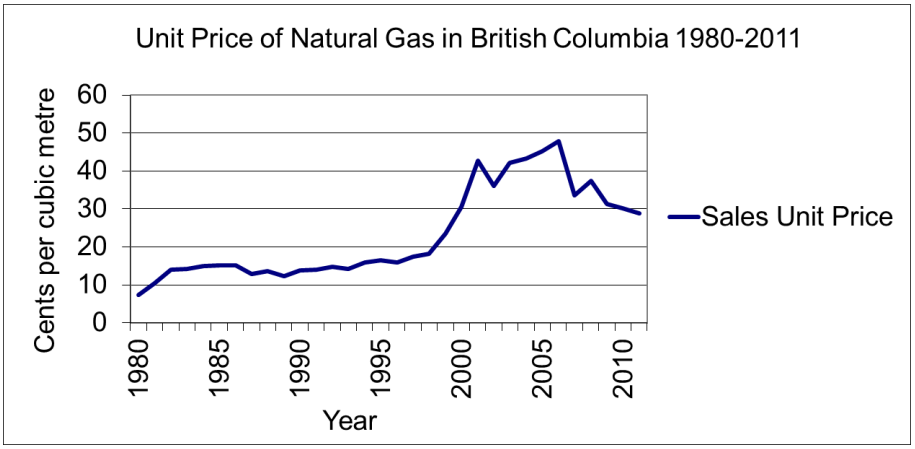
5.3.2 The Energy Efficiency and Conservation Policy Regime

In response to Policy Action 22 of the 2002 Energy Plan, the BC Ministry of Energy and Mine's Alternative Energy Division released a policy document in 2005 called Energy Efficient Buildings: A Plan for BC. Although a Provincial Plan, it was fully funded by an $11 million contribution from the federal government's climate-action focused Opportunities Envelope. Contained within the 2005 Plan were a number of shorter-term energy efficiency targets aimed at improving the energy performance of BC's entire building sector (See Table 5-1). These targets were based on studies commissioned by the MEM to better understand the potential for improved energy efficiency in new and existing buildings and homes. The studies showed that a number of cost-effective opportunities to save energy in the built environment existed but were not yet being pursued (Green & MacNab, 2006).



Source: Statistics Canada (2012a)

Figure 5-1 Historical Electricity Pricing in British Columbia



Source: Statistics Canasda (2012b)

Figure 5-2 Historical Natural Gas Pricing in British Columbia

The 2005 Energy Efficiency Buildings Plan and its targets were built around the idea of market transformation. In the world of energy efficiency policy-making, market transformation is, "a policy objective of encouraging or inducing social, technological and economic change in the direction of greater energy efficiency" (Blumstein et al., 2000, p. 137). The idea is to make permanent changes to the entire marketplace for more efficient technologies or processes by reducing market barriers to their development and diffusion. In the case of British Columbia, the objective was to transform the province's residential and commercial building stock into a high-efficiency marketplace.

Table 5-1 2005 Energy Efficient Buildings Plan's Efficiency Targets

Building Sector	Energy Efficient Target for 2010
New single-family and row houses	100% with EnerGuide for New Homes rating of 80. Leading to a 32% reduction in energy consumption.
New multi-unit residential buildings	Achieve energy reductions that are 25% better than Model National Energy Code for Buildings
New non-residential buildings	Achieve energy reductions that are 25% better than Model National Energy Code for Buildings
Existing single-family and row houses	Reduce energy consumption by 12% in 17% of buildings.
Existing multi-unit residential buildings	Reduce energy consumption by 9% in 16% of buildings
Existing non-residential	Reduce energy consumption by 14% in 20% of buildings.

Policy Measures

Prior to the 2005 Energy Efficient Buildings Plan, the four most consistent policy measures used by the Province to influence energy use were:

1. Enabling utilities to pursue cost-effective DSM when fulfilling their integrated resource plans[5];
2. Setting efficiency standards for a handful of electrical appliances and equipment through its *Energy Efficiency Act*
3. Investing in energy efficiency upgrades to provincial public sector buildings via BC Buildings Corporation; and
4. Incentivizing high efficiency appliances and equipment via provincial sales tax exemptions.

Otherwise, trying to influence energy efficiency in the marketplace was largely left to the federal government.

In Table 5-2, we see how the 2005 Plan increased considerably the number and type of measures used by the Province to try to curb energy use in the built environment. Given that the Plan was funded through a federal program, it was necessarily closely aligned with the federal government's ongoing efforts to curb carbon emissions and energy use. Chief among these were a number of incentive programs tied closely to National Resource's Canada's EnerGuide and Energy Star labeling systems (BC Ministry of Energy and Mines, 2007; Office of Energy Efficiency, 2006).

[5] Sparked by 2002 Energy Plan and enabled through DSM-Utilities Commission Amendment Act that decoupled commodity sales revenues and profits and put DSM in as a resource planning tool (avoidance of supply side investments)

Table 5-2 Provincial Policy Measures to Encourage Energy Efficiency and Conservation

Policy Measure	Established	Description of Measure
Regulations		
Energy Efficiency Act	1992	By 2006, some outdoor lighting applications, household appliances and equipment (such as air conditioners, ground or water source heat pumps and oil fired water heaters and furnaces) were regulated in B.C.
Net-Metering	2004	BC Hydro customers allowed to connect renewables to grid via two-way net meters
Financial (Dis)Incentives		
Energy Savings Plan	2005	$2.2 million whole building pilot project included incentive packages and outreach and educational initiatives in those communities that participated in the province's Community Action on Energy Efficiency (CAEE) program
Tax exemption	2005	Provincial sales tax exemptions for select high efficiency energy products.
Community Energy Planning	2005	Community Action on Energy and Efficiency program
Infrastructure Planning Grant	2005	Up to $10,000 to help improve or develop long-term community plans related to sustainable community infrastructure
Electricity rates	2006	BC Hydro industrial customer class moved to multi-tiered conservation rates.
Information and Training		
Energy audits	2005	Home energy audit required for Energy Savings Plan incentives
Contribution Agreements	2005	Organizations receiving funding to implement different parts of the Energy Efficiency Buildings Plan were required to endorse its 2010 efficiency targets.
Solar Demonstration	2006	A pilot project in 2006 to install solar hot water systems in three BC communities and build the institutional infrastructure to support the emerging sector.
Training	2005	Energy efficiency training and certification courses at over 10 educational institutions Funding to develop *Quality First* training program to industry association that represents BC's heating, ventilation and cooling industry.

Coordination

Policy Action 22 of the 2002 Energy Plan opened the door for actors within the Electricity and Alternative Energy Branch of the MEM to hold discussions about the very broad topic of how to improve energy efficiency for new and existing buildings. To do this, the Branch developed a consultative framework that included a "Ministers' Advisory Committee" (energy and building code) and four working groups: new residential buildings, existing residential buildings, new commercial buildings, and existing commercial buildings. Key stakeholders from each of these groups were then invited to participate in the discussion. What resulted was a wide range of measures, many of which were eventually incorporated into a draft of the 2005 Energy Efficiency Buildings Plan.

With a Plan in place, the next task was to find funding to support it. As one Provincial participant commented, "Government can come up with policy but it doesn't have any impact unless there is money or legislation to back it…Without the money EEBS would likely not have been published at all". As

noted above, the source of funding was the climate change Opportunities Envelope which was created under Prime Minister Paul Martin's federal Liberal government.

The next challenge was to get the utilities on side. According to a Provincial interviewee, BC's energy utilities were resistant to the Plan for two reasons. First, the Plan's multi-fuel whole-building focus went beyond the type of programs that the utilities' normally pursued i.e., high efficiency discrete technologies that are powered by the same fuel source that the utility distributes. In other words, it did not fit the utility's classic resource acquisition model. Second, there was concern that if the Province started to get more actively involved by delivering a DSM program of its own, that the BC Utilities Commission would reduce the DSM that utilities were allowed to pursue. In the end, what won the utilities over was the opportunity for them to participate in delivering a portion of the programs that came about from the $11 million in federal funding.

In all, the Energy Efficient Buildings Plan required formal and informal partnerships with over 70 public and private sector organizations (BC Ministry of Energy and Mines, 2007). These organizations include major energy utilities, local governments and First Nations communities, not-for-profit housing authorities, organizations representing building developers, owners and operators, equipment manufacturer organizations (e.g., windows and furnaces), energy efficiency service companies, and environmental non-governmental organizations.

5.3.3 TEEC Niches in the Built Environment

5.3.3.1 Low-Carbon Communities

The history of BC local communities pursuing an intentional low-carbon vision goes back at least as far as 1990 when the City of Vancouver adopted a report called *Clouds of Change* (Burch, 2010; Holden, 2013). Over the next decade-and-a-half a number of other communities started to also follow suit. One of the earliest programs supporting these efforts was the Federation of Canadian Municipalities' Partnership for Climate Protection (PCP) (Federation of Canadian Municipalities, 2012). By the end of 2006, 48 local and regional governments in BC were participating in the program.

In 2005, these early efforts were supplemented by two additional programs: the Ministry of Energy and Mines' Community Action on Energy Efficiency Program and the Federal Gas-Tax Fund which was administered by the Union of British Columbia Municipalities. The CAEE provided financial and technical support to local governments and First Nations to carry out efficiency audits, review policies, and develop community energy plans from which innovative, community-oriented energy efficiency and conservation policies, information and incentives measures could be identified, developed and implemented. The second source of funding for communities established in 2005 was the Gas-Tax Fund which was administered by the Union of British Columbia Municipalities (UBCM) with 100% of funding provided from the revenues collected in BC for the federal government's gasoline tax (Union of

British Columbia Municipalities, 2012). The objective of the Fund was to provide local governments in BC with a source of "stable, predictable, long-term funding towards environmentally sustainable municipal infrastructure to help them address their infrastructure needs and meet sustainability objectives" (Government of Canada, Government of British Columbia, & Union of British Columbia Municipalities, 2005, p. 9).

Just as important as providing local governments with additional financial resources to carry out sustainability and/or energy planning, were the spaces for new actors and thinking that these incentives helped to create for local governments. A Provincial interviewee put it this way:

> Again, for some local governments and there were some entrepreneurial consultants out there spreading the word, it was encouraging staff and elected officials to start really thinking about new ideas and approaches.

This sentiment of external organizations helping to bring new ideas forward was confirmed by one of the local government representatives with whom I spoke:

> The CEA (Community Energy Association), we've worked with them a lot. The awareness they brought to our political leaders and staff was really important, and the work they did provincially. They did a lot of work that really shifted a lot of folks.

Based on my interviews, a small number of consultants and organizations were particularly successful in this regard, namely, Sheltair (now part of Stantec), HB Lanarc (now part of HB Lanarc Golder), the Pembina Institute, The Community Energy Association and the Fraser Basin Council.

Despite the momentum building during this period, most local governments in BC were not yet at a point in their climate-related thinking and strategy development to push the Province to do more. A key exception to this would be the City of Vancouver which, in 2004, introduced energy efficiency measures to its Building By-laws, a full four years before the Province would add its first comprehensive energy efficiency requirements to the BC Building Code.

5.3.3.2 Green Buildings

Much like low-carbon communities, prior to 2005 most efforts to advance high efficiency buildings in Canada were being led by federal interests. Particularly prevalent were incentive programs that were tied to high-performance energy efficiency standards. In addition to the long-standing labels / certification programs administered by Natural Resources Canada, a number of private ones appeared on the market between 2000 and 2005 (see Table 5-3). To give some sense of the uptake of these private labeling schemes, by the end of 2006, there were 136 building projects in BC registered with LEED Canada, 25 of these had received certification (Canada Green Building Council, 2012).

Table 5-3 Building Energy Labels / Certifications Used in British Columbia

Building Sector	Label Administrator	Name of Label
New Homes	Natural Resources Canada	R-2000, ENERGY STAR® for New Homes, and EnerGuide for New Homes
New Homes	Built Green Canada	Built Green (based on the EnerGuide framework)
New Homes	BC Hydro	Power Smart (based on EnerGuide)
Existing Commercial buildings	Building Owners and Managers Association	BOMA Go Green
New commercial buildings	Canada Green Building Council	Leadership in Environmental and Energy Design (LEED)
Appliances and Equipment	Natural Resources Canada	ENERGY STAR, EnerGuide

These privately administered building certification programs give light to a broader trend taking place in the niche during this time, namely, the formation of organizations around a green building theme. Chief among these in British Columbia was the Canada Green Building Council which formed in 2002 which was preceded by LEED-BC (a chapter of the United States Green Building Council) which morphed into the Cascadia Green Building Council in 2000. The majority of the membership for both of these organizations was made up of actors working directly in the green building sector. Several of the interviewees with whom I spoke credited the Canada Green Building Council with being one of the most influential voices in advancing the idea and implementation of green buildings in Canada. Also coming to the fore during this period were several not-for-profit green building services organizations: the Lighthouse Green Building Centre in Vancouver and City Green in Victoria. A key component of all of these organizations was the provision of information and education services for both existing and potential green-building participants.

At the same time that these more general "green building" advances were being made, I also saw evidence of growing momentum around the concept of net-zero buildings. For example,

- In 2004, BC Hydro started to offer net- metering for its customers.
- In 2004, the Canadian Net-Zero Home Coalition formed.
- In 2006, the BC Sustainable Energy Associated administered solar hot-water pilot projects started in three BC communities.

5.3.3.3 Advocates of Regime-Level Institutional Change

In addition to the organizations and communities described above who are actively building BC's low-carbon communities and super-efficient/net-zero buildings niches, I was also interested in who advocated for changes to the regime's existing set of institutions to make them more supportive of the expansion and/or normalizing of these niches. As discussed in Chapter 3, data for this section was

collected from recommendations included in published documents that were available online (see Appendix C). To be sure, these sources of data are limited and do not represent a complete picture of who advocated for what during this period. However, as the case study evolves, they are sufficient to let me see trends in the type of organizations advocating for change as well as the type of change that was advocated for.

For the purpose of this section, I limit my analysis of these documents to the name and type of each organization advocating, the type of document in which recommendations to accelerate energy efficiency and conservation in the built environment were made (i.e., formal submissions to a provincial decision-making process, resolutions advanced at the annual UBCM conference, or more general reports), and the focus of these recommendations (i.e., new buildings, existing buildings or communities). An analysis of the specific recommendations advanced in these documents is carried out in Chapter 6.

Based on the data I collected, a couple of quick observations can be made about the level and type of advocacy taking place during this period (See Table 5-4). First, the number of advocates espousing TEEC to the Province, at least via recommendations included in online public documents, was small as were the number of documents published. Second, the groups doing the advocating all represented a strong environmental rationale for advancing TEEC. And third, most of the focus is on changes to improve the efficiency of new and existing buildings rather than community-level activities.

Table 5-4 Published Recommendations to Advance TEEC in BC (2001-2006)

		No. of Docs Issued	Document Type and Topic Addressed								
			Submissions			Resolutions			Reports		
Organization	**Type of Organization**		N	E	C	N	E	C	N	E	C
BC Sustainable Energy Association	Sustainable Energy NGO	2[a]							2	2	1
David Suzuki Foundation	Environmental NGO	1	1	1							
Pembina Institute	Sustainable Energy NGO	1[a]							1	1	1
Pollution Probe	Environmental NGO	1[a]							1	1	1

N - New Buildings, E - Existing Buildings, C – Communities

a - 2006 co-authored report

5.4 2007-2009 Climate Action Mania

5.4.1 The Policy Landscape

2007 marked a sea change in B.C.'s policy vision for its energy regime. The change was driven in large part by the twin issues of climate change and the Government's continued desire to exploit the province's "clean" energy resources. In the 2007 Speech from the Throne, the BC government introduced its intention to legislate a reduction in province wide greenhouse gas emission by at least 33 percent

below current levels by 2020 and to establish a long-term emissions reduction target for 2050 (later set at 80 per cent below 2007 levels) (Government of British Columbia, 2007). These goals were later put into legislation under the *Greenhouse Gas Reduction Targets Act*. The Act also required the provincial public sector (which includes schools, universities and hospitals) to have net-zero GHG emissions by 2010 through a combination of direct mitigation measures and purchasing carbon offsets. No other sectors of the economy were allocated such specific emissions reduction targets.

Following on the heels of the Speech from the Throne was the release of the 2007 *BC Energy Plan: A Vision for Clean Energy Leadership* (Ministry of Energy Mines and Petroleum Resources, 2007a). The most important energy efficiency and conservation policies included in the Plan from the perspective of the built environment were:

- 50 per cent of BC Hydro's incremental resource needs must be met through conservation by 2020.
- Ensure a coordinated approach to conservation and efficiency is actively pursued.
- Encourage utilities to pursue cost effective and competitive demand side management opportunities
- Explore with BC utilities new conservation rate structures
- Implement energy efficiency standards for buildings by 2010
- Undertake a pilot project for energy performance labeling of homes and buildings
- New provincial public sector buildings will be required to integrate environmental design to achieve highest standards for building performance
- Increase the participation of local governments in the Community Action on Energy Efficiency Program and expand First Nations and Remote Community Clean Energy Program

Another important piece of climate legislation affecting the built environment energy regime was *The Local Government (Green Communities) Statutes Amendment Act*, which required local governments to include greenhouse gas emission targets, policies and actions in their Official Community Plans and Regional Growth Strategies.

In terms of an overall guiding vision for the Province's climate objectives, in June 2008 the government released its *Climate Action Plan* for 2020 (Government of British Columbia, 2008a). The bulk of the Plan consisted of the specific pieces of climate change legislation introduced since 2007 in addition to some more sector specific regulatory changes and programs. The government's modeling estimated that these activities would achieve 73% of the province's 2020 GHG emissions reduction target.

To help it find how it could achieve the remaining 27% of emissions reductions needed to achieve the 2020 target, the Province appointed a 21 member committee called the Climate Action Team (CAT). The CAT was made up of experts from academia, industry, environmental NGOs, local government, and First Nations (Climate Action Team, 2008). The majority of the recommendations put forward by the Climate Action Team in its July 2008 summary report simply pushed the government to extend and expand what was already included in its Climate Action Plan. However, other recommendations called for a more transformative set of actions to be taken such as greatly increasing the role of public engagement in the province's climate change strategy; regulating all new buildings in the province to be net-zero GHG emissions by 2020; accelerating the deployment of carbon capture and storage; creating a regulatory regime that encourages compact, smart community development; and sharply reducing the amount of waste going to landfills. Following the release of its recommendations, the Climate Action Team was disbanded. No formal pubic response was ever made by the government to address these recommendations.

5.4.2 The Energy Efficiency and Conservation Policy Regime

Looking specifically at energy use in BC's built environment, in early 2008, the BC Ministry of Energy and Mines released an updated version of its Energy Efficient Buildings Strategy. The 2008 Strategy was intended to both update and align its 2005 Plan with the Province's new climate objectives (Ministry of Energy Mines and Petroleum Resources, 2007b). In addition to listing a host of new measures, the Strategy updated its targets for residential and commercial buildings (see Table 5-5). These targets were estimated using the "upper achievable" energy savings as per BC Hydro's 2007 Conservation Potential Review (Marbeck Resource Consultants Ltd., 2007) and a Canadian Gas Association study on conservation (Marbeck & MKJ, 2006) (Pape-Salmon, Muncaster, & Kaye, 2010). "Upper achievable" savings means that they are cost-effective to obtain (i.e., less costly than acquiring the same level of energy through the purchase of new supply), but they are only possible through the use of utility incentives as well as broader policy initiatives, aggressive codes and standards, and land use measures. In other words, relatively aggressive government intervention was required.

In addition to taking a longer-term time-frame than the energy savings target included in the 2005 Plan (12-years instead of 5), the new targets also carved out savings from two new niches, core-government buildings and communities, that were created through the Province's climate legislation, namely, the *Greenhouse Gas Reduction Targets Act* and the *Local Government (Green Communities) Statutes Act*. However, unlike the 33% carbon reduction, none of the efficiency targets included in the 2008 Energy Efficient Building Strategy were legislated.

Table 5-5 Energy Efficient Building Strategy's Efficiency Targets

Building Sector	Energy Efficient Target
Residential	Reduce average energy demand per home by 20 per cent by 2020.
Commercial and institutional buildings	Reduce energy demand at work by a total of 9 per cent per square meter by 2020.
All Government Buildings	Reduce government's electricity demand by 20 per cent by 2020, reduce natural gas demand and promote alternative energy options. Government will become carbon neutral by 2010 through efficiency measures combined with offsets
New Government Buildings	All new government buildings and facilitates will meet the standards of LEED Gold or equivalent certification, including BC wood products.
Communities	Set targets for new buildings' energy need from community-based, clean energy sources Complete energy conservation plans for all BC communities

Policy Measures

To help achieve the Province's carbon- and energy-reduction-targets in the built environment, most pre-existing policy measures were extended and a slew of new ones were developed and implemented (see Table 5-6) between 2007 and 2009. In terms of the genesis of higher-level climate objectives, particularly as they pertained to building codes and communities, as indicated in the following statement made by a Provincial interview, most of the policy direction came directly from the Premier and his staff:

> A lot of it was from the Premier himself and his office. A lot of it, in those days particularly, people like BC Hydro, California was a big influence so not necessarily the bureaucrats. The Premier and his advisors were talking a lot to the Schwarzenegger people in California. It was like, if they can do it, then we can do it and go one up or better. With Hydro, there was a whole team of people saying we could be the first in Canada in energy conservation in this front or that front, like the building code. Hydro, for example, is very interested in the building code. So I think those were kind of the sources. In most cases it was not coming from line ministries.

Under this higher-level policy umbrella, a number of study participants indicated a very active back and forth between the bureaucracy and the political leadership during this time. As one interviewee noted when asked about the role of the bureaucracy in advancing more specific policies and programs pertaining to energy and carbon intensity reduction in the built environment:

> In terms of putting things to cabinet, I'm going to suggest that a good chunk of policy is created from initiatives within or in the bureaucracy. A lot of policy is also created from above, from elected leaders. So there's a mix of the two. So during that period

> there was kind of an open call for proposals and we put in five or six. We have an entrepreneurial shop here with a go getter kind of mentality.

A couple of the ideas successfully advanced from within the bureaucracy included the $60 million LiveSmart BC incentive program, $1 million super-efficient building demonstration project and the capacity-building Community Action on Energy and Efficiency program. In addition to these internal sources of policy ideas, some advocacy organizations were also having a certain level of success with seeing provincial resources committed to their ideas. For example, here is a Provincial interviewee discussing how the $5 million Solar BC program made it onto the Province`s policy agenda:

> The Solar BC actually came out of a Solar Summit, orchestrated by Nitya Harris and the BC Sustainable Energy Association. Environment Minister Barry Penner made a surprise announcement at the Summit to install 100,000 solar roofs. From that point forward solar was prioritized on the policy agenda.

In addition to these Provincial measures, financial incentives were also provided by the Federal government and the province's major energy utilities. The most direct source of Federal funding was from its ecoEnergy Retrofit program which ran in parallel to the LiveSmart BC: Efficiency Incentive Program between 2007 and March 2010 at which point it was unexpectedly cancelled. However, not before paying out over $242 million to 209,762 property owners across Canada (Natural Resources Canada, 2010). For community-based energy-efficiency and conservation projects, federal funds were administered by the Federation of Canadian Municipalities via its Green Municipal Fund, which was established in 2007 with a $550 million endowment, and the Union of British Columbia Municipalities via the Gas-Tax Fund.

Another critical source of resources came from BC`s major energy utilities. During this period, BC Hydro's Power Smart DSM program spent over $50 million per year in 2007 and 2008 and over $100 million in 2009 on residential, commercial and industrial DSM (BC Hydro, 2006b, 2008a) (discussed in detail in Chapter 7). Terasen Gas, meanwhile, spent approximately $41.5 million on DSM programs over two years from 2009 to 2010, the bulk of which was directed toward its residential and commercial customers.

Table 5-6 Provincial Policy Measures to Encourage Energy Efficiency and Conservation

Policy Measure	Implemented	Description of Measure
Regulations		
Green Building Code	2008	Insulation required for houses and smaller residential and commercial buildings; Complex buildings to comply with ASHRAE 90.1 (2004) efficiency standards
Housing Statutes Amendment Act	2008	Energy Efficiency and climate action added as objectives to the BC Building Code.
Energy Efficiency Standards Regulation	2008	Standards for energy using products were added to the Province's list of regulated products: windows, electric and gas water heaters, line-voltage thermostats, gas furnaces, fluorescent ballasts, and commercial boilers
Demand-Side Measures Regulation	2008	Required utilities to include low-income and rental DSM programs as well as education programs from kindergarten to grade 12 and post-secondary. More flexible method to measure cost-effectiveness of low-income, education, training, community engagement, and technology innovation DSM programs Utilities allowed to claim a portion of energy savings from codes and standards
Carbon Neutral Public Sector	2008	Provincial public sector to be carbon neutral by 2010 through combination of emissions reductions and offset purchases
"Green Communities" Amendment	2008	Local governments required to include emission targets, policies and actions in their Official Community Plans and Regional Growth Strategies by 2010 Options added for municipalities to trigger higher building standards for designated Development Permit Areas
Utilities Commission Amendment Act	2007	Established DSM as the first priority for resource planning, ahead of new supply construction. Also confirmed a clear mechanism for utilities to recover their costs on DSM.
Financial (Dis)Incentives		
LiveSmart BC	2008	$60 million over two years for "whole-house" energy efficiency program
Tax exemption	2007	Provincial sales tax exemptions for select high efficiency energy products.
Public Sector Fund	2008	$75 million provincial Public Sector Energy Conservation Agreement competitive fund to help make efficiency and fuel-switching upgrades
Carbon Tax	2008	Starting at $10 per tonne in 2008, leveling out at $30 per tonne by 2012.
Electricity rates	2006	Nearly all BC Hydro customer classes slated to move to multi-tiered conservation rates.
Community Energy Planning	2008	$500,000 of funding to continue and expand the Community Action on Energy and Emissions program
Infrastructure Planning Grant	2005	Up to $10,000 to help improve or develop long-term community plans related to sustainable community infrastructure
Climate Action Charter	2008	Signatories of charter who agree to have carbon-neutral corporate operations by 2012 receive a full refund on corporate carbon taxes.
Innovation Fund	2008	Innovative Clean Energy Fund established with levy on utility energy rates

Policy Measure	Implemented	Description of Measure
Information and Training		
LiveSmart BC	2008	Online information - focus on reducing energy use to reduce carbon footprint.
Home energy labeling	2008	Home energy audit required for LiveSmart BC incentives (disclosure not required) Pilot projects for time-of-sale home energy audits and disclosure
Inventories	2008	Community Energy and Emissions Inventories administered by the Province.
LiveSmart BC Community	2008	Online information sharing space for local government practitioners and related experts
Climate Action Toolkit	2008	Online local government information source for news, best practices, advice, information and strategic guidance to help reduce greenhouse gas emissions.
Demo project	2008	$1 million subsidy to super-efficient building demonstration projects
Solar BC	2008	$5 million solar pilot project includes incentives, information sharing and education
Climate research	2008	Pacific Institute for Climate Solutions established with $60 million endowment
Training	2008	$950,000 to train people in the energy efficiency industry

Coordination

During this period a number of different divisions within the Province were involved in new intergovernmental and stakeholder engagement processes to help it address different aspects of its climate and energy efficiency objectives. Nationally, the provincial Premiers and the Prime Minister agreed to add energy efficiency as an objective of the national building code at a provincial-federal "Summit" held in 2007 that included climate change on its agenda (Council of the Federation, 2007). This commitment was followed up in a joint federal, provincial and territorial initiative in which the Energy Efficiency Branch of the MEM cooperated to work out a coordinated and complementary agenda for energy efficiency (Council of Energy Ministers, 2007, p. 22). The most tangible outcome to come from this initiative for the built environment was a commitment "to upgrade the Model National Energy Code for Buildings (1997) to a higher level of energy efficiency by 2012". These activities ultimately paved the way for the Province to adopt energy efficiency as an objective for the BC Building Code.

Within the Province, the Energy Efficiency Branch worked on strengthening the coordination of energy efficiency along two fronts. The first was with a broad set of stakeholders involved in one way or another with energy use in BC. This work was part of a $500,000 pledge by the Province that was included in the 2008 EEBS to carry out a first-ever, province-wide, energy conservation potential and implementation study (Ministry of Energy Mines and Petroleum Resources, 2007b), although that initiative didn't materialize. This process was overseen by a Steering Committee that consisted of utility executives, BC Utilities Commission staff and local and provincial government representatives. This Steering Committee in turn identified four stakeholder working groups: buildings, industrial, communities, and transportation. The Energy Efficiency Branch was directly responsible for coordinating the first two of these. The buildings and industrial working groups met several times each in 2008 and

early 2009 but were discontinued when it was realized that these efforts were duplicating efforts being undertaken in other Ministries (i.e., the Climate Action Secretariat in the case of industrial energy efficiency and the Buildings Safety and Standards Branch in the case of building energy efficiency). The coordination of the communities working group was outsourced largely to the Fraser Basin Council which administered the MEM's Community Action on Energy and Emissions program with some limited community-oriented coordination within the Province led by the MEM. Finally, the transportation working group was part of a multi-ministry/provincial agency transportation coordination..

The Energy Efficiency Branch's second front for improving the coordination of energy efficiency in the province was with the demand-side management departments of BC's major energy utilities. At a senior level, the Province organized the BC Partnership for Energy Conservation and Efficiency which held several half-day meetings in 2008 and 2009. Members of the Partnership included senior managers of the Ministry of Energy and Mines' Electricity and Alternative Energy Division and the DSM divisions of BC Hydro, Terasen Gas, Fortis BC and Pacific Northern Gas as well as representatives from the BC Utilities Commission sitting in as observers. T*he Partnership acted as a venue for the Province to test the waters with its utility stakeholders on some of the policy ideas that it was working through and an opportunity for stakeholders to share information with one another.* Issues discussed included progress on energy efficiency regulations and building codes, the Province's fuel switching policy, a provincial roadmap for energy use in the built environment, and a long-term financing strategy for the province's energy efficient Live Smart program. *In parallel to these more strategic discussions, the Province also collaborated closely at a staff level with each utility on the development and tactical implementation of these ideas.*

Looking at other Ministries, the Ministry of Housing's Building Safety and Standards Branch convened a temporary stakeholder-based Green Building Advisory Committee to help it define and prepare elements of its 2008 Green Building Code. For low-carbon communities, the Ministry of Community Development, the Climate Action Secretariat and the Union of British Columbia Municipalities collectively formed the Green Communities Committee which in turn oversaw three working groups: urban communities, rural communities and climate-neutral government. The carbon neutral government working group was the longest standing of the three. It was tasked with working with the Province on defining the requirements for a carbon-neutral designation as well as developing several tools to support and build the capacity of local governments to take climate actions.

In addition to these coordinated interactions with external stakeholders, interviewees also identified several efforts to coordinate around issues related to energy-use in the built environment between ministries, particularly between the Energy Efficiency Branch of the MEM, the Building and Safety Branch of the Ministry of Housing, the Local Government Branch of the Ministry of Community

Development and the Climate Action Secretariat which at the time was located in the Premier's Office. Each of these processes was organized to address a specific and pressing policy issue and disbanded when either the issue was made into a formal policy or the level of urgency surrounding it on the political agenda dissipated. Three such issues were the 2008 Green Building Code, Green Communities, and building a vision and roadmap for high-efficiency building codes in 2020.

5.4.3 TEEC Niches in the Built Environment

5.4.3.1 Low-Carbon Communities

The size and stability of the low-carbon communities niche was significantly bolstered by the passage of the *Local Government (Green Communities) Statutes Act* in 2008 which required local governments to include greenhouse gas emission targets in their Official Community Plans by 2010 and Regional Growth Strategies (RGSs) by 2011, along with policies and action proposed for achieving those targets. Although this legislation did not require communities to adopt the Province's GHG reduction targets, in many cases there was a pairing between the Province's target and the targets adopted by local governments as part of their Official Community Plans. A second major push for low-carbon communities was the Climate Action Charter and its associated Climate Action Revenue Incentive Program (CARIP). Signatories of the Charter were reimbursed the carbon tax paid on corporate emissions if local they demonstrated that their corporate operations were moving toward carbon neutrality.

By the middle of 2010 175 of BC's 188 communities signed the Climate Action Charter. Despite this high level of take up, for many BC communities the couple of years immediately following the Province initial rounds of climate announcements were spent trying to come to terms with the question of "what do we do", while updating their Official Community Plans. During this period, numerous sources of financial assistance for preparing community energy and/or sustainability plans were made available from programs such as the Ministry of Energy and Mine's Community Action on Energy and Emissions program, the Local Government Infrastructure Planning Grant, the Federation of Canadian Municipalities Municipal Green Building Fund, UBCM's Gas-Tax Fund.

While many communities struggled with their new responsibility, a small number of leaders moved ahead more rapidly with innovative measures such as supporting energy efficiency certification programs for home builders; pilot projects for energy labeling of homes at the time of real estate transactions; incentive programs for energy efficient homes; the introduction of Development Permit Area Guidelines to conserve energy and reduce GHG emissions; energy efficiency checklists for developers; and the design and construction of a municipally-operated district ground source heating utility; and requiring beyond building code efficiency standards be applied to rezoning applicants, arguably the most powerful of these measures (Fraser Basin Council, 2010). Even more ambitious were the actions taken by

the City of Vancouver. For example, in 2009, the City pushed ahead of the Province once again in its legislated energy efficiency building requirements.

Local Governments in British Columbia were also active places for TEEC visioning. For example, in 2009 the City of North Vancouver released its *100 Year Sustainability Vision* (Condon, Owen, Miller, White, & Smith, 2009):

> The 100 Year Sustainability Vision describes a city that reaches the 80% GHG reduction target by 2050 and continues to employ green, clean energy services and increase transportation and building efficiencies to achieve net zero GHG emissions by 2107. Key to the success of this Vision are a new distribution of neighbourhood commercial services and an intensified local transit system. Additional density, the inclusion of an adequate number of jobs and a more even distribution of commercial land uses enables reductions in vehicle use.

Working with a shorter timeline, in 2009 the City of Vancouver released a list of ten long-term goals for the city to become "the greenest city in the world" (Boyd, 2010). Each goal was also accompanied by a medium-term term and measureable target for 2020. Although the goals were deeply integrated, two in particular suggested a vision for TEEC in the built environment:

- Eliminate Vancouver's dependence on fossil fuels with a 2020 target to reduce greenhouse gas emissions 33% from 2007 levels (the same as the Province); and
- Lead the world in green building design and construction with a 2020 target for all new construction to be carbon neutral and improve the efficiency of existing buildings by 2020.

In addition to these individual efforts, a number of local-governments in the Province started to coordinate certain aspects of their climate-related activities. Most coordination was organized on a regional basis. For example, the Capital Regional District, which comprises of the thirteen local governments in the Victoria area plus the regionally administered Islands Trust, established a bylaw in late 2008 to create a regional climate action service for its member governments. Shortly after this, another regionally-based coordination effort formed in southeastern BC, called Carbon Neutral Kootenays, which consisted of three regional districts, 29 local government sand six First Nations. Finally, in 2009 the Pembina Institute launched its Municipal Green Building Leaders initiative with 12 smaller local governments from across BC. The objective of this group was to see what climate-related building requirements they could collectively advance and/or adopt. Initiatives reviewed included energy performance standards for existing buildings, renewable energy requirements for new buildings and energy performance standards for new buildings that exceed what is required by the Province. A major institutional impediment recognized by this initiative was that other than the City of Vancouver, local governments in B.C. did not have clear legislative authority to introduce building-related requirements

that exceeded the BC Building Code unless authorized through a concurrent authority regulation under the Community Charter.

5.4.3.2 Green Buildings

Although BC's green building sector continued to grow between 2008 and 2009, the direct effect of the Province's climate policies on this growth were more difficult to see than in the low-carbon communities niche. However, in a few cases, I did see evidence of a more direct line between these policies and growth in the net-zero/super-efficient building sector. To start with, as of 2007 all new public sector buildings or major renovations must target LEED Gold certification. In addition, the Province provided a three-year $75 million fund called the Public Sector Energy Conservation Agreement to help the public-sector offset some of the costs associated with making efficiency and fuel-switching upgrades in existing buildings..

The Province's increased emphasis on energy efficiency and conservation also contributed to growth in residential energy labeling. Most of this activity resulted from the LiveSmart BC incentive program. To participate in the program, a home energy assessment must be completed which results in the home being given an EnerGuide energy performance rating. By August 2010, 47,000 residential properties were assessed in BC under the LiveSmart program (Pape-Salmon et al., 2010).

In addition to these provincially-prompted labeling initiatives, there was a rise during this period in both the number and scope of private-sector energy performance building labels. For example, between February 2007 and June 2010, 435 building projects in British Columbia registered with LEED Canada and 58 new LEEDS certifications were awarded (Canada Green Building Council, 2012). The Canada Green Building Council also announced two new LEED certifications: LEED for existing commercial and institutional buildings and LEED for Neighborhood Development. In a similar vein, BOMA Canada repackaged its BOMA Green program into a multi-gradient rating system called BOMA BESt (BOMA Canada, 2011). However, while labeling efforts such as these are important, they generally still fall short of meeting net-zero or super-efficient buildings standards.

To help advance the niche further, the Province supported three more research-oriented programs for residential building: a time-of-sale home energy labeling pilot program; a $1 million grant to builders to aid in the construction of approximately 100 "super-efficient new homes"; and $5 million to expand the Solar BC program administered by the BC Sustainable Energy Association. (Solar BC, 2011).

5.4.3.3 Advocates of Regime-Level Institutional Change

During this period, there was a noticeable increase in the number and type of organizations putting forward recommendations for how the regime's existing set of institutions could be changed to make them more supportive of the expansion and/or normalizing of low-carbon communities and/or super-efficient/net-zero buildings (see Table 5-7). There was also an increase in the number of

documents produced. However, one needs to be careful to not overestimate the total number of documents as three documents included in the dataset were signed by multiple organizations and are therefore represented in more than one row. Beyond this increase in activity, there are a couple of other points that are worth noting: First, there were a growing number of recommendations being advanced for the Province to give local governments additional powers to pursue their low-carbon objectives. And second, the number of co-authored documents suggests an increase in efforts to coordinate a unified message.

Table 5-7 Published Recommendations to Advance TEEC in BC (2007-2009)

		No. of Docs Issued	Document Type								
			Submissions			Resolutions			Reports		
Organization	**Type of Organization**		N	E	C	N	E	C	N	E	C
BC Sustainable Energy Association	Sustainable Energy NGO	4[a,b,c]	1	1	1				3	3	2
Cascadia Region Green Building Council	Green Building Association	1a	1	1							
David Suzuki Foundation	Environmental NGO	3[a,b,c]	1	1					2	2	2
Dawson Creek	Local Government	1a	1	1							
Lighthouse Sustainable Building Centre	Green Building Service Provider	3[a,c]	1	1					2	1	1
Mountain Equipment Co-Op	Retail Business	1[a]	1	1							
North Vancouver (City of)	Local Government	1						1			
North American Insulation Manufacturers Association Canada	Industry Association	1a	1	1							
Pembina Institute	Sustainable Energy NGO	6[a,b,c]	1	2					4	4	3
Saanich (District of)	Local Government	1[a]	1	1							
SmartGrowth BC	Sustainable Communities NGO	2[b]							2	2	2
Whistler	Local Government	1[a]	1	1							

N = New Buildings, E = Existing Buildings, C = Communities

a – 2007 co-authored report, b – 2008 co-authored report, c – 2008 co-authored report

Not included in this list are organizations directly involved in the development and construction of green buildings. Where these organizations tended to influence the Province was on discussions about the more technical aspects of standardizing green building practices. In the following statement, a Provincial interviewee explains the legitimacy that building professionals carry with them as well as their influence on government decision-making:

> In terms of big advocates, it's the Canada Green Building Council. They have a huge, huge, huge impact. If it wasn't for LEED, I don't think we would have had that throne speech announcement in 2007 for the unified green building code. And you know they built their power from the ground up, and they built it through selling the merits to consumers…But in a way that advisory committee that I mentioned (the Building Standard and Safety Branch's Green Building Code Advisory Committee), the second one, really does have a lot of weight, because they represent the engineers, the architects, the Green Building Council, I don't know, I think they might have a UDI (Urban Development Institute) person on the group, I might be wrong. So it's kind of a balanced of who the key players are. Engineers do actually wield a lot of weight. As do architects. So professionals.

Another group worth mentioning but which is not included in Table 5-7 is Quality Urban Energy Systems of Tomorrow (QUEST), which was founded in 2007. The organization, which focused on promoting integrated-community energy systems in Canada, is noteworthy as much for its messengers as it is for its message. Among the membership of its National Advisory Committee are representatives from some of Canada's largest oil and gas companies, energy utilities, and all levels of government. However, the focus of the group, whose offices resided within the Canadian Gas Association, tended to be on supply-oriented solutions rather than demand ones.

5.5 2010-2012 Shifting Priorities

5.5.1 The Policy Landscape

By late 2009, the context within which the Province`s climate and energy policies were immersed had changed considerably since they were first introduced in 2007 and 2008. To start with, the province`s economy, like most of the developed and developing world was engulfed in a deep and drawn out recession. One outcome of this was a drop in demand for natural gas and electricity, by far the two most widely used sources of fuel in the built environment. This drop in demand contributed to their decline in price on the North American spot market. Another outcome was a decline in the revenues collected by the provincial government. A third outcome, was the decline in the perceived importance of environmental issues by the general public relative to other issues facing Canadians (Environics, 2011).

In the midst of this rapidly changing context, the Province continued to craft its climate agenda. As the Province had not responded to the Climate Action Team`s recommendations about the additional set of actions needed to achieve its 2020 emissions reduction target, there was considerable uncertainty as to what steps would be taken next. One strategy that percolated to the top of the political agenda in 2009 was the electrification of the Province`s economy with existing and new clean renewable energy sources. The apex of this strategy was the passage of the *Clean Energy Act* in June 2010. A few of the overriding energy objectives stipulated in the Act included:

1. Being self-sufficient in electricity generation by 2016 (plus an additional 3,000 GWh of "insurance" by 2020);

2. Ensuring that at least 93% of the electricity in B.C. must come from clean or renewable resources;
3. Meeting at least 66 per cent of BC Hydro's incremental resource needs through conservation by 2020;
4. Encouraging switching from high-carbon intensive energy sources or uses to low or no carbon ones;

From a demand-side perspective, objectives three and four were particularly important. As the impact of objective three was felt most by BC Hydro, I will limit my discussion here to objective four and discuss the other in detail in Chapter 7. Encouraging a switch from high-carbon to lower-carbon fuels was empowered by a provision in the Act that allowed energy utilities to pursue projects, programs, contracts or expenditures for the purpose of reducing greenhouse gas emissions in BC (Section 18 of the Act). This meant that in addition to developing and charging rate payers for DSM programs that reduce energy savings, utilities could also develop and charge rate payers for measures that were justified by their potential to reduce greenhouse gas measures. However, before utilities could pursue specific GHG reducing measures under this provision, explicit permission needed to be granted by the Minister of Energy and Mines through a regulation.

A few months after the *Clean Energy Act* was passed, BC Premier Gordon Campbell, who led the Province since 2001, resigned. The Premier's resignation was closely tied to the government's (mis)handling of a controversial new harmonized sales tax which was announced only days after it was reelected to office in 2009.

Premier Campbell was succeeded by Premier Christy Clark in March 2011. During the leadership race she barely touched on the Province's climate initiatives. Instead, her leadership bid focused almost exclusively on a jobs creation platform. However, an early indication of the new government's shifting climate priorities was the discontinuation of the Cabinet Committee for Clean Energy and Climate Action within weeks of the new Premier being sworn in. Next, in early 2012, the government announced its plan to expand the Province's natural gas sector, including the construction of a number of liquid natural gas (LNG) plants in British Columbia over the coming years (BC Ministry of Energy and Mines, 2012a). Finally, in June 2012, the Province announced its intention to amend the *Clean Energy Act* to allow the LNG Plants to be powered by gas thermal generation, should they purchase electricity to produce LNG. Under the original *Clean Energy Act*, any new gas thermal power plant would need to be carbon neutral. The proposed amendment, though, would consider gas thermal generation for the purposes of supplying LNG facilities to be 'clean', reversing a key component of the Province's 2007 Energy Plan.

5.5.2 The Energy Efficiency and Conservation Policy Regime

Despite the Province's changing economic and political context, other than the Amendments made to the *Clean Energy Act* to allow for LNG plants to generate non-sequestered thermal electricity, the Province did not rescind any of the climate legislation passed under the Campbell administration (see Table 5-8). According to one study participant, one important reason for this resilience is the strong dedication to the Province's climate file demonstrated by the Minister of Environment, Terry Lake, under who's Ministry the climate agenda now sits. More broadly, though, a policy undercurrent that emerged during this period was an understanding that the Province was moving away from being a climate policy leader toward staying closely in step with other jurisdictions. The following comment is indicative of what a number of the provincial officials that I spoke with said about this shift:

> The message we heard when the change of Premiers happened was that we don't want to be the leaders any more. In 07-08 we wanted to be the first, the best, the most efficient, the most stringent blah, blah, blah, standards. And now, it's we don't want to be in front, we want to be with the pack.

One example of how this change in leadership affects how policies were implemented was the energy efficiency upgrades to the BC Building Code. In the 2008 Energy Efficiency Buildings Strategy, the target was to have these updates in place by 2010, a full two years before the federal government was planning to make similar upgrades to its Model National Energy Code for Buildings[6]. However, in the changing economic and policy context, it was eventually decided that it made more sense to go along with the Model National Energy Code than it did to expend already stretched provincial resources on going it alone just to, as one interviewee put it, "meet some arbitrary deadline that was picked out of the air". The energy efficiency upgrades to the BC Building Code, which are based on the national models, are expected to be in place by 2013.

When I look at the policy measures established or still supported during this period that are directed at the built environment energy system (see Table 5-8), five things stand out from the previous period. First, other than the *Clean Energy Act* and amendments, no new pieces of legislation were passed that were directly aimed at affecting this system. Instead, the amendments and regulatory changes advanced are all extensions of the preexisting legislative framework. Second, the most significant regulatory changes in terms of their impact on how energy is used in the built environment, namely upgrades to the *Energy Efficiency Act* and the BC Building Code, were in close step with what other jurisdictions were already doing or planning to do. Third, the regulations that arguably move the regime

[6] Replaced by the "National Energy Code for Buildings (NECB)" for commercial and section 9.36 of the National Building Code (NBC) for residential

the furthest toward new institutional practices, namely, the Improvement Financing Regulation, GHG Reduction Regulation and the Solar Hot Water Ready Opt-in for the BC Building Code, are all very narrowly defined in terms of the scope of activity that they permit. Fourth, the amendments made to the DSM Regulation increased the capacity of utilities to assist the Province in steering technology-oriented market transformations, strengthening the potential for growing TEEC-oriented partnerships between these interests. Fifth, other than renewed funding for the LiveSmart BC incentive program and the Infrastructure Planning Grant for local governments, all preexisting Provincial energy-efficiency building incentive programs were essentially cancelled. The only new building efficiency incentive programs were aimed at building a market for certified energy efficiency tradespeople. This reduction in funding was consistent with across the board budget cutbacks and hiring freezes that took place during this time.

Despite these challenges, the Province estimates that the total energy saved each year through electric utility, provincial conservation policies, programs and regulations to be 5207.3 tera joules (1446.5 gigawatt hours per year). The LiveSmart BC program, alone, incentivized more than 100,000 home energy inspection audits by the end of 2012; with the average energy saved per participant estimated by the Province to be 27 per cent per year (Ministry of Energy and Mines, 2012). Looking further ahead, a Provincially commissioned study by the Pembina Institute projected that the Province is on the path to achieving its energy efficiency targets for 2020 that were included in its 2008 EEBS. For residential buildings, it even showed that the Province can achieve its targets by simply maintain its current regulatory initiatives and programs (such as LiveSmart BC). As one interviewee put it, “We could actually stop introducing anything new and still deliver those targets”. While positive, it did raise questions among some of the staff in the Energy Efficiency Branch of the Ministry of Energy and Mines about whether the targets are ambitious enough. If I compare the measures taken today to the ones for the built environment that were recommended by the Climate Action Team as necessary for achieving the Province’s 2020 emission targets, the answer would most certainly be no.

In terms of other sources of funding, in July 2011, the federal government announced it would provide $400-million in funding over one year for its national ecoEnergy Retrofit for homes program. By January 2012, though, Natural Resources Canada announced that the program would be cancelled prematurely after allocating less than half of the budgeted funding (Natural Resources Canada, 2012; Tapper, 2012). While various levels of government were cutting back on their funding, utility DSM programs continued to increase with the province’s utilities spending $211 million on DSM initiatives in 2011.

Table 5-8 Provincial Policy Measures to Encourage Energy Efficiency and Conservation

Policy Measure	Established	Description of Measure
Regulations		
Clean Energy Act	2010	Opened the door for utility-based energy efficiency financing mechanism and utility DSM programs intended to reduce greenhouse gas emissions in BC.
Energy Efficiency Act	2010-2012	Eight categories added to the BC's regulated products list: electric and natural gas water heaters, natural gas furnaces, general purpose electric motors, windows, doors and skylights, general service lights, televisions, & standby power devices
BC Building Code Solar Hot Water Ready Opt-in	2011	Allows communities to voluntarily require new single family homes to be built to accommodate future installation of a solar hot water system, thereby triggering a provincial regulation.
Amendments to DSM Regulation	2012	A number of amendments intended to, among other things, better align the regulation with the Clean Energy Act as well as increase the capacity of utility's to assist in the Province's energy efficiency market transformation strategy.
Improvement Financing Regulation	2012	Under the Clean Energy Act, sets up the parameters for two small-scale on-bill financing pilot projects to be established by BC Hydro and Fortis Electric
Greenhouse Gas Reduction Regulation	2012	Under section 18 of the Clean Energy Act, public utility companies are authorized to spend up to $104 million to incent heavy-duty fleets in the Province to adopt natural gas as a transportation fuel.
Climate Action Charter	2012	Guidelines for carbon neutrality finalized by the Green Communities Committee for local government Climate Action Charter signatories.
BC Building Code Energy Efficiency Upgrades	2013 expected	Complex buildings - meet the National Energy Code for Buildings (2011). Will also reference ASHRAE 90.1 (2010) Homes - energy performance standard from s. 9.36 of the National Building Code (NBC), approximately consistent with EnerGuide 80 in coastal regions
Financial (Dis)Incentives		
LiveSmart BC	2010	$35 million over two years for "whole-house" energy efficiency program $15 million for LiveSmart Small Business Program
Carbon Tax	2008	$30 per tonne by 2012. No plans to increase but also no plans to eliminate.
Electricity rates	2006	All BC Hydro customer classes moved to multi-tiered conservation rates by 2013.
Infrastructure Planning Grant	2005	Up to $10,000 to help improve or develop long-term community plans related to sustainable community infrastructure
Contractor incentive	2011	$100 for LiveSmart participants who used certified contractors
Information and Training		
LiveSmart BC	2008	Online information - focus on reducing energy use to reduce carbon footprint.
Inventories	2008	Community Energy and Emissions Inventories administered by the Province.
LiveSmart BC Community	2008	Online information sharing space for local government practitioners and related experts
Climate Action Toolkit	2008	Online local government information source for news, best practices, advice, information and strategic guidance to help reduce greenhouse gas emissions.
SMARTTool	2010	Carbon emissions inventory and reporting software developed for provincial public sector and local governments.
Climate research	2008	Pacific Institute for Climate Solutions established with $60 million endowment
Training	2010	Training and certification of weatherization professionals established in BC. $100 subsidy for training by the Thermal Environmental Comfort Association

Coordination

Since 2008, the Province's Energy Efficiency Branch had tried to work out a longer-term "road map" for transformative energy efficiency in the built environment. By 2010 this effort merged with a similar project being undertaken by the Building and Safety Standards Branch which oversees the BC Building Code. In the fall of 2010, several provincial government entities, including the Energy Efficiency Branch, the Buildings and Safety Standards Branch, the Local Government Branch of the Ministry of Community, Sports and Cultural Development, and to a lesser extent BC Hydro, which is a Crown Corporation, participated in workshops hosted by the Building and Safety Standards Branch. The focus of the workshops was to develop an ambitious energy efficiency reduction vision for the built environment in the broadest sense e.g., buildings, urban design and institutional change. As one interviewee put it, "They had a super-wide mandate". Although the final vision and measures to achieve it that were developed through these workshop are confidential, the scale of change sought is not inconsistent with a challenge issued by the Minister of Housing to the province's building developers in the spring of 2010 (Barnes, 2010, p. 6; Frank, 2010):

> My ministry is currently working towards mandating EnerGuide 80 energy performance for housing. By 2020, my challenge to you is to be building housing that is net zero for GHG emissions with superior air tightness and insulation that will enable net zero energy performance through the addition of renewable energy generation such as solar panels.

To achieve these targets, though, it was recognized that a number of key supporting elements were needed. From the Province these included the continued greening of the BC Building Code and expanding the government's existing efficiency commitments via the *Energy Efficiency Act* and Section 18 of the Clean Energy Act. It was also acknowledged that utility DSM programs would need to play a key role in both priming the market for more ambitious standards and building the knowledge and skills capacities needed to see these measures through.

Shortly after the workshops were held, the Housing and Safety Standards Branch began working on a cabinet submission for the built environment that included the potential targets and types of actions needed to achieve net-zero emissions buildings by 2050. However, as a result of the political changes that were afoot at the time and the change in government focus that followed, this submission was never made.

Elsewhere in the Province, the BC Ministry of Energy and Mines continued to collaborate with major energy utilities on a number of fronts. At a senior management level, the BC Partnership for Energy Conservation and Efficiency met once in 2010 and again in 2011. Topics discussed during the 2010 meeting included: the impact of the Clean Energy Act and the Amendments to the DSM Regulation on utility DSM programs; stakeholder updates; the government's LiveSmart BC program; financing

mechanisms to encourage individuals to self-finance energy efficiency upgrades; and how to improve the province's existing market transformation strategy for energy use in the built environment. The last of these topics led to a lengthy discussion about how the utilities and the Province could better coordinate their efforts to achieve market transformation. During this discussion, it was acknowledged that although some level of coordination does take place between the energy utilities and the province with regards to advancing energy performance standards (particularly with BC Hydro), the current focus of utility DSM programs remains resource acquisition rather than market transformation. It was generally agreed that in order to make a clearer link between utility program spending and the advancement of regulated codes and standards, a strategic plan from government was needed that articulated all parts of a transformation strategy and the different roles needed to be played by different actors. Another issue raised during the market transformation discussion was how to broaden the scope of utility-DSM programs from individual energy-use components to a more energy services systems perspective of energy savings (e.g., whole-building space heating or illumination systems). Moving to a system's based perspective was something the utilities indicated was particularly pertinent if the government intended to achieve its ambitious GHG targets because a number of more conventional DSM programs were starting to run up against diminishing returns. This in turn led to a general recognition that the Partnership needed to ensure that such governance-related issues were worked into the Province's long-term built environment road map. In addition to the road map work, it was acknowledged that the Partnership needed to also work out how existing regulations could be amended to increase the capacity of utilities to contribute to the Province's market transformation strategy.

By the time the Partnership met in 2011, the decision to not advance the energy efficient buildings roadmap to Cabinet was known. As a result, the Partnership narrowed its focus on more immediate tactical measures such as recent or upcoming regulatory changes to broaden the scope of utility DSM programs (e.g., Section 18 of the Clean Energy Act and the DSM Regulation), the Province's LiveSmart BC incentive program, and a utility-delivered energy efficiency financing mechanism.

For the most part, the majority of issues brought up during the Partnership meetings observed by the study were ones being driven by the Province. In addition to getting technical input from utility experts, these meetings were also helpful for gauging utility support, identifying where potential non-political problems might lie in pursuing different courses of action, and working out how resources could be used to start to address these challenges. Although not the focus of these conversations, these forums also provided an opportunity for participants to try to work out how the Province's changing political waters could affect existing and planned for activities and gauge where they were pointing to in terms of what work should be pursued and how.

For a number of issues, such as on-bill financing, DSM regulation changes, energy efficiency regulations and Section 18, these higher level discussions were followed up with ongoing and in depth staff level collaborations. Also at the staff level, an interviewee discussed the importance of the more informal coordination taking place between the Province, Natural Resources Canada and the Province's utilities regarding upcoming efficiency standards.

At a regional scale, the Province deepened its ties with four American States – Alaska, California, Oregon and Washington - with the signing of the 2010 Action Plan on the Environment and the Economy in 2010. One of the initiatives included in the Plan was to work on ways to reinforce and accelerate the adoption of energy efficiency standards across these jurisdictions (BC Ministry of Energy and Mines, 2012b). This effort was part of a broader coordination effort between these jurisdictions called the Pacific Coast Collaborative.

Internally, the retraction of resources throughout the Province meant that the line ministries primarily responsible for delivering the Province's energy efficiency and low-carbon built environment agenda were struggling to keep on top of their own discrete responsibilities, never mind the myriad of initiatives announced between 2007 and 2009 that required coordination between ministries. Although many of these issues were eventually addressed, there was a limited capacity to develop more than a couple of new initiatives at any given time. And when they were, they were dealt with in a series of starts and stops as the political agenda jumped around from one set of priorities to another.

5.5.3 TEEC Niches in the Built Environment

5.5.3.1 Low-Carbon Communities Niche

By the end of 2012, 180 of BC's 188 local governments signed the Province's Climate Action Charter which commits these communities to make their corporate operations carbon neutral by 2012 (Ministry of Community, 2012a). To enable them to do so, in 2012 the Green Communities Committee (2012) finalized what the requirements are for corporate carbon neutrality. These requirements were the result of four years of negotiations between the Province, local governments and the Union of British Columbia Municipalities. Their intention is to provide flexibility to local governments while also ensuring that some progress is made to becoming carbon neutral. To this end, in addition to monitoring, reducing, and reporting emissions, local governments can claim carbon neutrality in one of three ways: 1) invest in local emissions reduction projects that are supported by the Green Communities Committee, 2) invest in local emissions reduction projects that are not formally supported by the Green Communities Committee, and/or 3) purchase offsets from a credible third-party provider.

In terms of actions taken, according to annual reports submitted for 2012 by the 180 communities that signed onto the Province's Climate Action Charter to the Ministry of Community Development (2013) thousands of community and corporate climate-related actions were taken. Of these, building and

energy generation projects accounted for 39 per cent of all direct corporate actions and 14 per cent of direct community actions (Ministry of Community, 2012b). Specific policies adopted by some local governments to reduce community emissions included: an internal carbon fund, efficiency development density bonuses that incent developers to build new buildings that go beyond the energy performance requirements of the BC Building Code, efficiency upgrade programs, a home energy loan program in the City of Vancouver, expedited development permit processing, a passive design toolkit, and a green building checklist. Of course there is no way of knowing how many of these actions would have been taken regardless of the Province's climate initiative and reporting requirement. However, the very fact that this information exists and ongoing energy and emissions inventories are required by all local governments in BC represents significant progress from only five years earlier.

As was the case in the two previous periods, the Federation of Canadian Municipalities' Green Municipal Fund and the UBCM's Gas Tax Fund continued to provide financing for local governments to plan for and develop corporate and community-oriented energy projects. A new source of financial and knowledge support for local governments was the BC Hydro Power Smart's Sustainable Communities Program (BC Hydro, 2012c). Meanwhile, new Provincial initiatives helping to accelerate the niche included: an optional *Solar Hot Water Ready* requirement in the BC Building Code that gave local governments the authority to elect to require new single family homes to be built to accommodate future installation of a solar hot water system (Office of Housing and Construction Standards, 2012); and efforts to make it more straightforward for local governments to access, model and interpret high-quality, neighborhood-level data about their current emissions pathways to help local governments self-monitor their emissions.

Despite these gains, the changing Provincial context resulted in a retraction of some of the resources that were previously available to local governments for planning and implementing their energy and emissions plans. One of the clearest examples of this was the discontinuation of the Community Action on Energy and Emissions program in 2010. Less obvious was the decline in Provincial human resources due to hiring freezes and budget cuts. Other than interactions with a small group of actors working within the Climate Action Secretariat on local climate issues, most of the local government representatives with whom I spoke expressed a sense of disconnect between the Province and local governments' climate activities. However, many local government representatives communicated with each other. In addition to an informal network of leading practitioners, study participants emphasized the ongoing importance that more guided network arrangements played in helping them work through and pursue their community's climate objectives (such as BC Hydro's Community Energy Managers who met on a quarterly basis; regional climate networks e.g., the Capital Regional District's climate group, and

Metro Vancouver's Regional Engineers Advisory Committee; and the Pembina Institute's Green Municipal Building Leaders).

5.5.3.2 Green Buildings

According to a 2012 report (Globe Advisors, 2012) on British Columbia's green building and energy efficiency sector, the sector in 2011 generated approximately $8.4 billion in gross domestic product ($5.5 billion direct and $2.9 billion indirect) and employed 76,450 full-time equivalent workers in British Columbia (46,290 direct and 30,160 indirect). In addition to these figures, by September 2012, 201 existing commercial buildings in British Columbia were certified through the BOMA BESt program (BOMA Canada, 2012). And by November 2012, 760 building projects in BC had registered with the Canadian Green Buildings Council's LEED Canada program (Canada Green Building Council, 2012). Of these, 623 were registered since February 2007 and 178 were granted some type of LEED certification. Within this mix of activity, the province boasted some of the most innovative developments in North America such as Victoria's Dockside Green, Vancouver's Olympic Village, Simon Fraser University's Univercity, and the University of British Columbia's Centre for Interactive Research on Sustainability.

Despite these impressive numbers and projects, net-zero/super-efficient buildings remained an elusive target for the vast majority of the Province's building stock (new and old). For example, a recent study of 39 mid- to-high-rise multi-unit residential buildings in Vancouver found that space-heating and total energy consumption in high-rise condominium increased over the past 30 to 40 years (Finch, Ricketts, & Knowles, 2010). What is more, it appeared as though the Province was stepping away from its direct pursuit of a number of the initiatives likely needed to accelerate the normalization of net-zero/super-efficient buildings (e.g., time-of-sale home energy labeling and super-efficient/net-zero demonstrations projects).

On a more positive note, there was an increase in activities to improve the efficiency of existing multi-unit residential buildings (MURBs). For example, the BC Sustainable Energy Association administered a pilot project in the City of Vancouver aimed at upgrading the efficiency performance of 15 existing multi-unit residential buildings (MURB) (BC Sustainable Energy Association, 2012b). In addition, since 2010 the Province's Homeowner Protection Office (HPO) supported at least 10 applied research projects that focused on improving the energy performance and GHG emissions of residential buildings (Homeowner Protection Office, 2012). More generally, the Province's Innovative Clean Energy Fund, which was cancelled in July 2010 after the 0.4% levy on consumer energy sales that funded it was cut, was reinstated in 2012. Finally, by the end of 2012, LiveSmart BC supported more than 100,000 home energy inspection audits; the average energy saved per participant is estimated by the Province to be 27 per cent per year. In addition, the Province estimates that the total energy saved each year through

electric utility, provincial conservation polices, programs and regulations to be 5207.3 tera joules (1446.5 gigawatt hours per year).

5.5.3.3 Advocates of Regime-Level Institutional Change

A noticeable difference between the advocacy in this period and the previous two, was the number of local- and regional-governments who started to engage in putting forward creative ideas to empower local-governments to do more to help expand and normalize low-carbon communities and high-efficiency buildings (See Table 5-9). The most common formal process used by local governments to do this was through the tabling, and sometimes passing of, resolutions at the Union of British Columbia's Municipalities annual conference each fall. Another example of advocacy being taken by local governments to improve the institutional conditions in the Province to pursue low-carbon communities was the Pembina Institute's Municipal Green Building Leaders program. In 2010, eight of the mayors whose local governments participated in the program wrote a letter to the Province that requested it to both expand and accelerate the inclusion of energy efficiency measures within the BC Building Code and to provide local governments with more authority to require higher efficiency performance standards than what is in the Building Code. The letter answered several months later with an encouraging but non-committal response from the Minister of State for Building Code Renewal.

5.6 Conclusion

Over the course of this chapter we see the rise and gradual leveling off of the Province's energy efficiency and climate objectives. In the first era (2002-2006), the Energy Efficiency Branch of the BC Ministry of Energy and Mines begins to take steps toward a classic efficiency market transformation strategy and supporting low-carbon communities. That is an accelerated shift toward incrementally higher-levels of energy performance in more discrete energy end-use and energy-service technologies such as light bulbs, furnaces, and windows. Authority for these endeavours comes through the Province but the funding for its 2005 Energy Efficient Building Strategy, under which these actions fall, comes mainly through a federal government climate initiative.

Table 5-9 Published Recommendations to Advance TEEC in BC (2010-2012)

		No. of Docs Issued	Document Type and Topic Addressed								
			Submissions			Resolutions			Reports		
Organization	**Type of Organization**		N	E	C	N	E	C	N	E	C
BC Sustainable Energy Association	Sustainable Energy NGO	3		1					1	2	
Campbell River	Local Government	1[a]	1	1	1						
Caribou Regional District	Regional Government	1						1			
Cowichan Valley Regional District	Regional Government	1[a]	1	1	1						
David Suzuki Foundation	Environmental NGO	1[b]								1	
Dawson Creek	Local Government	2[a]	1	1	1	1					
Forest Ethics	Environmental NGO	1[b]								1	
Fort St. John	Local Government	1[a]	1	1	1						
Globe Advisors	Sustainable Business NGO	1							1	1	
Lighthouse Sustainable Building Centre	Green Building Service Provider	1							1		1
Metro Vancouver	Regional Government	2				1		1			
Nanaimo (Regional District)	Regional Government	1[a]	1	1	1						
North Vancouver (District of)	Local Government	1						1			
North Vancouver (City of)	Local Government	1[a]	1	1	1						
Pembina Institute	Sustainable Energy NGO	6[b]	1	3	1				2	2	1
Smithers	Local Government	1						1			
Terrace	Local Government	1					1				
Tides Canada	Environmental NGO	1[b]								1	
Tofino	Local Government	1[a]	1	1	1						
West Coast Environmental Law	Environmental NGO	1[b]								1	
Whistler	Local Government	1[a]	1	1	1						
World Wild Life Fund (BC)	Environmental NGO	1[b]								1	

N = New Buildings, E = Existing Buildings, C = Communities

a – 2010 co-authored letter, b – 2012 co-authored report

By early 2007, the province enters into a second era (2007-2009) of energy efficiency and conservation. In addition to more conventional least-cost benefit arguments for supporting energy efficiency intervention, efforts to support accelerated levels of energy efficiency and conservation in the built environment are being pushed also by the Province's ambitious climate targets. During this period a 2008 report by the provincially-appointed Climate Action Team and supported with forecast modeling suggests, among other things, that in order for these targets to be met, the Province will need to pursue an aggressive, integrated and prolonged energy efficiency strategy within the built environment.

Recommended objectives included in this strategy include a requirement for net-zero GHG new buildings by 2020 and major upgrades to the existing building stock, supported by measures such as mandatory building energy labeling, a scaled-up carbon tax, and sustainable land-use planning. In other words, TEEC is required, a much more ambitious and broader scoped energy efficiency and conservation objective than conventional market transformation. In response to the Province's climate objectives, measures intended to lower energy and emissions intensities in buildings and communities are increased substantially, many of which put the Province at the forefront of government action on climate change across North America. However, despite all of this activity, the goal of pursuing TEEC is never formally adopted, only implied through its climate targets.

By 2010, the golden allure the Province's climate objective and the Premier on whose shoulder it came in on were starting to tarnish. In the third period of time covered by this chapter (2010-2012), we see the Province's changing political and economic winds pushing shut the window for advancing TEEC. Most telling of this change was the shelving of the Province's vision for a "super-wide mandate" to reduce energy and carbon intensities in the built environment in late 2010, almost as quickly as it was crafted through an intra-ministerial/agency process. Since that time the appetite for steering transformational change is all but diminished. However, a more conventional but incremental market transformation vision of reducing energy intensity in the built environment is proving more resilient. A good example of this was the decision to extend the LiveSmart BC program in 2010 because of its job creation and economic development merits rather than its potential to reduce carbon emissions (although the program's carbon "co-benefits" are still strongly touted).

Despite the slowing Provincial agenda, both the low-carbon communities and super-efficient/net-zero niches continued to expand throughout the decade. For buildings, this speaks to the legitimacy and stability of the concept of green buildings and the capacity of actors within the niche to draw resources to it. For communities, the hard work is about to begin. The reporting requirements included in the *Local Government (Green Communities) Statutes Amendment Act* and the Climate Action Charter, which come into effect in December 2012, were successful at putting climate change on the policy agenda of all local governments in BC. Within this group is a small subset of local governments who want to blaze a trail to becoming low-carbon communities. It remains to be seen, though, whether these leading communities will be granted the authoritative resources by the Province (via *Local Government Act*, Community Charter, Vancouver Charter) that they argue are necessary to do so. Although these types of resources will bear few direct financial costs to the Province, they will undoubtedly require the sustained and concentrated human resources to help coordinate. In the current environment, it is difficult to see how the authority to proceed with such an effort will be granted.

Summing up, while the Province talked about transformative levels of carbon reduction, it was never clear what role energy efficiency and conservation in the built environment should play in achieving it; despite the best efforts of the Climate Action Team in 2008, a few actors within the Ministry of Energy and Mines and the Housing Branch's Vision 2020 initiative in 2010 to build a TEEC vision. Instead, what we see in the case study are a series of stops and starts with regards to planning for TEEC. In the chapter that follows, I will use the theory-based evaluation framework developed in Chapter 3 to assess the efforts taken by the Province's to steer TEEC to see what lessons may be drawn to help maintain and build on the momentum for TEEC that already exists in BC.

Chapter 6: Assessing Provincial Efforts to Steer Transformative Energy Efficiency and Conservation in British Columbia's Built Environment

6.1 Introduction

In this chapter I assess the efforts of the Government of British Columbia to advance transformative energy efficiency and conservation (TEEC) in the built environment as described in Chapter 5. Using my theory-based evaluation framework from Chapter 3 for the conditions found to support transformational socio-technical change I assess the state of these conditions in BC's building and community sectors (see Figure 6-1). Critical elements of this framework include (see Table 3-2 in Chapter 3 for a full listing of indicators):

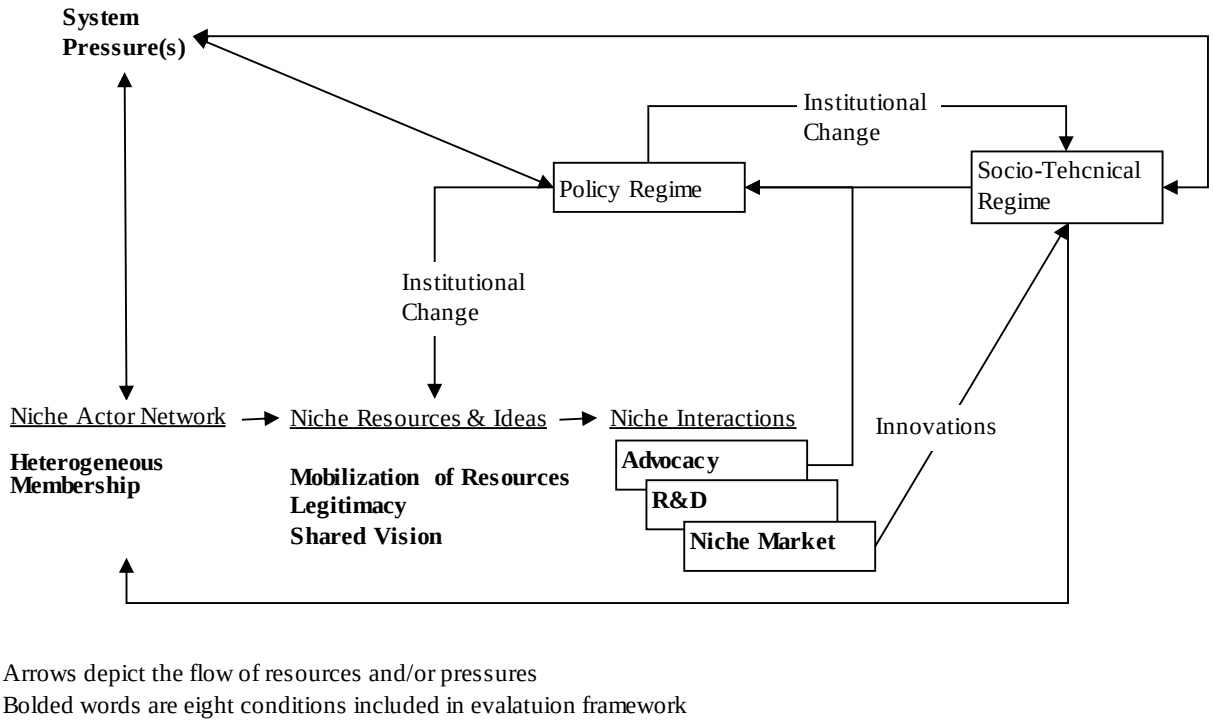
- The system pressures bearing on the regime
- The formation of a socio-technical niche
- The capacity of this niche to create a shared vision among its membership, build legitimacy, and mobilize resources
- The creation of innovative sustainability structures through the creation of new knowledge, the formation of niche-markets, and advocacy
- A strategic capacity to not only scale-up niche innovations beyond the realm of niche markets to that of the regime but to also increase its powers in order to continue to expand its activities.

Although the range of activities described in Chapter 5 take place from 2002-2012, my evaluation is on the strength of these conditions at the end of this timeframe to see what cumulative benefits have accrued from these efforts. After assessing the state of each of these conditions as they pertain to TEEC in the built environment, I will then provide my overall assessment of the system's current capacity to steer such a change.

6.2 System Pressure(s)

By the mid- 2000s, there were a number of system pressures moving the Government of British Columbia (Province) toward a rapid scale up of its efforts to reduce energy use in the built environment. To start with, the unit price of both natural gas and electricity were either at or expected to rise to record levels (National Energy Board, 2011). The economy was also projected to continue to increase, putting additional pressure on these energy resources. In addition to these economic factors, concerns about climate change among Canadians was also at or near its apex (Environics, 2008, 2011). Within this environment, the Province announced its intention to be a climate change leader in North America. It backed up its claim with a host of climate initiatives that ultimately increased the cost of carbon-based fuels even more and put into legislation provincial carbon targets and mandatory carbon reporting for

both provincial and local public sectors. At the same time that the province was advancing its climate agenda, a number of jurisdictions throughout North America were rapidly scaling up their energy efficiency objectives and programs (York, Witte, Nowak, & Kushler, 2012). While sector-wide trends such as these may not function as direct sources of pressure to pursue more ambitious levels of energy efficiency and conservation (EEC), they do attest to a rising set of expectations for any jurisdiction claiming to be a leader in the efficient use of energy. In addition to these top-down and horizontal pressures, there was also a bottom-up policy entrepreneurship within the Energy Efficiency Branch of the Ministry of Energy and Mines (MEM) that helped steer these pressures toward an expanding market transformation strategy. Strangely, though, there was a clear lack of bottom-up pressure coming from external stakeholders.



Arrows depict the flow of resources and/or pressures
Bolded words are eight conditions included in evalatuion framework

Figure 6-1 Analytic Framing of the Conditions that Support Socio-Technical Transitions

There is no question that these pressures, particularly the Province's push to be a climate leader, led to considerable action in certain sectors of the Province. However, what lacked were clear signals about how much of the province's climate target each sector of the economy was expected to achieve. Without this coherency, after the first wave of climate euphoria between 2007 and 2009 died down, the

political climate agenda became stalled with a revolving series of high-level, largely-supply oriented, energy strategies (i.e., electrification, clean energy exports and liquid natural gas).

This is not to say actions that take place around trying to reduce energy use in the built environment ceased. However, by 2012 what was largely left in place for trying to reduce energy use in buildings were measures driven by a shorter-term energy savings rationale (e.g., job creation, economic development, and rates) rather than a climate one. Other than the carbon tax, the only specific climate policy measure hold-out for buildings is the Province's LiveSmart BC incentive program which was being justified increasingly according to its economic development and job creation merits.

For communities, pressure to continue to pursue low-carbon pathways was spelt out more coherently in the form of the Local Government (Green Communities) Statutes Amendment Act and the Climate Action Charter as well as their own Official Community Plans and Community Energy and Emissions Plans. So although pressures such as provincial climate leadership, the economy and social concern about climate change decreased after 2008, local governments had to, at the very least, continue to demonstrate that some effort was made to continue to reduce emissions so long as these legal requirement were not repealed.

From this we see that a major difference between the building sector and local governments was how the Province's climate expectations were translated into a form that could prompt and enable a response by regime and/or niche actors. For most sectors of the economy, including buildings, these expectations were never translated. A provincial interviewee explains how this lack of allocation affected how her/his ministry thought about striving for net-zero GHG emissions for buildings:

> So it's great to have a vision and it's great to have strategies and measures but you also have to allocate. And what we've, and that's where we haven't gone. Is to say, where's the burden? You know, in what sectors? So if we're going to deliver minus 33 in the case of emissions or minus 20 in the case of energy. Are we are applying that equally to all sectors? Or do we give transportation a bit of a break and buildings have to go a little bit further? And back to the net-zero, that was a bit of a point. Our target was minus 33, so why would we say minus100 to the built environment when other sectors might not? That was a key question.

For local governments that signed the Climate Action Charter, these pressures were translated into a much clearer objective: net-zero corporate emissions by 2012. While there was considerable debate as to whether this was an appropriate objective, it did at least enable a response from 180 of the province's 188 communities. Far less clear, however, is whether and to what extent local governments needed to respond to these pressures within their broader communities. By not allocating specific reduction targets to specific sectors of the economy, the Province has largely left each community to answer these questions on its own. The problem with this decentralized approach is that there is little in

place to prompt other sectors (including the Provincial Ministries that represent them) to coordinate with local governments to achieve community targets.

On the whole, there were sufficient pressures to steer a more conventional market transformation strategy in the built environment (see Table 6-1). However, there was a persistent lack of clarity around how far to stretch these efforts and what role EEC in the built environment should play in helping the Province achieve its ambitious climate targets. So although the potential is there to pursue TEEC, without greater clarity, the default response to these pressures is to continue to do more of the same just a bit quicker. Given this information I asses, the strength of the system pressures to pursue TEEC to be weak to moderate.

Table 6-1 Summary of Selection Pressure Indicators

Indicator	*"Strong" Indicator*	*Province Strengths*	*Province Weaknesses*
Multiple Pressures	Multiple pressures in terms of type and level of origin	Multiple system pressures exist (rising energy costs, environmental risk avoidance, job creation, sector-wide shift to market transformation strategy) Bottom-up pressure from internal policy entrepreneurs.	Climate change politically deemphasized after 2009. Economic slowdown reduced cost-effectiveness rationale for efficiency. Little in the way of external bottom-up pressure.
Coherent	Response plan developed, adopted and implemented.	Pressure was particularly coherent when reinforced by Province's climate agenda (2007-2009)	Lowered significantly with drop in political attention to climate agenda (2010-2012)
Translation	Rationale used to address system pressures is consistent with both the problem and the organization's operationalized primary objectives.	Carbon tax and carbon-neutral requirements were clear signals to the provincial public sector to reduce emissions. Carbon-neutral legislation also very clear link (for public sector and 'corporate' local government emissions). Energy and emissions reporting requirement for public sector as well as local governments is very clear.	Link between TEEC and carbon reduction are still not well developed. Unclear how much GHG emissions reductions each sector in the economy should be expected to achieve.

Overall Strength: Weak to moderate

6.3 Resources & Ideas

This section looks at how the Province efforts to steer TEEC was supported with the kinds of ideas and resources that my framework argues is necessary to pursue transformational change. Although numerous ideas and resources will ultimately be required to see a socio-technical transition advance, I now highlight three that the literature tells me are particularly important for furthering this process: a shared vision (idea), legitimacy (authoritative resource), and resource mobilization (authoritative and allocative resources).

6.3.1 Shared Vision

In Chapter 3, I define a shared vision as a meta-idea that represents the desired futures that the actors participating within a niche are trying to collectively achieve. In Table 6-2 public vision statements about the built environment are listed for a number of the more active TEEC niche participants described

in Chapter 5. For communities, the emphasis is on compact and mixed-used neighbourhoods and in some cases the use of district energy systems. For buildings, common themes include: very high-efficiency, minimal environmental impacts, and some form of integrated on-site or community clean energy system.

For low-carbon communities, Table 6-2 shows a close alignment between the Ministry of Community, Sport and Cultural Development's "Green Communities" vision and the visions held by other niche actors. What is particularly telling is the alignment between the Province's vision and the visions put forward in the planning documents of the three different sized cities included in Table 6-2: the City of Vancouver (large), the City of North Vancouver (medium), and the City of Dawson Creek (small). The fact that these documents exist demonstrate the vision's strength for mapping out a 'possibility space' for plausible alternative arrangements of each city's built environment as well as for building an heuristic for indicating the technical, institutional and behavioural problems needed to be addressed. What is more, given the numerous interactions that take place between and within each of these levels of government as well as the host of other organizations working with them to map out and work toward their visions (i.e., sustainable energy NGOs, community planning consultants, utilities) (Berkhout & Westerhoff, 2013), the vision is also a useful metaphor for building actor networks. The vision is, in other words, coherent enough to bring coalitions of actors together to begin planning for and taking action to achieve it and flexible enough to adjust to the specific long-term objectives of different kinds of communities in British Columbia. Finally, as demonstrated by the following statement that was made by a Provincial representative who works for the ministry responsible for overseeing local governments, the vision has also proven stable over time:

> The Throne Speech usually sets the context and how we message but it doesn't necessarily influence the foundation of our work. We continue to work with communities to achieve the goals of integrated community sustainability planning. It may have a specific focus on families, affordable housing or something else of key importance to government at the time. With climate action it has focused on GHG reductions but ultimately working to effectively support any and all goals that support the development of healthy livable communities needs to be done in an integrated way. So, we find ways of weaving in the new focuses with our core work.

In short, the vision used to describe low-carbon communities is both coherent enough to bring coalitions of actors together to begin planning for and taking action to achieve it and flexible enough to adjust to the specific long-term objectives of different kinds of communities in British Columbia as well as the coming and going of different provincial agendas.

In contrast to the coherent and flexible vision used by the Ministry of Community, Sports and Cultural Development to describe sustainable, low-carbon communities, is the one used by the MEM (2007, p. 2) in its 2008 Energy Efficient Building Strategy (EEBS) to describe its vision of energy

efficient buildings (see Table 6-2). Although many different avenues are certainly possible within such a vision, it is so flexible that it is difficult to see how it can hold together a network of actors interested in pursuing transformative levels of EEC, never mind advance such a network.

An opportunity to build such a vision presented itself during the Vision 2020 workshops held in 2010 with officials of the Energy Efficiency Branch and Buildings and Safety Standards Branch of the Ministry of Energy and Mines, and the Ministry of Community, Sports and Cultural Development. Although the mandate provided by the Minister of Housing to build a vision of a highly efficient and low-carbon built environment was broad and ambitious, no formal position on the matter was ever released.

In the meantime, the Province's Energy Efficient Built Environment Strategy includes numerous targets. Although forward looking and ambitious, targets are not in themselves visions of a desired future. Instead, they reflect road markers that can be used to estimate progress toward achieving a broader vision. Visions, on the other hand, establish the desired ideal image of the future that efforts to steer transformational change are hoping to move towards (John Bridger Robinson, 1982). Given the high-level and long-term nature of visions, they are necessarily ambiguous and systemic in nature.

The EEBS attempted to draw a link to a future "vision" by referencing its supports to the "government's goal to reduce greenhouse gas emissions by 33 percent from 2007 level by 2020 as well as electricity self-sufficiency by 2016" (Ministry of Energy Mines and Petroleum Resources, 2007b, p. 2). However, the first of these objectives is itself a target in need of a vision and the second is so fluid and relatively imminent that it holds little sustaining binding power for actor's hoping to collectively achieve TEEC in the built environment over the course of decades.

The good news is that while the Province failed to step forward with a clear vision, the building industry continued to advance and invest in ideas about "green" buildings" (as evidenced by the growing portfolio of green buildings in the Province). Ten years ago many of the organizations propelling this niche forward did not even exist. This fact alone is strong evidence of the ability of these ideas to build an alternative actor-network. To be sure, some of the more organized and well-resourced proponents of these approaches (such as the net-zero energy home coalition and QUEST) are more interested in taking advantage of the supply-oriented opportunities that getting to "net-zero energy" represents than they are in improving the efficiency of buildings. However, the involvement of these interests and their willingness to invest resources simply reinforces the delicate and powerful balance that these ideas hold between being coherent enough to bring a diverse-range of actors and resources together and flexible enough to keep them together while they work toward advancing different pieces of a shared vision.

Table 6-2 Regime and Niche Energy Use Visions for the Built Environment

Organization	Vision
Provincial Government	
BC Ministry of Energy	*For buildings*: [I]mprove the energy and emission performance of new homes and buildings and upgrade existing ones to reduce energy demand.
BC Ministry of Community	*For communities:* complete, compact communities that encourage "mixed-use" development and the use of alternative modes of transportation to reduce greenhouse gas (GHG) emissions.
Climate Action Team	*For buildings*: Net-zero emissions for all new buildings by 2020; efficiency upgrades for existing homes and buildings. *For communities*: Operate within a low emission development pathway.
Local Government	
City of Vancouver	*For the city*: … show the world how to live, and live well, within its limits. We can be the greenest city on earth. *For emissions:* Eliminate Vancouver's dependence on fossil fuels. *For buildings:* Lead the world in green building design and construction. By 2020 all new construction carbon neutral; improve efficiency of existing buildings by 20%.
City of North Vancouver	*For the city:* The 100 Year Sustainability Vision describes a city that reaches the 80% GHG reduction target by 2050 and continues to employ green, clean energy services and increase transportation and building efficiencies to achieve net zero GHG emissions by 2107. *For buildings:* Green buildings and efficiency technologies, including efficient local energy delivery systems (i.e., community energy systems).
City of Dawson Creek	*For the city:* Create a compact, complete community *For buildings:* The City of Dawson Creek will position itself as a true innovator in its promotion of green building practices and use of renewable energy to increase livability and move towards its greenhouse gas emission targets.
Green Building Sector	
BOMA BESt	*For buildings*: Creating a sustainable environment one building at a time.
Canada Green Building Council	*For the built environment:* A transformed built environment leading to a sustainable future.
Net-Zero Energy Home Coalition	*For buildings:* All new home construction meeting a net-zero energy standard by 2030.
Sustainable Energy NGOs	
BC Sustainable Energy Association	*For the Province:* A British Columbia that can flourish in a clean sustainable energy future.
Community Energy Association	*For communities:* all local governments consider energy in their land use planning and development, infrastructure choices and daily decisions. A widespread ethic evolves that values the efficient use of energy and clean, renewable sources of energy supply. As a result, communities save money, have a stronger economy, enjoy cleaner air, reduce greenhouse gas emissions and are more pleasant and vibrant places in which to live.
The Pembina Institute	*For the Province:* The Pembina Institute envisions a world in which our immediate and future needs are met in a manner that protects the earth's living systems; ensures clean air, land and water; prevents dangerous climate change; and provides for a safe and just global community.
QUEST	*For communities:* By 2030, Integrated Community Energy Solutions will be the preferred way of doing development and redevelopment in communities.

Overall, there is a lack of clear provincial vision for TEEC in BC (see Table 6-3). Not surprisingly, then, many of the benefits intended to develop from such a vision are spotty at best. Although local governments and the green building sector have stepped up to the plate with ideas, resources, and actions of their own, without a clearer vision from the Province of where and how these ideas fit into its own view of the future of B.C.'s building sector, it is difficult to say just how far and how fast such alternative arrangements will normalize within the system. As a result, my evaluation assesses the strength of the shared vision for TEEC in BC to be weak to moderate.

Table 6-3 Summary of Shared Vision Indicators

Indicator	*"Strong" Indicator*	*Province Strengths*	*Province Weaknesses*
Mapped out alternative "possibility space(s)"	Multiple alternative arrangements mapped out.	Climate Action Plan and Climate Action Team Report, and Vision 2020 show possible paths forward.	No plans developed past 2020. Only single pathway forward was mapped out. Vision 2020 not made public.
Heuristic for problem identification	Broad set of problems that need to be addressed identified.	Only developed in very broad terms.	Unclear what climate targets mean to energy efficiency in the built environment.
Target-setting and monitoring	Target set and monitoring is ongoing	Climate targets set and monitored. 2008 EEBS targets set and monitored.	2008 EEBS targets are more incremental than transformative. Climate targets are ambiguous.
Actor networks	The vision has helped to maintain niche cohesiveness and has encouraged growth of membership.	Some early network building around the 2008 EEBS and Climate Action Team (Section 6.5)	Climate targets too flexible for building a stable TEEC niche. Short-term nature of provincially-coordinated networks (Section 6.5).
Focus of resources	Consistent and timely flow of resources to pursue vision.	Reasonable provincial flow of resources from 2007-2009 at height of climate agenda (Section 6.3.3). Local governments and green building sectors are focusing resources around their visions.	Very inconsistent provincial flow after 2009 as climate agenda deemphasized. (Section 6.3.3)

Overall Strength: Weak to moderate

6.3.2 Legitimacy

At question in this case study is the level of legitimacy afforded to *super-efficient/net-zero buildings* and *low-carbon communities* in BC. To help answer this question I will compare the state of each niche against the factors identified in the new institutional literature as influencing a positive legitimation outcome, namely, the level of debate surrounding a concept (C. R. Hinings et al., 2004), the emergence of new actors and mature ideas that work toward delegitimizing existing institutional structures (DiMaggio, 1991; Fligstein, 1990); the adoption by established actors of new innovations (Greenwood et al., 2002; Leblebici et al., 1991; Morrill, 2005); and multi-level shifts in widely held ideologies, social structures and the organization of power (Holm, 1995). Although these factors alone cannot tell me if an idea or action is viewed as appropriate, they can at least indicate the strength of efforts to build their legitimacy.

To start with, in Chapter 5 we saw the emergence of a number of new organizations and programs in the early- to mid- 2000s promoting green buildings and sustainable, low-carbon communities in British Columbia. Although not necessarily new ideas, they ran counter to common practices in both the building- and community-sectors that paid little heed to the energy-related consequences of their planning and development activities. Despite the transformative nature of these ideas, there was actually little debate about their desirability. However, this apparent consensus, has not necessarily led to a deluge of resources and activities and solid commitments to achieving them, raising questions about the saliency of these ideas to many decision-makers.

In terms of the adoption of these niche ideas and practices by established actors, over the last decade they were taken up and acted upon by an increasing number of well-established public and private entities. For buildings the Province's public-sector played a particularly important role in providing an initial niche-marketplace for green certified buildings (Globe Advisors, 2012). Moving beyond a specific sector, the City of Vancouver is targeting net-zero construction and major efficiency upgrades for all buildings in the City as part of its low-carbon pathway.

Despite the expansion of each of these niches over the last decade and the actions taken by the Province (and others) to promote them, the ideologies, social structures and organization of power of conventional and far less sustainable energy-related rules, technologies and practices in the built environment still dominate. When asked to comment on the Province's desire to push a net-zero energy vision, a representative in the Ministry of Energy and Mines answered:

> The big tell in terms of the transition around climate action policy was The Climate Action Team Report. Right? And they said, okay, if you're serious, here's you know labeling, net-zero emissions and there was a whole series of recommendations there. So we kept waiting. Okay, when government responds to those recommendations then we'll know if they're serious…They never responded.

Evoking many of the measures recommended by the Climate Action Team will undoubtedly require shifts in how power is organized within the built environment. For example, moving toward mandatory labeling and super-efficiency standards for existing and new buildings will reduce the authority afforded to market participants to voluntarily operate and build lower efficiency buildings. Similarly, giving local governments more flexibility to pursue innovative policies that encourage low-emissions development will decrease the authority of the Province to set the development paths of these communities. However, until this level of legitimacy is afforded to these niches, as was done in the City of Vancouver, the authoritative capacity of actors within them to transform the marketplace will remain locked within niches.

In Table 6-4, I summarize many of the points discussed above, When looked at as a whole, the best I can say about the legitimacy of super-efficiency/net-zero buildings and low-carbon communities in BC is that they are still going through a process of legitimation. However, the concern is that although the niches themselves have legitimacy, a market transformation based on them does not. Given this mixed result, I assess the strength of TEEC's legitimacy in BC to be moderate to weak.

Table 6-4 Summary of TEEC Legitimacy Indicators

Indicator	*"Strong" Indicator*	*Province Strengths*	*Province Weaknesses*
Strength of Debate	New sustainability-oriented arrangements are being supported and/or adopted with little debate about the appropriateness of these actions	Concepts of super-efficient buildings and low-carbon communities generally accepted as desirable.	More talk than action though. Ideas advanced by Climate Action Team have gone nowhere within the Province.
Delegitimizing	Pre-existing arrangements are perceived as inappropriate	No coordinated effort is evident to delegitimize existing practices and expectations regarding building efficiency.	Conventional building practices still dominant
Adoption by Established Actor	New sustainability-oriented arrangements adopted by established actor	LEED Gold building standards for new public sector buildings. City of Vancouver's super-efficient building goals.	Not tied to any bigger strategy of scaling these practices up to other sectors and communities throughout the Province.
Multi-level shifts aligned with TEEC	New sustainability-oriented arrangement aligned with significant shifts occurring across levels.	The more incremental objectives of conventional market transformation are proving more adaptable to changing circumstances.	Muddled provincial "clean" energy policy created mixed messages about role of TEEC in addressing pressures

Overall Strength: Moderate-to-weak

6.3.3 Resource Mobilization

In Chapter 5, we saw that in both the case of super-efficient/net-zero buildings and low-carbon communities, government and non-governmental actors mobilized a number of different allocative and authoritative resources which, given the rise in the number of building projects and communities pursuing these objectives, have had considerable success in expanding and propelling these niches forward over the past decade. Despite these successes, in Sections 6.3.1 and 6.3.2, I showed that in both niches, the problem is not a lack of legitimacy for the niches themselves but more a lack of legitimacy for the steps likely needed to accelerate the normalization of these niches across the built environment. From a resource perspective, a critical question is whether enough of the right kinds of resources were mobilized quickly enough to advance these visions in a timeline that was consistent with the Province's carbon targets.

For local governments pursing low-carbon visions, in addition to their own sets of resources, resources mobilized by higher-levels of government were key. In fact, although the networks providing financial, technical, information, and monitoring and evaluation support to local governments were all quite decentralized, there was nevertheless a concentration of resources being mobilized by a relatively

small number of government actors (Berkhout & Westerhoff, 2013). These included: the Ministry of Community, Sport, and Cultural Development, the Climate Action Secretariat (Ministry of the Environment), BC Hydro (a Crown Corporation), the Ministry of Energy and Mines, the Federation of Canadian Municipalities, and Solar BC (a Ministry of Energy and Mines funded program that is administered by the BCSEA), as well as energy and climate consultants (many hired with at least partial funding provided by the Province or BC Hydro), and interactions within and between local and regional governments.

Despite the considerable network of actors providing largely allocative resources, according to the local government representatives that I spoke with, other than the City of Vancouver which operates under its own Provincial legislation, even in cases where individual communities are willing to take actions and are able to access allocative resources, a major limitation for them was the narrow range of market shaping actions that they could legally impose to influence how energy is used in the built environment. In the following passage, a local government representative expresses her/his frustration with the existing provincial hard governance infrastructure that oversees local government affairs:

> The legislative barrier is our biggest challenge...It's the fact that, other than the City of Vancouver, the Ministry, the Province writes our rules. And I think they understand very little about what we do to write our rules. And we're told to...quantify our emissions and change some things. But when you really want to change things, you're not allowed because then you don't have the ability. The Local Government Act doesn't let you do that. And to change the Local Government Act is a hair-pulling exercise that requires time and money and lobbying and a huge effort. So that's our biggest challenge - legislative.

For local governments (or at least the leading ones that I spoke with), then, a lack of appropriate authoritative resources was just as big an issue as a lack of allocative ones.

On the building side, the rapid growth of green building projects in BC over the last decade speaks volumes about the ability of this highly-decentralized and independent network of niche actors to mobilize resources toward a shared vision. The challenge here was more one of mobilizing the resources needed to *normalize* many of these practices across the building sector. The following passage by a Provincial interviewee gives a good indication of what resources are likely needed to accelerate the market transformation of net-zero/super-efficient new buildings:

> There's actually a very simple tactic or measure or set of measures that it would take to achieve that net-zero. I mean, if its new construction, it's easy, it just has to go in the building code. But we've often talked about having a road map for the building code. So we only announce one code at a time and then industry doesn't have time to prepare. Whereas…we should start talking now about what the 2020 building codes are going to look like.

Despite efforts from 2008 to 2010 to build such a road map by the Province's Energy Efficiency Branch and BC Building and Safety Standards, at the end of 2012 there was still neither a long-term net-zero/super-efficient target for building standards adopted in the Province nor a stepwise pathway worked out to nudge towards it.

For existing buildings, the suite of resources likely needed to advance the market is more complex. Here is the same Provincial interviewee describing the likely path forward to accelerate the transition to net-zero/super-efficient buildings for the existing building stock:

> And then on existing buildings what we need is mandatory benchmarking, disclosure, followed by financing, which actually we're doing right now. Followed by building a workforce to basically deliver services to the real estate industry. When people are selling their homes they can get these labels. Engaging the mortgage loan lenders to ensure that their rules are such that they can do what we call an improvement mortgage. So you take out a mortgage on your house but they give me an extra 20,000 dollars if you complete the upgrades. And the final step, and we see it in the City of San Francisco, is a mandatory standard at the time of sales and you just nudge that up. They call it an ordinance. It's a municipal ordinance. It says if you're going to sell your house you have to have R x of insulation in the attic. And, you know, arguing that when somebody's selling a house they can afford to do those upgrades because they're about to receive funding. And if you couple that with financing, so those who don't have the cash but they can take out a loan that is transferable. Then it's a done deal. So we know what needs to be done, it's just political will.

At the end of 2012, although the Province was moving ahead with a transferable financing mechanism, there were no immediate plans to further the home energy labeling pilot projects that were run by the Province in collaboration with BC Hydro and Fortis BC in 2010 and 2011. Similarly, there were no immediate plans to further the work of a stakeholder advisory working group, which was brought together by the Buildings and Safety Standards Branch and met several times in 2011 to look at how to apply more uniformly the BC Building Code to existing buildings at the time of major renovations or change in occupancy (in the case of commercial buildings). From a more "next-practices" perspective, there were also no signals that either the Solar BC program, which ended in 2011, or the super-efficient demonstration project, which was scheduled to end in 2012, would be extended. In other words, there was virtually no plan in place to extend authoritative or allocative resources to some of the more leading edge market transformation concepts that were introduced in the 2008 Energy Efficiency Building Strategy.

One place in BC where resources were and continue to be mobilized to implement many of the measures outlined above for transforming the market for new and existing buildings is within the City of Vancouver which is able to operate far more independently from the Province than all other local jurisdictions. This speaks to the potential for communities to act as innovation niches within the Province, if granted the authoritative resources needed to map out and actually implement the measures

needed to pursue their own pathways. Interestingly, at the same time that these local governments are very dependent on the Province, they are also very independent from one another. This latter scenario means each community has the potential to be its own niche for transformational change. However, the Province seems to perceive this opportunity as more of a threat than a benefit.

Looking back at Chapter 5, we saw both the advantages and disadvantages of so many resources being controlled by the Province. From the time of its announced climate initiatives in 2007 until the release of the Clean Energy Act in 2010, the provincial Government demonstrated a strong willingness to lead the province toward a low-carbon future. It supported its ideas with both a number of legislative changes as well as new sources of funding to pursue innovative policies and programs. However, this level of direction and support was maintained only as long as the attention of the Province's political leadership remained focused on it. Through a combination of factors, including the global economic slowdown that started in late 2008 and a change in leadership, the objectives of the Province turned almost exclusively toward its short-term economic situation. And as it did so, the drive to transform BC's building sector slipped back into neutral as did many of the resources required to maintain the momentum of change needed to achieve the Province's climate objectives. One of the places where this retraction of resources was most acutely felt was within the provincial line ministries tasked with delivering the Province's policy agenda, making it more challenging to address the pieces of this agenda that they were solely responsible for, never mind the ones that required coordination between ministries (such as building an energy efficiency road map for the built environment).

In summary, efforts to date to steer the province toward super-efficient buildings and low-carbon communities appear to be left half concocted and even less than half built. Local governments were given incentives to turn themselves into low-carbon communities but were not given the legal flexibility to pursue many of the innovative measures that they will likely need to undertake to do so. While the building sector was left with a provincial strategy whose objectives will likely be obtained but fall far short of a super-efficient market transformation. The shining light in all of this is the green building sector, but it is still relatively insular in its focus, leaving the question of who works toward normalizing its practices up in the air. Given this lack of coordination, on the whole, I assess the strength of the resources being mobilized to steer TEEC in BC to be weak to moderate (see Table 6-5).

When I look at shared visions, legitimacy and resource mobilization together, we see how intricately linked these elements are to building the structures of TEEC. At the time of writing, there is no clear idea of what should come next for TEEC in BC, if anything. Undoubtedly the super-efficient/net-zero buildings and low-carbon communities niches will continue to do their important work of transforming specific nodes on the margins of the bigger built environment energy system. However, creating the level of momentum needed to increase and scale-up these niche innovations and eventually

transform the system as a whole will require the kinds of authoritative and allocative resources that under the current governance system, other than the City of Vancouver, only the Province has the power to mobilize. Before such a consistent flow of resources are stabilized, though, the legitimacy of these actions will need to be strengthened in the eyes of the Province.

Table 6-5 Summary of Resource Mobilization Indicators

Indicator	"Strong" Indicator	Province Strengths	Province Weaknesses
Timeliness	The development of TEEC initiatives is ongoing and timely in terms of how smoothly initiatives flow through different phases of development.	Large network of organizations administering government-funded programs.	Provincial cutbacks affecting services and programs. Local government activities are stunted by lack of and/or confusion about authority to act on building efficiency.
Distribution of resources	Centralized around actor(s) with a strong transformative vision or… Decentralized in a network with a strong shared transformative vision and at least moderate system pressures	Allocative resources for steering TEEC are highly decentralized. Shared TEEC vision among green building sector and small number of leading local governments.	Tight central control of authoritative resources by the Province whose TEEC vision is less progressive than a number of leading local governments. Little evidence of a shared TEEC vision among broader building sector.
Interdependency of a network's actors	Interdependent network with a strong shared transformative vision or central actors with one or... Independent network with strong shared system pressures	Building sector and local governments are generally very independent actor-networks but there is a shared vision among the green building sector and leading local governments.	Capacity to steer TEEC is highly interdependent with building and local government sectors. Little evidence of a shared TEEC vision among broader building sector or within Province.

Overall Strength: Weak to moderate

6.4 Activities

The previous section assessed the strength of support that exists for and within BC's super-efficient buildings and low-carbon communities niches in BC. In this section I assess the success of the actors within these niches to use these ideas and resources to carry out the three activities that according to my framework are critical to developing and scaling-up niche innovations, namely: creating new knowledge, niche-market formation and advocacy.

6.4.1 Creating New Knowledge

In this section, my interest is in assessing the creation and application of new knowledge in B.C. about how to accelerate a market transformation to super-efficient/low-carbon buildings and communities. Although this type of knowledge is undoubtedly being explored by actors throughout the built environment energy system, for this case study I am specifically interested in what knowledge was created and implemented by the Province because of its unique powers to shape and influence the marketplace.

However, it is important to not only look at what knowledge was created and applied, but to also understand what knowledge was not pursued and why. To do this, I first identified issues raised as necessary for advancing energy efficiency in BC's built environment either by the Province or brought to

its attention by different actors (see Table 6-6). For each issue I then tracked the level of attention it received on the government's policy agenda (i.e., systemic agenda, institutional agenda, and decision agenda) as a proxy for whether new knowledge was created to address the issue and whether or not this knowledge was eventually applied. As discussed in Chapter 3, a systemic issue is one that at some point in time was at least taken under consideration by decision-makers for further action. Meanwhile, an issue on the Province's institutional agenda is one for which some level of action was taken to explore it further (i.e., resources were mobilized). While an issue on the decision-agenda is one for which an informed decision was made or is about to be made about whether or not to implement it. In Table 6-6, all of the issues advanced were placed at a minimum on the Province's systemic agenda since they were introduced either by Provincial decision-makers or to them via a formal process. This means that they were at least momentarily looked at and taken into consideration by a decision-maker within the Province.

To help answer the question of why new knowledge was created and applied for some issues and not others, I looked at three different explanatory factors: i) who advanced the issue, ii) what theme did the issue address, and iii) what type of organizational learning was needed to address it. In terms of who, I identified issues advanced by five different groups of actors: the Province, the Climate Action Team, local governments, energy utilities, and environmental/sustainable energy non-governmental organizations.

To help me track the type of topics being recognized as important for pursuing TEEC, each issue was assigned one of six broad categories for which new knowledge was sought: 1) the strategic pathways that might lead toward achieving the Province's overarching climate targets (strategy); 2) how a market transformation should be coordinated in British Columbia (governance); 3) market parameters to influence how energy is used (market); 4) the technological elements of super-efficient/net-zero buildings (technology); 5) improving the energy performance of core governmental buildings (core gov); and 6) low-carbon communities (communities).

Finally, I assigned each issue one of the three social learning loops discussed in Chapter 3 to distinguish between the types of organizational learning needed to address them. A 'single-loop learning' issue is one that either was or can be addressed within the underlying assumptions or frames-of-reference of existing regime components. A 'double-loop learning' issue, meanwhile, explores or requires a significant reframing of one or more regime components for it to be addressed. Finally, to address a triple-loop learning issue, a significant reconfiguration of one or more landscape structures is required or at the very least needs to be explored.

Data for Table 6-6 was collected through three means (see Appendix B): The first was through direct observations of internal meetings between the Ministry of Energy and Mines and its utility partners between 2009 and 2012. The second sources of data were interviews in late 2012 with provincial staff

members from the Ministry of Energy and Mines, the Ministry of Community, Sport and Cultural Development, and the Ministry of Citizens' Services and Open Government. And the third were publicly available documents that addressed matters related to EEC and were either published by the Province or formally submitted to it by a TEEC network participant. It is important to keep in mind that Table 6-6 is not intended to show all of the issues raised by these actors. For example, it does not include more operational and procedural topics discussed. Instead it shows the key issues raised with regards to advancing TEEC in British Columbia.

Of the 61 issues listed in Table 6-6, 46 required either double-loop or triple-loop learning to address because they reflect either a new framing about how an action should be carried out or an entirely new context for how energy in the built environment is either thought about or used (see Figure 6-2). This demonstrates how many of the issues raised through provincial planning processes did not align easily with the pre-existing set of ideas about how the province should address EEC in the built environment. In other words, old institutions were challenged and adapted at the same time that new ones were created.

However, not all of the issues raised received the support needed to advance them beyond the Province's systemic agenda. In fact, the most predictable indicator of whether an issue advanced or not was who placed it on the agenda. Of the 19 issues that advanced to the decision agenda 12 were introduced by the Province. Similarly, of the 15 issues that advanced to the institutional agenda, seven of them were provincially-led initiatives.

In contrast, of the 36 issues advanced by all the non-provincial actors combined, only seven made it onto the Province's decision-agenda and nine onto its institutional agenda. Of the seven that made it to the decision-agenda, one was rejected outright (sharing carbon tax revenues with local governments); three were already being looked at by the Province at the time that they were advanced (increasing the mandate of utility's to pursue carbon emission reductions, providing financial assistance to local governments to pursue low-carbon community actions and develop training, certification and support programs); one aligned with a BC Hydro consultant's report on market parameters for encouraging energy efficiency that the Province was privy to (introducing an efficiency financing mechanism); and two advanced after years of coordinated efforts by leading local governments and ENGOs (the retention of carbon offsets by local governments and an "opt-in" for local governments to require new residential buildings to be solar ready).

Table 6-6 The Built Environment Energy Efficiency and Conservation Issue Agenda for the Government of British Columbia

				Type of Learning			Location on Province's Agenda		
Source of Issue	**Issue advanced to accelerate market-transformation which needs new knowledge to address**	**Topics Explored**	**Year**	**Single -Loop**	**Double - Loop**	**Triple -Loop**	**Systemic**	**Institutional**	**Decision**
Province	Building code applied uniformly to existing buildings	Market	2011	✓				✓	
	Improve efficiency of existing government buildings	Core Gov	1977	✓					✓
	Advance equipment and appliance energy standards	Market	1992	✓					✓
	Workforce capacity for energy efficiency	Market	2005	✓					✓
	Increase the scale and scope of utility DSM programs	Market	2010	✓					✓
	Public disclosure of building energy ratings (labeling)	Market	2007		✓			✓	
	Strategy for achieving provincial **climate targets**	Strategy	2007		✓			✓	
	On-site renewables (solar pilots)	Technology	2007		✓			✓	
	Province wide energy conservation study and plan	Strategy	2008		✓			✓	
	Coordination of **market transformation**	Governance	2009		✓			✓	
	Provincially-administered incentive program	Market	2005		✓				✓
	Electricity **conservation** rates	Market	2005		✓				✓
	Support emerging, commercial-ready technologies	Technology	2007		✓				✓
	Greening the Building Code	Market	2007		✓				✓
	Leading green design for new government buildings	Core Gov	2007		✓				✓
	Implement an **efficiency financing mechanism**	Market	2008		✓				✓
	Fuel switching to reduce **GHG emissions**	Market	2009		✓				✓
	Net-Zero buildings roadmap	Strategy	2008			✓		✓	
	Low carbon communities	Communities	2007			✓			✓
Climate Action Team	Update Green Building Code at least every three years	Market	2008	✓			✓		
	Increase and expand carbon tax coverage after 2012	Market	2008	✓				✓	
	Comprehensive public engagement and outreach	Market	2008		✓		✓		
	Adopt **leading** equipment and appliance standards	Market	2008		✓		✓		
	Full lifecycle costing for government procurement.	Core Gov	2008		✓		✓		
	Remove **capital restrictions for public sector** retrofits.	Core Gov	2008		✓		✓		
	Ensure building code compliance by local governments	Market	2008		✓		✓		
	Mandatory building energy **labeling** by 2012	Market	2008		✓		✓		
	Develop an **aggressive** energy efficiency **roadmap**.	Strategy	2008		✓			✓	
	Flexible regulations to encourage **green communities**	Communities	2008		✓		✓*		
	Tie infrastructure funds to **green communities**	Communities	2008		✓		✓*		
	Create a conservation **culture**	Market	2008			✓	✓		
	All new public sector buildings to be **net-zero** by 2016	Strategy	2008			✓	✓		
	All new buildings to be **net-zero** by 2020	Strategy	2008			✓		✓	

				Type of Learning			Location on Province's Agenda		
Source of Issue	**Issue advanced to accelerate market-transformation which needs new knowledge to address**	**Topics Explored**	**Year**	**Single -Loop**	**Double - Loop**	**Triple -Loop**	**Systemic**	**Institutional**	**Decision**
Local Gov't	Continue and expand whole home efficiency program	Market	2012	✓				✓	
	Financial assistance from Province for local government low-carbon actions	Communities	2007	✓					✓
	Give communities **flexibility** to require higher energy performance energy **building standards** than code.	Communities	2007		✓		✓*		
	On-Site renewable energy requirement	Market	2011		✓		✓		
	Provincial integrated sustainable **energy plan**	Strategy	2010		✓			✓	
	Retention of **carbon offsets by local governments**	Market	2011		✓				✓
	Carbon tax revenues shared with local governments	Governance	2010		✓				✓↓
Utilities	Increase the scale of FortisBC's utility DSM program	Markets	2008	✓			✓		
	Coordination of market transformation	Governance	2010		✓		✓		
	Utility mandate to pursue GHG emissions reductions	Governance	2010		✓				✓
ENGOs	Increase & expand existing DSM programs	Market	2012	✓			✓		
	Accelerate building energy performance standards	Market	2007	✓				✓	
	Improve and expand building code enforcement	Market	2007	✓				✓	
	Carbon tax should be increased and expanded	Market	2007	✓				✓	
	Develop training, certification, and support programs	Market	2007	✓					✓
	Solar hot-water required on all new buildings	Market	2006		✓		✓		
	Compliance based on **post-construction** performance	Market	2008		✓		✓		
	Adopt **leading** equipment and appliance **standards**	Market	2006		✓		✓		
	Energy performance standards for **existing buildings**	Market	2006		✓		✓		
	Minimum **on-site renewable** building requirement	Market	2007		✓		✓		
	Publish **schedule** for future building code updates	Market	2007		✓		✓		
	Ongoing stakeholder input into building code changes	Governance	2007		✓		✓		
	Give communities **flexibility** to require higher energy performance energy **building standards** than code.	Communities	2007		✓		✓*		
	Use carbon tax to fund emission reducing projects.	Market	2008		✓		✓		
	Mandatory building energy **labeling**	Market	2006		✓			✓	
	Introduce **efficiency financing** mechanism	Market	2006		✓				✓
	Solar ready residential building **requirement**	Market	2007		✓				✓*
	Set **green building target** & develop **roadmap**	Strategy	2007			✓	✓		

✓* Issue advanced by the Province but not to the extent recommended.

✓↓ Decision was made to not support this issue

Bolded text indicates either new framing (double-loop learning) or new context (triple-loop learning)

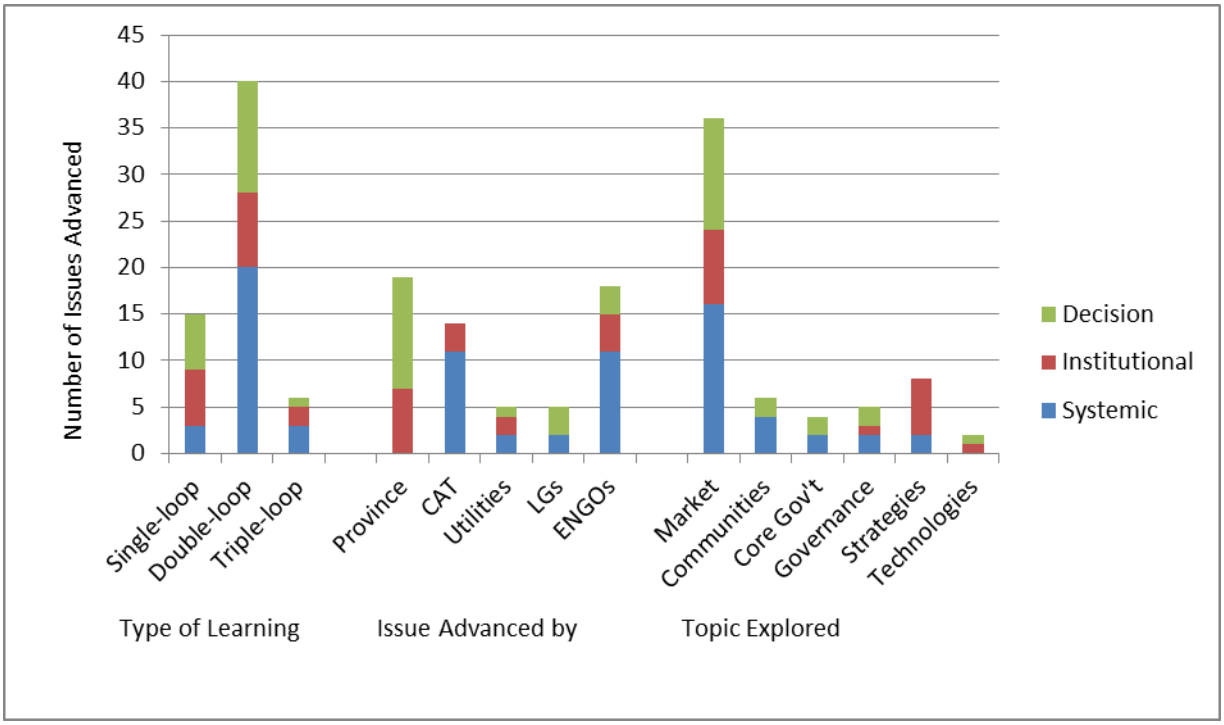


Figure 6-2 Summary of Data Included in Table 6-6

A similar story holds for the issues advanced by non-Provincial actors that made it onto the Province's institutional agenda. All of these either flowed into existing or upcoming processes or were picked up by the Province because they supported a direction that it was looking to advance itself.

In terms of the kinds of topics explored, most of the issues put forward reflected tactical elements of the market transformation strategy adopted by the Province's 2005 and 2008 Energy Efficient Building Strategies. To start with, market parameters received the most consistent attention. This is reflects a long-standing assumption by energy use planners that there is an acute market failure in how energy is used. Walking in close-step with learning about and implementing new market parameters was creating new knowledge about emerging energy efficient technologies in BC. Although the emphasis here tended to be on the innovation and diffusion of more discrete building technologies and systems (such as passive daytime lighting and solar hot-water heating), some efforts were also made to advance learning about more whole building systems (e.g., $1 million for net-zero home demonstration projects and building envelope research by the Homeowners Protection Office).

Also consistent with a conventional market transformation strategy was the creation of public sector market niches for "green" and low-carbon building technologies and practices. As a result, the Province needed to create and advance knowledge about how to achieve these objectives for its own core operations and how to support local governments to do the same.

The priority given to advancing knowledge related to the more tactical side of market transformation held true for issues advanced by nearly all of the actors. Where the issues advanced by the Province and the rest of the actors tended to differ was the degree of action that they proposed taking.

In contrast to these more tactical issues, issues that required knowledge about more structural aspects of a market transformation, namely, strategies to reduce GHG emissions in the built environment and knowledge about market transformation governance were far less prevalent. Of the eight strategy-related issues and five governance-related issues put on the Province's agenda, only two advanced to the Province's decision agenda (sharing carbon tax revenues with local governments and increasing the mandate of utility's to pursue carbon emission reductions).

From the analysis above, we can see that over the past decade, the Province was active in creating and applying new knowledge on a variety of issues related to EEC in BC. Indeed, there are now far more initiatives moving forward than there were in the two-and-a-half decades prior to the Province's 2007 climate initiative. The prevalence of issues requiring second-loop and triple-loop learning demonstrates that something truly different was sought than what existed before, likely due to the scale of energy savings and emission reductions sought as well as the shift to a province-led market transformation approach for achieving these savings. For all those issues that advanced as far as the institutional agenda, the Province now knows more about them than it did six years ago. As several participants noted, this knowledge becomes part of the government's institutional memory. When the political context is once again more open to exploring them, this preexisting knowledge about issues such as building labeling, the types of ambitious actions needed to achieve the Province's 2020 emissions targets, a net-zero building roadmap, and solar-installations and super-efficient buildings that is contained within government reports and the experiences of the bureaucrats who worked on them can be reintroduced, discussed, and built upon.

However, despite these reassurances, there is also the question of momentum. If the Province's ambitious emission targets are to be met, existing knowledge not only needs to remain within government and eventually move forward but new knowledge about issues-in-waiting also needs to be created and applied on an ongoing basis. However, the creation of knowledge was limited in terms of whose issues and what kinds of knowledge resources were mobilized for to explore and advance on the Province's agenda. In terms of whose issues, new knowledge creation was all but limited to those issues that were brought forward by the Province. In terms of what kinds of knowledge, the knowledge sought was largely tactical in nature and failed to address more structural questions such as: To what end? And, what is the most appropriate governance framework for achieving these ends in B.C.? Given these failings, I assess the overall strength of the knowledge created to advance TEEC to be weak to moderate (see Table 6-7).

Table 6-7 Summary of Indicators for the Creation of New Knowledge

Indicator	*"Strong" Indicator*	*Province Strengths*	*Province Weaknesses*
Tier of learning pursued	Most double- and triple-loop issues advanced onto the institutional or decision agendas.	About half of double-loop learning issues advanced, suggesting a changing context for how the Province thinks about and approaches DSM (most noticeably toward a market transformation framework).	A limited number of issues requiring triple-loop learning advanced, suggesting that considerable work needs to be done on creating knowledge about more a more sweeping transformation.
Diversity of perspectives	A relative equal ratio between the number of issues advanced by each actor and the number of each actor's issues on the institutional and decision agendas.	Some diversity of perspectives being advanced, particularly to the institutional agenda.	Agenda is heavily weight to issues raised by the Province.
Diversity of topics explored	A relative equal ratio between the number of different types of topics raised and the topics on the institutional and decision agendas	More immediate market-related issues dominant but there is a reasonable sprinkling of most other topics at the higher-levels of the policy agenda.	Long-term issues such as building a TEEC strategy and low-carbon communities are not receiving as much attention.

Overall Strength: Weak to moderate

6.4.2 Development of a Niche Market

A niche market represents a non-dominant market technologies or practices that are encouraged and protected by one means or another. In Chapter 5 I described the emergence of two such niches over the past decade in BC - super-efficient/net-zero buildings and low-carbon communities and the provincial policy measures taken during this period to encourage their expansion and normalization. In Table 6-8, these policies are assessed according to the energy policy evaluation framework develop in Chapter 3. In this framework I distinguished between three tiers of policies: tier 1 policies are those that *require* a baseline of energy performance to be achieved; tier 2 policies provide financial incentives or disincentives to encourage voluntary activities that are *expected to achieve* a certain level of energy performance; and tier 3 policies are ones which rely on *moral suasion* to encourage action or are foundational for future expected savings (e.g., training, demonstration projects, research and development) but *do not in and of themselves lead to direct* energy performance improvements. For communities, although a number of communities were already taking some actions to address climate change prior to 2007, this niche was enforced and expanded with the passage of the Local Government (Green Communities) Statutes Amendment Act and Climate Action Charter. While these actions require some form of action by local governments, they are weak from a performance standard perspective because they ultimately leave it up to each local and regional government to set its own emissions target and level and pace of effort to achieve it. As long as a target is set, a plan developed and some effort made toward achieving it, a local government is in compliance with the Province's requirements. Furthermore, while several sources of incentives and information to assist local governments; these do little for the subset of local governments

who want to advance more ambitious policy measures within their communities to lower carbon emissions in the built environment.

Table 6-8 Assessment of Policy Measures to Support the Formation of TEEC Niche Markets

Indicators (Energy Policy Type)	*Niche Formation Policy Tier*	*Description of Existing Activity*	**Strength of Existing Activity**
Command-and-control regulations	1	Buildings: – Energy Performance standards for equipment & appliances – Efficiency building code requirements	Moderate
Cap and tradable permits	1	None	Zero
Niche market regulation	1	Core-Government Buildings – Carbon neutral provincial public-sector operations – Leading green building standards for new buildings.	Weak
		Communities: – Energy and emissions reporting for communities. – Carbon neutral corporate operations	Weak
Financial disincentives	2	Buildings/Core-Government/Communities – Carbon tax – Electricity conservation rates	Moderate
Financial incentives	2	Buildings – LiveSmart BC incentive program – Provincial Sales Tax exemptions – Pay-As-You Save financing mechanism	Moderate
		Core-Government Buildings – $75 million Public Sector Efficiency Capital Fund	Weak
		Communities: – Climate Action on Energy and Emissions Program – UBCM Gas Tax Fund for infrastructure projects. – Climate Action Revenue Incentive Program	Weak
Voluntarism and information	3	Buildings – LiveSmart BC marketing and education – Workforce training and certification – *Super-efficient buildings $ 1 million demonstration project* – *$5 million Solar BC program* – *Labeling pilot projects* – Innovative Clean Energy Fund	Medium
		Core-Government Buildings – Ministerial "Green Teams"	Weak
		Communities – Climate Action Tool Kit – Guideline Booklets (e.g., net-zero and waste-to-energy)	Weak

Overall Score: Weak

Turning to buildings, the inclusion of energy efficiency requirements in the BC Building Code and the expansion of appliances and equipment standards are definitely positive steps forward. However, answers to questions about what comes next and when are still very much outstanding in terms of advance the market toward super-efficient/net-zero buildings. For existing buildings, the market is even

weaker as requirements for efficiency upgrades remains weak and fragmented. In the meantime, the dominant policy tool used remains financial incentives and information. On the margins of this activity, a handful of measures were also taken to advance learning about truly innovative building technologies and policies. Unfortunately, though, such actions were one-off and not connected to any longer-term market transformation strategy or resources. In the case of core-government buildings, the construction of new government buildings to LEED Gold standards will further strengthen the province's green building niche. However, for existing buildings, which will make up the vast majority of government buildings for the foreseeable future, the real niche created was for made-in B.C. carbon offsets rather than high-efficiency buildings.

Given these shortcomings, it appears as though the Province's policy measures to date to advance TEEC in the built environment are geared almost exclusively to supporting incremental change with little or no movement toward what comes next and the strategies and tactics needed to start to accelerate the advancement of more transformational outcomes across the building stock. Overall, then, I assess the strength of these efforts to date to be weak.

6.4.3 Advocacy

In Chapter 5, a growing number and diversity of actors were identified who were trying to influence the Province to make its existing set of institutions more supportive of the expansion and/or normalizing of super-efficient/net-zero buildings and low-carbon communities in BC. For low-carbon communities, the idea was initially advanced by environmental NGOs and sustainable community planners and consultants. However, over the course of the case study we saw increased advocacy by a number of local and regional governments who were trying to actively take steps to build low-carbon pathways in their communities.

For buildings, the most active actors, at least in terms of published policy recommendations to accelerate a market transformation, were a handful of environmental/sustainable energy NGOs and an even smaller number of organizations providing services to the green building sector. The green building sector, for the most part, tended to concentrate on expanding the niche through information-sharing, education and research rather than more direct policy advocacy. The exception to this, were the Canada Green Building Council and a small number of green building professionals who advised the Province on more technical aspects of standardizing green building practices.

Although each niche grew over the course of the case study, when we look at the host of issues advanced by these groups in published documents, their ability to influence provincial policy appeared limited. To start with, as discussed in Section 6.4.1., very few of the issues advanced by non-Provincial actors through formal policy processes advanced on the Province's policy agenda (See Table 6-6). In

addition to these formal submissions, I extended a similar test to recommendations made in a number of more general information documents published by niche advocates (see Table 6-9). To help me assess each recommendation's success in terms of being picked up by decision-makers, I again used the policy literature's three levels of policy agenda: systemic, institutional, and decision. If a recommendation is not listed under one of these headings, I found no evidence of it coming to the formal attention of Provincial officials.

Table 6-9 Informal Policy Recommendations for Advancing TEEC in BC's Built Environment

			Location on Policy Agenda		
Issues advanced by NGOs in self-published reports	**Topic**	**Year**	**Systemic**	**Institutional**	**Decision**
Environmental/Sustainable Energy NGO Advocates					
Accelerate building energy performance standards	Market	2001		✓	
Increase programs to incent building retrofits	Market	2001			✓
Conservation rates	Market	2001			✓
Introduce carbon tax	Market	2001			✓
Net-metering	Market	2001			✓
Public Benefits Wires Charge	Market	2001			
Solar ready residential building requirement	Market	2006			✓
Improve information and public consultation	Governance	2006	✓		
Energy performance standards for existing buildings	Market	2006	✓		
Adopt leading equipment and appliance standards	Market	2006	✓		
Mandatory building energy labeling	Market	2006		✓	
Target, roadmap & plan for green building standard	Strategy	2006		✓	
Introduce efficiency financing mechanism	Market	2006			✓
Require community energy and emissions planning	Market	2006			✓
Incent net-zero homes	Market	2006			
Incent the development of district energy systems	Market	2006			
Encourage sustainable communities	Communities	2007			✓
Penalize inefficient construction and renovations	Market	2007			
Energy intensity measures for performance standards	Market	2008		✓	
Tradable energy efficiency certificates "white tags"	Market	2008			
Create a Healthy Building Fund with energy sales tax	Market	2010			
Review financing for upgrading public sector buildings.	Government	2012	✓		
Annual investments in public sector upgrades	Government	2012			
Plan to balance public sector offsets & emissions reductions	Government	2012			
Green Building Sector Advocates					
Expanded stakeholder training and education	Market	2012	✓		
Give communities flexibility to require higher energy performance energy building standards than code.	Communities	2012	✓		
Improve scope and quality of building inspection	Market	2012	✓		
Enforce mandatory energy performance requirements	Market	2012	✓		
BC specific energy & GHG performance metrics	Market	2012		✓	
Building labeling systems and building energy audits	Market	2012		✓	
Develop energy efficiency financing mechanisms	Market	2012			✓
GHG emission reduction goals reflected in upstream & downstream planning and development requirements	Market	2012			
Super-efficient/low-carbon buildings explicit goal	Strategy	2012			
Require schematic designs to show low carbon strategies	Market	2012			
Establish stakeholder committee to push for & oversee low-carbon road map for BC Building Code	Governance	2012			
Require performance inspection at building occupancy	Market	2012			
Ongoing whole-building pilot and demonstration projects	R&D	2012			
Accelerate building energy performance standards	Market	2012			
Establish energy performance standard for public sector	Market	2012			
Expand building material, technology & methodology research	R&D	2012			
New public sector buildings should use alternative project delivery models to increase market knowledge	Market	2012			
Create financial incentives that improve the return-on-investment for the whole building e.g., tax credits	Market	2012			

As was the case with recommendations included in formal submissions, the majority of recommendations advanced by TEEC advocates had not yet made it onto the Province's institutional or decision agendas. However, what we do see is a fairly high-level of success for recommendations that were advanced by Environmental/Sustainable Energy NGOs recommendations prior to the opening of the climate change policy window in 2007. I caution the reader, though, to not draw too direct a link between a policy idea being raised by an advocate and the Province's decision to mobilize resources to explore it further and/or adopt it. For example, I do not suggest that the Province adopted a carbon tax in 2007 solely on the basis that the David Suzuki Foundation (2001) recommended it as a clean energy policy in 2001. At the same time, I would not suggest that there is no link between the two. As one provincial government interviewee pointed out:

> [T]hose two [BCSEA and Pembina] in particular are quite credible. So we'll take them seriously. And when there's been a political opening. For example, they were both pushing for on bill financing so that it part of what contributed to the buzz and support for that. I think around when we were doing labeling pilots, there's definitely credibility there.

In other words, knowing in advance that certain "credible" advocates are on side with an emerging program or policy idea lends legitimacy to the efforts of those within the government who are trying to move it forward. However, most recommendations advanced after 2007 are still looking for traction within the Province.

In terms of the types of topics that were gaining traction, all but one of the topics picked up by the Province were related to market-based policy measures. The only non-market recommendation advanced on the policy agenda was to encourage sustainable communities which was arguably reflected in the Province's local government climate initiatives.

In Table 6-10 I provide a summary of the strengths and weaknesses for each indicator relating to advocacy. I assess this particular condition to be weak to very weak because the success of advocacy seems to have more to do with finding support for the Province's already defined internal agenda than it does with proactively shaping the policy agenda. As long as there was a political opening, the advocates both within and outside of government seem to have had some measure of success. Prior to 2007, the window for advancing TEEC in BC was all but closed. Despite this, organizations continued to work on and put forward different policy recommendations. When the climate change window opened in 2007, many of these ideas advanced relatively quickly between 2007 and the first half of 2010 as is evidenced by the number of them that made it onto the Province's institutional- and decision-agendas. However,

shortly after the Clean Energy Act in 2010, the policy window for new TEEC-oriented ideas and initiatives was largely shut again.

Table 6-10 Summary of Advocacy Indicators

Indicator	*"Strong" Indicator*	*Province Strengths*	*Province Weaknesses*
Number of topics addressed	At least half of the issues have made it to the institutional or decision agenda.	A growing list of organizations are advocating for TEEC niche expansion and normalization.	Most of the issues advanced by advocates were not picked up by the Province.
Timeliness	Time between issues being first raised and picked up and advanced on the organizational agendas of key actors is relatively short (1 to 2 years).	Issues can move quickly when the policy window opens.	Issues can linger for years while they wait for the policy window to open up.
Diversity of topics addressed	A relative equal ratio between the number of different types of topics raised and the topics on the institutional and decision agendas	A number of market-oriented were picked up (once the policy window opened in 2007-2009).	Only one non-market oriented topic advanced by advocates made it onto the Province's institutional- or decision-agenda.

Overall Strength: Weak to Very Weak

6.5 Actor-Networks

In this section, I assess the strength of the actor-network in BC for steering TEEC. To help me differentiate between the three indicators for actor-networks that were established in Chapter 3 - the diversity of communities-of-learning, the diversity of actors participating in communities-of-learning, and prime movers – I assess each of these separately throughout this section. The reason for this change in format is to reflect the nested nature of these three particular indicators.

<u>Communities-of-Learning</u>

In Chapter 3 I introduced the concept of communities-of-learning as the places between individual learning and social learning where the collective generation of knowledge may occur within specific group contexts (Cohendet et al., 2001). Next, I identified five different types of such communities: hierarchically coordinated functional groups and teams as well as more self-coordinated networks, communities-of-practice, and epistemic communities. Of these five communities, I am particularly interested in ones that were creating mutually negotiated TEEC agendas or specializations via *networks*, increasing the skills and advocacy required to deliver TEEC via *communities-of-practice*, and intentionally producing and codifying new knowledge about TEEC via epistemic communities

In Table 6-11, we see that there were many different types of communities-of-learning working on one aspect or another of super-efficient buildings or low-carbon communities. For both niches, functional activities were led by different branches of the provincial government as well as local and regional governments in the case of low-carbon communities. Each of these groups was active in setting up project teams to carry out different aspects of the green building mandate laid out for them by the

Province. One outlier in this category was the Climate Action Team because it lacked any responsibility for steering or implementing a policy. Instead, it represented a team that was established purely to learn about and recommend the types of measures that others will likely need to take in order to achieve the low-carbon targets that were set by the Province.

In terms of networks that are aimed at building a shared TEEC agenda, I found evidence of two types. The first was government coordinated discussions with provincial, territorial and federal counterparts. The second were industry-led networks. Of these two, the industry-led communities were more progressive in terms of the transformative agenda they sought to build.

Table 6-11 Communities-of-Learning for Transformative Change in the Built Environment

Community Type	Super-Efficient Buildings	Low-Carbon Communities
Functional Groups	Energy Efficiency Branch (MEM) Building and Safety Standards Branch (MEM) Integrated Workplace Solutions	Local and Regional Government Planning/Sustainability Departments Local Government Branch (MCSCD)
(Project) Team	Climate Action Team (CAS) MEMPR Roadmap Working Group (MEM) Net-zero energy roadmap (MEM) Solar BC (MEM) Super-Efficient New Construction Program (MEM) Green Building Advisory Committee (MEM) Existing Buildings Working Group (MEM) New core-government buildings (IWS)	Climate Action Team (CAS) Green Communities Committee (CAS, MCSCD, UBCM) Community Energy and Emissions Plans “Green” infrastructure projects “Green” development policies
Network (building a shared agenda)	Council of Canadian Energy Ministers Pacific Coast Collaborative (???) Cascadia Green Building Council Net-zero Energy Home Coalition	Council of Canadian Energy Ministers QUEST Canada QUEST BC
Community-of-Practice (collaborate to improve individual capacity of members)	BC Environmental/Sustainable Energy NGO’s (Advocacy)	Sustainability managers of leading communities Regional climate networks BC Hydro’s Community Energy Managers Community Energy Association – Build to Zero Program Pembina Institute’s Municipal Green Building Leaders LiveSmart Communities online network
Epistemic Community (codifying knowledge)	Canada Green Building Council - LEED R-2000 Homes (administered by NRCan)	Canadian Green Building Council - LEED Pacific Institute for Climate Solutions: Sustainable Communities Theme

For communities-of-practice, a more hands-on and independently motivated type of community, I did not find a readily recognizable *application-oriented* community for the super-efficient/net-zero building niche. This is not to say that such a community did not exist for buildings, it is just that given the

nature of B.C.'s decentralized building sector, these groups were likely locally-based, fluid and informal. In other words, they were difficult to identify within a provincial-scale case study. However, I did find evidence of a more *advocacy-oriented* communities-of-practice for buildings, the core of which was formed by the BC Sustainable Energy Association, the Pembina Institute and the David Suzuki Foundation. In contrast, for low-carbon communities, there were a number of identifiable traditional *application-oriented* communities-of-practice throughout the Province but no clear *advocacy-oriented* one.

The final community-of-learning, epistemic communities, is where the green building sector arguably played its most influential role by first validating and then codifying knowledge about leading-edge sustainable building and community practices through programs such as LEED and R-2000. Through the creation and management of this knowledge, organizations such as the Canada Green Building Council gain their legitimacy with building decision-makers both within the green building niche as well as with key decision-makers. Pushing the epistemic envelope a bit further is the Pacific Institutes for Climate Solutions which among other things promotes and publishes on research designed to foster sustainable communities in BC.

On the surface, there looks to be a healthy balance of different types of communities-of-learning in British Columbia working to advance both super-efficient buildings and low-carbon communities. However, based on my interviews I found at least three shortcomings in the existing configuration. The first was a lack of an enduring transition-oriented network between provincial representatives and niche builders in both the super-efficient buildings and low-carbon communities sectors. When asked about building an ongoing green building network between the Province and the green building sector as one step toward advancing a more ambitious agenda, one of the Provincial interviewee that I spoke with responded:

> There's lots of progressive guys out there who really want to move the needle and they know how. And in the real world, they're making a buck doing it. So I think, my personal belief is that you need to collaborate with the people involved in order to get to the future. It's just that everybody seems so pressed for time and just too much going on to have some of the conversation that I think would be really good.

As for low-carbon communities, much of the dialogue between the Province and local governments centred on the carbon-neutral objectives included in the Climate Action Charter. This partnership, though, was very much project-oriented and hierarchical. As the different pieces of the Committee were finalized, the push for continuing this more formal dialogue dropped. Meanwhile, informally, the dialogue between the Province and local government officials was hampered by resource constraints that restricted travel by provincial employees. As one Provincial employee noted:

> When I first started, I could attend conferences and meetings and that's all about relationship building. And it's also about finding out what's going on in the Province. So that was how we also found out what kinds of local governments were actually pushing the boundary and what kinds of opportunities were there to support these local governments that were out there. Now, it's much harder to do that. That's also how I built some relationships that ultimately became funding partnerships to support local governments. So we lose out on those opportunities as well.

A second shortcoming was a lack of enduring transition networks between ministries. This is not to say that collaboration between ministries was not taking place, it is just that it was done on a project-by-project basis. When I asked why there was not more effort to coordinate between ministries to advance a more transformative agenda for energy efficiency in the built environment, the answers I received tended to focus on a lack of authoritative and/or allocative resource to do so:

> And sometimes, it's like so many things in different organizations, the vertical accountabilities and relationships persist through time and horizontal things like collaboration and networking and the like are, let's just say, not as well established and sometimes ebb and flow depending on priorities. There's less of a formal mandate.

Finally, the third shortcoming was a lack of an epistemic community for policy-oriented innovations being tried by and within the Province. When asked about how new ideas percolate up, one interviewee commented that the Province is not even taking full advantage of the opportunities that already exist:

> …that's part of market transformation too, allowing local governments or some, allowing pilot projects to test drive this and see what works and what doesn't. I'm not seeing a feedback loop that's tying into what's not working. As people walk away from these things, I'm not seeing a feedback loop saying this worked and this didn't. This is something to build on where it worked, but we have to rethink this part of it over here. But I'm not seeing it. And I think that that is critically important to go together.

So while I found evidence of many different types of communities-of-learning for both niches, there was an overriding disconnect between the learning taking place within niches and decision-makers within the Province. This is not to say that those within the Province were not aware of what was taking place within these niches as many displayed knowledge that showed them to be acutely aware. Instead the problem was a lack of a mandate and resources for niche and regime actors to share and create the knowledge that was needed to build and pursue a mutually negotiated agenda for advancing and accelerating TEEC in the Province.

Diversity of Actors

On the whole, the actors who make up the various communities included in Table 6-11 represented a very diverse range of stakeholders from a multi-level perspective, a geographical perspective, and a sectoral perspective (e.g., building sector, environmental and sustainable energy NGOs, government, utilities, academia, and energy services). As to efforts to coordinate stakeholders by the Province, when they did do this, they generally seemed to get a good range of actors involved. Although a deeper study would need to be done to ensure the adequate involvement of groups such as low-income households, First Nations, and people with disabilities, generally speaking, getting a diverse range of actors involved in TEEC does not seem to be an issue.

Prime Mover(s)

In Chapter 3, I argue that prime movers (i.e., actors with a strong capacity to exercise allocative and authoritative resources within and outside of the niche) are critical to transition niches because they are well situated to accelerate both the niche's legitimacy and development. For low-carbon communities, the best prime movers are the communities themselves that are taking the lead on planning for and implementing such futures. In British Columbia these includes places such as Vancouver, North Vancouver, Dawson Creek and Whistler. Based on my interviews with representatives from a number of "leading" local governments, it was clear that not only do these local governments act as important examples for other communities, they can also play an important policy entrepreneur role as they run up against and try to change the rules that restrict their capacity to pursue TEEC.

For super-efficient buildings, it is far less obvious if a prime mover currently exists. For commercial buildings, BC Hydro is an important partner in BC for advancing green building practices through its demand-side measures programs. Beyond this, though, it is mainly the green building sector itself that is busy promoting its advantageous. A plausible explanation for a lack of a clear prime mover in this niche is that the building sector is not only a highly decentralized and independent network structure but because buildings are something which are so place and time specific, each one is essentially a prototype. Contrast this to the renewable energy sector which, for the most part, is built around a small variety of large, single-purpose technologies. The capacity for one or a small number of actors to have a direct impact on such a market is far more straightforward as evidenced by the rapid amalgamation of this sector over the past decade.

Despite the lack of influence of a prime mover, the strength of the green building actor-network and, to a somewhat lesser extent, the low-carbon community actor-network is likely the strongest condition supporting TEEC in BC. However, more needs to be done to develop enduring relationships

between these niches and the Province. Given the above discussion, in Table 6-12 I assess the overall strength BC TEEC actor-network to be moderate to weak.

Table 6-12 Summary of Actor Network Indicators

Indicator	*"Strong" Indicator*	*Province Strengths*	*Province Weaknesses*
Diversity of communities-of-learning.	All four higher-order TEEC communities-of-learning are active and ongoing (i.e., networks, application-oriented communities-of-practice, advocacy-oriented communities-of-practice, and epistemic communities)	Strong network and epistemic communities for green buildings There are a variety of application-oriented communities-of-practice for low-carbons communities.	Communities-of-learning for super-efficient buildings are far less mature and not necessarily well represented by green building niche. Low-carbon community networks are coordinated by more supply-oriented interests; epistemic communities are also not particularly strong.. Advocacy coalitions for both niches are relatively weak. Green building niche tends to focus on niche expansion, leaving no clear voice for normalization of practices and technologies.
Diversity	Broad range of energy-services and governance regime actors participating in the different communities-of-learning.	Broad range of actors working with green building sector and low-carbon communities.	Low-carbon communities relatively fragmented.
Prime Mover	Prime mover is active in advancing niche both internally and externally	For local governments, City of Vancouver is acting as a prime mover along with a number of other positive examples; QUEST Canada for district-energy related initiatives. For green buildings BC Hydro is likely the best candidate for a primer mover.	Influence of leading local governments is limited because of insular nature of this sector. No clear prime mover for super-efficient buildings.

Overall strength: Moderate to weak

6.6 Conclusion

A summary of my assessment of the efforts of the Government of British Columbia to advance TEEC in the built environment is provided in Table 6-13. For each of the conditions found to support a socio-technical transformation that are discussed above, a level of strength has been assigned using the aggregated evaluation criteria developed in Chapter 3. By looking in turn at each of the conditions found to support transformational change in socio-technical systems, I see that there have been a number of positive developments with regards to the Province's efforts to influence TEEC in the built environment. First and foremost, was the coherency in 2007 that the Province's leadership on climate change brought to mounting public concern surrounding the issue. Not only did the Province set ambitious emissions reduction targets in 2007 for the years 2020 and 2050, but it backed these targets up with legislation and allocative resources.

For buildings, which, prior to the Province's 2007 climate agenda, already had a growing and relatively stable green building niche, a basic challenge was to raise the energy performance of new and existing buildings not only within the conventional building sector but within the green building niche as

well. A second challenge was to start to standardize across the entire building sector some of energy enhancing technologies and practices already being used in the green-building niche. The Province's initial plan for addressing these challenges was the 2008 Energy Efficiency Buildings Strategy. The strategy introduced a number of new initiatives including energy efficiency requirements in the building code, a LEED Gold building standard for all new provincial public sector buildings, the strengthening of energy performance standards for appliances and equipment, whole building incentive financing for existing buildings, and time-of-sale home energy labeling pilot projects. In addition to these policy measures, the Province also increased its coordination for achieving energy savings with BC's four major energy utilities. As utility DSM programs represent not only the bulk of DSM spending in the province but also the most secure source of funding, this coordination was critical for the Province to achieve its objectives. Taken as a whole, these and the other measures included in the Strategy were projected to achieve the energy savings targets for buildings that it established for 2020.

While positive first steps, the Province's building efficiency targets for 2020, which were based on utility Conservation Potential Reviews, were more representative of incremental energy performance improvements than transformative ones. The question of what comes next was explored briefly by the Energy Efficiency Branch and later by the branch of government responsible for administering building codes via its internal Vision 2020 process. Although it is not known what came out of this latter effort as this information is considered confidential by the Province, I do know that it had a very ambitious mandate (e.g., setting a vision and pathway for low-carbon communities).I also know that the Minister responsible for housing at the same time was talking about net-zero energy ready homes by 2020 which aligned with a recommendation advanced by the Climate Action Team in 2008. However, the Vision 2020 work was never advanced to Cabinet for further direction. Part of the challenge with advancing a vision was that the Province's climate targets were incoherent with regards to the level of emissions reductions each sector in the economy should be responsible for. So when the Province's political agenda changed by late 2010, there were no clear signals for continued leadership in this area. In other words, the political pressure that drove the 2007 climate objectives were no longer there or at least not as coherently expressed. Without the required political legitimacy, many of the resources needed to support such a transition started to slowly dry up as well, starting with "made in BC" energy efficiency building code requirements and moving onto building labeling and super-efficient/net-zero demonstration projects. Although some innovative policy measures still exist or continue to move forward (e.g., the Solar-Ready Opt in legislation and the Pay-As-You-Save efficiency financing mechanism), without a clear vision or plan, it is difficult to know where these fit into a larger transition pathway for buildings.

Table 6-13 The Strength of the Conditions Supporting Transformational Change in 2012

Supporting Condition	Strength	Explanation for Assigned Strength
System pressures	C+	• Strengths: Multiple system pressures; carbon neutral requirements for province and local governments send clear signal along with carbon emissions reporting • Weaknesses: Coherency for action dropped with the climate agenda; confusion over role of TEEC in Province's climate agenda; little-bottom up TEEC pressure
Vision	C+	• Strengths: Climate targets, Energy Efficiency Building Strategy targets; Some early working drawing out possible paths forward. • Weaknesses: Energy efficiency targets in 2008 Energy Efficiency Building Strategy are more incremental than transformative; Climate targets were too flexible to act as a metaphor for building stable niche networks.
Legitimacy	B-	• Strengths: Relatively strong legitimacy for the concepts of super-efficient/net-zero buildings and low-carbon communities • Weaknesses: TEEC related recommendations by Climate Action Team in 2008 have gone nowhere; Actions by established actors are not linked to a scaling-up strategy.
Resource Mobilization	C+	• Strengths: large network of actors administering community-oriented programs; strong vision helping to bond otherwise independent actors of green building sector • Weaknesses: Many mobilized resources were temporary in nature and supported incremental change; tight central control of authoritative resources by Province.
New Knowledge	C+	• Strengths: Issues that required double- and triple-loop issues advanced on organizational agenda; numerous market-related initiatives were advanced • Weaknesses: Limited number of perspectives considered; longer-term and higher scale issues (e.g., governance and strategies for TEEC) were slow to advance
Niche Market Formation	C	• Strengths: Inclusion and strengthening of energy performance standards in building code; LEED Gold building standards for all new provincial public sector buildings. • Weaknesses: Few required measures for existing buildings; No schedule for future codes and standards updates; lack of high-efficiency demonstration projects.
Advocacy	C-	• Strengths: Growing list of organizations advocating for niche expansion and normalization; a number of issues advanced when policy window opened in 2007. • Weaknesses: Most of the issues advanced by advocates are not gaining traction; almost no issues with a longer-term and/or higher scale focus are being taken up.
Actor Networks	B-	• Strengths: Strong green buildings networks; lead local governments acting as prime movers; diversity in the number and type of niche-level communities-of-learning • Weaknesses:; lack of enduring regime-niche communities-of-learning; regime-led communities worked on issues with short-term functional groups and teams.
OVERALL	**C+**	

A – Strong, B – Moderate, C – Weak, D – Very Weak, F – Non-Existent

For low-carbon communities, which prior to 2007 was still very much an emerging niche, the Province's objective was less about expanding and scaling-up the climate practices and policies of leading local governments and more about trying raise the profile of climate change on the policy agendas of local governments across the province. To do this, it passed legislation that required all local and regional governments in the Province to include energy and emissions reductions goals and plans in Official Community Plans and Regional Growth Strategies. In addition the voluntary Climate Action Charter committed the 180 local government signatories to it to make their corporate operations carbon neutral by

2012. These community requirements were in turn backed by a number of provincial initiatives including the Community Action on Energy and Emissions program, a legislative change that allowed local governments promote energy conservation through the development permitting process, and a host of information services. In addition to requiring each community to build for itself a climate reduction vision and pathway for achieving it, for officials working within local government, these measures were important for putting and keeping climate change on the local political agenda. In other words, the Province's actions helped to build political legitimacy around this work at the local level, which was ultimately necessary to start mobilizing some of the resources needed to address community-related carbon emissions.

Despite the political pressure created by the Province's local government climate requirements, it is a stretch to think that all local governments in the Province are now actively working towards becoming low-carbon communities. As the targets for emissions reductions and pathway to achieve them are determined by each community, there are as many visions for how the Province's requirements should be addressed as there are communities. However, within BC there is without a doubt a small subset of local governments that are aggressively striving to become low-carbon communities. Each of these communities share a vision of low-carbon communities which include a compact and multi-use built environment that is filled with super-efficient/net-zero buildings, a vision which was also shared by the Ministry of Community Development's Green Communities program.

A major challenge for these leading local governments, though, is the range of measures that they are able to evoke to encourage this vision, particularly for the buildings component of it, is very narrowly defined and tightly controlled by Provincial legislation. Although the Province talks about "enabling" local governments to be self-directed in terms of how they achieve the province's climate objectives, the path taken must fit within the Province's one-size-fits-all municipal legislation. This long-standing position was summarized in the Province's response to a 2007 Union of British Columbia Municipalities' resolution that asked the Province to give local government's flexibility to impose beyond building code efficiency requirements:

> The Community Charter strikes a balance between local government authority to make decisions that best suit their communities, and the consistent, safe building standards set out in the B.C. Building Code for every community in the Province.

While fine in principle, this policy contradicts the objectives of the Climate Action Charter if it means leading local governments are unable to take the actions that they need to take in order to achieve their emission reduction targets.

The exception to this is the City of Vancouver which operates under a unique Provincial Charter. With the flexibility afforded to it under this Charter, Vancouver is moving ahead quickly with implementing its plan to transform itself into a low-carbon, super-efficient built environment, with significant progress made toward achieving this end by 2020.

For all other communities, although some legislative changes were made to increase the range of measures that they can impose (such as the solar-ready opt-in regulation), these are handled on and issue-by-issue basis and can require years of lobbying before they are passed into law. As one local government representative expressed it, "to change the Local Government Act is a hair-pulling exercise that requires time and money and lobbying and a huge effort."

A critical resource being withheld from local governments, then, particularly the ones who want to lead on community climate initiatives, was the authority to push beyond a single, universally applied set of community standards. The issue of legitimacy here seems to be not so much one of low-carbon communities, as it is of the capacity of local governments to set rules that go beyond these standards. Put differently, instead of thinking of these standards as a floor for appropriate municipal actions, they are instead applied as a ceiling. How then are local governments ever to push beyond normalized ways of using energy in the built environment if they are not given more flexibility to break through the very ceiling that defines them?

The issues raised above are not novel. They are ones that were told to me by the actors with whom I spoke. The fact that they persist with no apparent plan in place to reconcile them speaks to the limited paths for new issues and ideas to emerge and advance on the Provincial political agenda. Indicative of this is the limited and narrowly defined opportunities for learning that exist between and among niche and regime actors. As was discussed in Section 6.5, although there are numerous communities-of-learning working to expand and advance super-efficient/net-zero and low-communities niches in BC, none of these were spaces where regime and niche actors came together on an ongoing basis to share and create knowledge to build and pursue a mutually negotiated agenda for advancing and accelerating TEEC in the province. Within existing decision-making processes, non-provincial actors seem far better situated to wait to support initiatives generated within and advanced by the Province than they are at advancing their own unique issues. However, as shown in Section 6.4.1 the type of learning and knowledge created by this non-participative approach was limited in scope and ambition.

Part of the explanation of why such a network does not exist was a lack of resources within the Province, both human and financial to support it. Another part of the explanation is a lack of political direction to do so. This explanation ties back to the age old question of political will. More specifically, how can momentum for change be nurtured when the political will to do so or to at least support the processes to nurture such momentum is limited? This is a question that I will attempt to answer in

Chapter 9. Before I do that, though, I will shift my attention to another centrally-driven effort to steer TEEC in BC that took place between 2006 and 2012 but used a more participatory approach for agenda building. The entity leading the process in this case was BC Hydro, the province's dominant and publicly owned electricity utility.

Chapter 7: The Pursuit of Transformative Energy Efficiency and Conservation by BC Hydro

7.1 Introduction

In this chapter I describe the efforts of British Columbia's largest public energy utility, BC Hydro, to advance transformative energy efficiency and conservation (TEEC) in the built environment. To do this, I look at how the utility's efforts to advance TEEC have emerged over three successive periods of change: 2005-2006 ("ramping up demand-side measures), 2007-2009 ("the new climate agenda") and 2010-2012 (Vision Quest). As was done in Chapter 5, each of these periods is described according to three different levels of influence that are consistent with the multi-level perspectives of socio-technical systems and power that were described in Chapter 2: the policy landscape, which describes the Provincial electricity policy environment; the regime-level, which describes the measures that BC Hydro is trying to influence energy efficiency and conservation; and the niche-level, which describes the arrangement and activities of actors within and outside of BC Hydro who are trying to advance a more transformative view of energy efficiency and conservation by BC Hydro. From this longitudinal and multi-level description, I identify both the sources and responses to transformational change that the utility has faced over the past six years. In the chapter that follows, I will use the evaluation framework developed in Chapter 3 to assess whether these efforts are leading to the kinds of soft-governance infrastructures that support transformational change.

7.2 An Overview of BC Hydro's Electricity System

The generation and distribution of electricity in British Columbia is dominated by the publicly-owned BC Hydro which services electricity to over 94% of the province's population. On the supply side, in 2012, the utility generated 49,927 gigawatt hours (GWh) of electricity from its own facilities (almost all of which was from hydroelectric sources) and purchased 15,157 GWh of electricity from its contractual long-term commitments. On the demand side it distributed 52,197 GWh of electricity to domestic customers and experienced line and system losses of 4,779 GWh. On the whole, then, it generated or purchased from existing commitments 8,108 GWh more than what was needed to meet its domestic requirements (BC Hydro, 2013a). Looking forward, over the next 20 years BC Hydro (2013b) predicts a 1.7 per cent annual average growth rate in domestic electricity demand, largely from growth in population and economic activity. If this prediction proves accurate it would be a 40 per cent increase in electricity requirements over 20 years (not accounting for savings from conservation and efficiency measures). Despite this growth, the utility estimates that between its projected savings from conservation measures and its existing and planned electricity supply it has adequate energy for the next 10 years and

adequate capacity for six years. In other words, according to this projection, no additional resources are needed for at least another six years.

As part of its mandate, BC Hydro is required to conduct its long-term capital planning according to the principles and practices associated with Integrated Resource Planning (IRP) (British Columbia Utilities Commission, 2003). In the following passage, Mark Jaccard (2001, p. 61), a former Chairman of the BC Utilities Commissioner and BC-based energy policy expert, describes the main aspects of the IRP planning approach:

> Integrated resource planning involves comparing, on an equal footing, energy supply investments with efforts by the utility to encourage energy efficiency, which, in turn, may eliminate the need for some supply investments. It is usually an open process that involves interested parties, the idea being that it will enable the planning decision of utilities to be both understood and supported. This openness helps the utility and its regulator grasp how different interest groups view the trade-offs that need to be made with respect to economic, environmental, and social objectives.

As of 2010, BC Hydro submits its Integrated Resource Plan to the Minister of Energy and Mines for approval. It is then the responsibility of the British Columbia Utilities Commission to rule on the appropriateness of any capital expenditures (other than the ones already waived by the Province) and revenue requirements that resulted from the IRP. The BCUC is a provincial government agency that is responsible for regulating rates, utility capital planning, standards of service, the practical implementation of the government's energy policy, and ensuring that shareholders of utilities are afforded a reasonable opportunity to earn a fair return on their invested capital. BC Hydro has been regulated by the BCUC since 1980.

7.3 2005-2006: Ramping up Demand-Side Measures

7.3.1 The Policy Landscape

In 2006, the direction of the Province's energy regime for the built-environment was guided in large part by the 2002 provincial energy plan (Ministry of Energy Mines and Petroleum Resources, 2002), which focused in large part on the development of new sources of supply by independent power producers. From an energy efficiency and conservation perspective, the Plan specifically sought four Policy Actions:

- Policy Action 9 – Electricity distributors will acquire new supply on a least-cost basis, with regulatory oversight by the BC Utilities Commission.
- Policy Action 21 – New rate structures will provide better price signals to large electricity consumers for conservation and energy efficiency;

- Policy Action 22 – The Province will update and expand its Energy Efficiency Act, and will work with the building industry, governments and others to improve energy efficiency in new and existing buildings; and
- Policy Action 23 – The Utilities Commission Act will be amended to remove a disincentive for energy distributors to invest in conservation and energy efficiency.

Policy Actions 9 and 23 essentially reopened BC Hydro's demand-side measures (DSM) program, Power Smart, which was stopped in the mid-1990s in anticipation of the privatization of the public utility's assets. However, by 2002, the decision was made to not privatize BC Hydro. As a result of this decision, its DSM program was once again needed to help curb upward pressure for new sources of generation by reducing customer demand for electricity. Policy Action 21, meanwhile, indicated the Province's intention for BC Hydro to start moving toward a rate structure that signaled to its industrial customers the marginal cost of electricity (i.e., the cost of adding the next unit of firm electricity to the existing system). And finally, Policy Action 22, as discussed in Chapter 5, paved the way for the 2005 Energy Efficient Buildings Plan which had only limited impact on what the utility was already doing. Despite these four energy efficiency and conservation Policy Actions, it is fair to say that the policy landscape in 2006 was very much oriented toward economic development via the development of conventional electricity supply resources.

7.3.2 The Demand-Side Measures Regime

Historically BC Hydro was able to count on a surplus of electricity supply, predominately from large hydroelectric sources of generation, to meet its domestic demand. In 2006, BC Hydro generated or purchased from long-term agreements 58,504 GWh of energy. Meanwhile, its domestic demand for electricity including line and system losses was 57,758 GWh (BC Hydro, 2006a, p. 106). However, in the same year the utility was also projecting that over the next 20-years demand for electricity would grow by 18,800 to 26,800 GWh/yr because of increasing population and economic growth (BC Hydro, 2006b), contributing to a total system shortfall of 25,100 to 33,200 GWh/yr by 2025. BC Hydro, therefore, was confronted with a growing gap between its system's current level of supply and its projected demand.

Despite the landscape pressures on BC Hydro to purchase any new sources of electricity from independent power producers, in 2006 the utility developed its most ambitious DSM plan to date (see Figure 1). For its 2006 Integrated Electricity Plan/Long-Term Acquisition Plan (IEP/LTAP), BC Hydro proposed closing its projected 20-year gap with 9,600 GWh of savings from DSM and acquiring 13,000-15,000 GWh/yr of new electricity generation from independent power producers. The Plan was approved by the BCUC in May 2007.

As can be seen in Figure 1, prior to its 2006 IEP/LTAP, DSM played a considerably smaller role in BC Hydro's long-term electricity plans compared to new sources of supply. A number of factors were

given in BC Hydro's 2006 Integrated Electricity Plan (BC Hydro, 2006b) for the increase in its reliance on DSM, namely, cost-effectiveness relative to the cost of new supply, the minimal impact of its DSM Plan on rates relative to scenarios that replaced DSM with other sources, lower consumer bills, and the avoidance of fuel and environmental risks. It is worth noting that locked within environmental risks are political risks. Although much of B.C. is not inhabited, this does not mean that there is any lack of interest around how its wilderness is exploited and by whom. The institutional and political costs associated with exploiting new sources of large hydroelectricity, therefore, are not inconsequential.

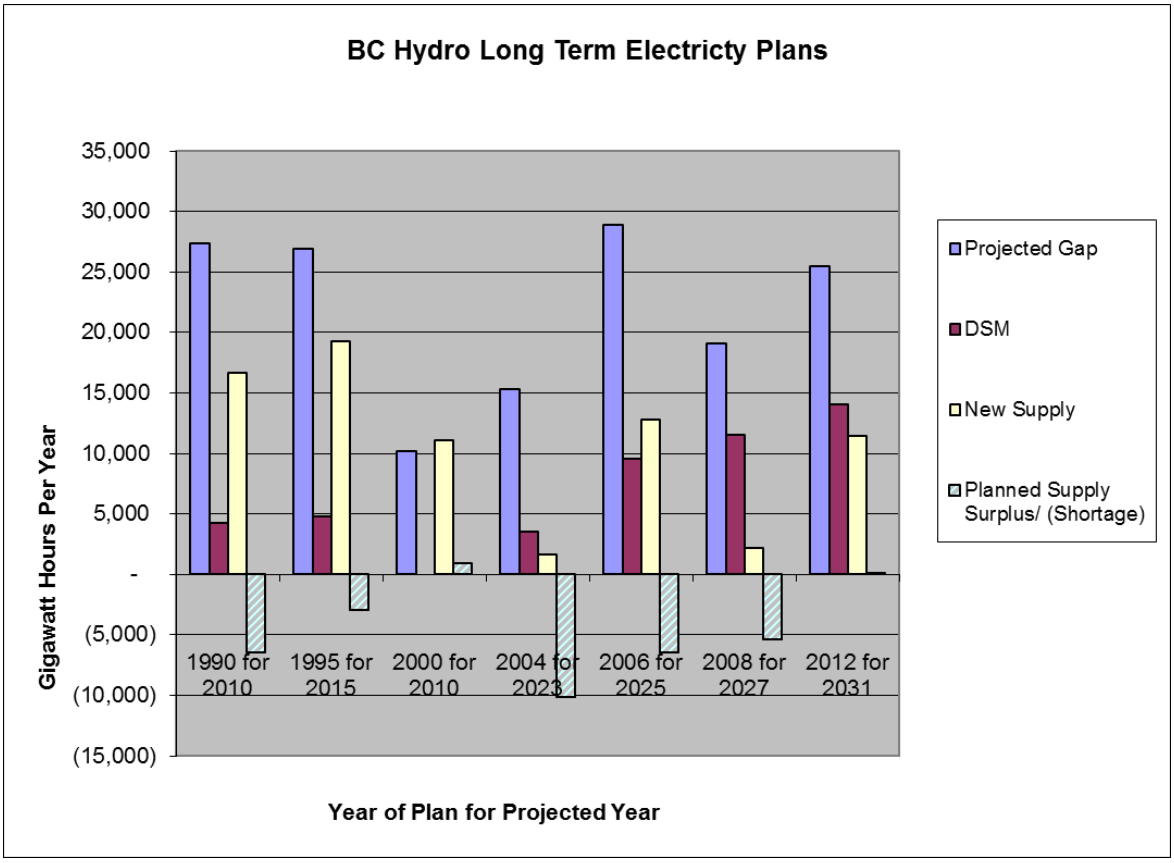


Figure 7-1 BC Hydro's Historical Integrated Resource Plans

What is interesting here, though, is none of these factors really changed since 2004 as both the 2004 and 2006 Energy Plans use $60/MWh as the marginal cost of new supply to evaluate cost-effective DSM. So clearly something beyond these factors was at play. Three additional factors in particular appear to have contributed to the sharp increase in planned energy savings: 1) a growing level of comfort with DSM as a reliable long-term planning resource; 2) stakeholder pressure to pursue more cost-effective DSM, particularly during the 2005 Resource Expenditure and Acquisition Plan negotiated settlement

process; 3) behind the scenes pressure from the Province to pursue more energy savings; and 4) strong internal DSM leadership, particularly from BC Hydro's Chairperson, Larry Bell, and CEO, Bob Elton.

7.3.3 BC Hydro's Energy Efficiency and Conservation Niche

Along with the increased reliance on DSM in BC Hydro's 2006 Integrated Electricity Plan/Long-Term Acquisition Plan (IEP/LTAP), in 2006 we also see the beginnings of an energy efficiency and conservation policy niche within the utility which is informed by a stakeholder committee called the Electricity Conservation and Efficiency Advisory Committee (EC&E). The EC&E was assembled by BC Hydro's Power Smart Division. Power Smart is responsible for pursuing the utility's planned electricity savings. [7]

The EC&E was established in September 2006 in response to a BCUC requirement for BC Hydro to set up a public committee to provide it with ongoing advice and input into DSM (British Columbia Utilities Commission, 2005). This requirement was part of a larger negotiated settlement between BC Hydro and its stakeholders that took place in 2005 around the utility's proposed Resource Expenditure and Acquisition Plan for 2006 and 2007.

Although the creation of a stakeholder group to address different utility-issues was not new, the EC&E advisory committee was unique because there was no single project around which it was formed, nor a final date when one can expect it to conclude (it is still operating, more than 6 years later). Instead, it represented an open-ended deliberative process between BC Hydro and its stakeholders on the topic of energy efficiency and conservation.

Potential members of the EC&E were first identified through a Request for Expressions of Interests that was issued by BC Hydro (BC Hydro, 2007). Applicants were screened according to BC Hydro's pre-established criteria and the utility made a final decision based on forming a committee that:

- Represents a diversity of sectors, views, perspectives and interests;
- Includes a diversity of age, gender and geographical location;
- Provides some continuity from actors who participated in BC Hydro's 2006 Integrated Electricity Plan;
- Includes individuals from regions in the province where new electricity resource development is under consideration;

[7] Power Smart may itself be considered a niche because it is a creation of government regulation requiring the utility to pursue the most cost-effective resources – supply or demand – for fulfilling its projected long-term energy requirements. Power Smart is situated within its Customer Care and Conservation operational business group which in 2006/2007 consisted of 290 employees. For comparison sake, BC Hydro's other major units at that time included its two other operational business groups – Engineering, Aboriginal Relations and Generation and Field Operations (1,345 employees) and Field Operations (2,220 employees) - a Corporate service function (440 employees), and two wholly owned subsidiaries – Powerex, its energy exporting arm, (151 employees); and Powertech Laboratories (100 employees), an energy technology consulting and testing laboratory (BC Hydro, 2007).

- Includes actors who function as formal interveners of regulatory hearings held by the British Columbia Utilities Commission;
- Encourages participants who either are or may be a strategic partner in the implementation of BC Hydro's Demand-side Management Programs;
- Welcomes participants who could provide BC Hydro with access to useful sources of relevant data;
- Give precedence to applicants who through previous experiences are known to be constructive in their participation in engagement forums.

In its original configuration, the EC&E consisted of three senior BC Hydro Power Smart managers (including BC Hydro's Senior Vice President of Customer Care and Conservation), and 23 non-BC Hydro members and individuals (see (BC Hydro, 2012d) for a full listing). The 23 external members represented a broad range of stakeholders and First Nations' views. Committee participants include: electricity consumers (industrial, commercial and residential), environmental non-governmental organizations, academia, Independent Power Producers, Power Smart's residential and commercial Trade Allies; First Nations, government (federal, provincial and municipal), BC's major natural gas utility, several Power Smart senior managers and BC Hydro's Executive Vice-President of Customer Care and Conservation. For the most part, the criteria set out above were met with the selection of the Committee. However, over the course of the case study certain sectors were underrepresented, particularly the building sector, energy services, and residential customers and to a somewhat lesser extent First Nations and local governments. Recognizing this, BC Hydro would periodically invite new members from these sectors to join but they continued to be under represented. It is important to note also that participants were not remunerated for their time on the Committee although the travel costs of most members were reimbursed by BC Hydro.

The Committee's mandate, as set by BC Hydro, is to (BC Hydro, 2007, 2010):

- Provide a forum for identifying and responding to key issues associated with demand Side management including institutional issues that go beyond BC Hydro;
- Provide advice regarding how to structure meaningful opportunities for other stakeholder and First Nations input to BC Hydro's electricity conservation and efficiency programs, and to assist BC Hydro in designing its ongoing approach to creating those opportunities for input; and
- Provide advice and input with respect to BC Hydro's guiding strategies, principles, and individual program concepts.

Between September 2006 and March 2007, the EC&E met four times. These meetings focused largely on building participants' knowledge about BCH Hydro's core-business and the institutional

environment in which it operates as well as understanding the range of perspectives held by Committee members (BC Hydro, 2007).

In addition to the work being undertaken by the EC&E, BC Hydro was also engaging with its stakeholders on the issues of energy efficiency and conservation through two other processes: the implementation of a new industrial conservation rate as per the 2002 Energy Plan and the updating of its Conservation Potential Review. For the conservation rate, the BCUC facilitated negotiations between BC Hydro, industrial customer representatives and a number of other social and environmental organizations. Through these negotiations an agreed upon rate structure was reached, approved by the Commission in August 2005 and put in place by 2006 (BCUC TSR Application).

Another new issue that emerged during this time was the need for BC Hydro to update its Conservation Potential Review (CPR) (Marbeck Resource Consultants Ltd., 2007). In addition to involving multiple consultants and a sixteen member BC Hydro project team, the CPR process also included up to 20 stakeholders who sat on the CPR's External Review Panel. The process began in June 2006 and concluded in November 2007.

The consultative processes followed for both the industrial conservation rate and the 2007 CPR were fairly typical of how BC Hydro pursued decision-making since at least the mid-1990s[8] (BC Hydro, 1995). Typically, these kinds of issues and processes are topic and time specific. To say that they formed the basis for any kind of niche would be a stretch. The EC&E, however, was quite a different situation.

7.4 2007-2009: The New Climate Agenda

7.4.1 The Policy Landscape

As discussed in Chapter 5, marked a sudden and quite dramatic shift in in B.C.'s policy vision for its energy regime. The changes hinged on climate change and economic development. For energy policy, the most influential policy document was the 2007 *BC Energy Plan: A Vision for Clean Energy Leadership* (Ministry of Energy Mines and Petroleum Resources, 2007a).

For BC Hydro, the Plan included a number of policies that directly influenced how it operated and planned. First, it increased the amount of electricity that had to be generated within the Province by stipulating that BC must be self-sufficient in electricity generation by 2016. Next, it put a suite of constraints in place around the kind of electricity that could be generated:

- All new electricity supply must be zero net greenhouse gas;
- No nuclear generation;
- Zero greenhouse gases from coal fired electricity generation;

[8] In 1995 BC Hydro was ordered by the BCUC to establish a Consultative Committee for its 1995 electricity plan.

- Existing thermal generation power plants must be net zero by 2016;
- Conservation rates for all BC Hydro's customer classes

Finally, a number of policies stipulated the actions that utility DSM programs needed to take:

- Utilities were to be "encouraged" to pursue cost effective and competitive demand side management opportunities
- By 2020, 50 per cent of BC Hydro's incremental resource needed to be met through conservation;
- New conservation rate structures for all utility customer classes (i.e., industrial, commercial and residential) were to be explored; and
- Utilities and the Province were to take a coordinated approach to pursue conservation and efficiency

Many of these measures were added to the *Utilities Commission Act* via a legislative amendment in 2008. BC Hydro's 50 per cent conservation requirement was completed with further ECE related requirements in the Act. The amendment required regulated (public) utilities (primarily electricity and natural gas) to demonstrate that they are pursuing cost-effective DSM in their resource plans. The same amendment also legislated a "DSM first" policy for utility resource planning that required utilities to evaluate energy savings from its DSM resource before considering supply resources. As such, DSM was supposed to take precedence over supply side resources measures rather than as parallel alternatives of one another. Another amendment made at this time required smart meters to be installed throughout the province by the end of 2012.

Also in 2008, the Province adopted a DSM Regulation as part of the Utilities Commission Act (Government of British Columbia, 2008b). The regulation, among other things, gave special cost treatment to a number of DSM activities that supported utility and Provincial energy savings but were more difficult to measure the direct cost-effectiveness of. These included: education programs for elementary and secondary schools as well as universities and colleges; energy efficiency training, community engagement, and utility technology innovation programs. Under the new regulation, a utility measured the cost-effectiveness of these specific programs based on the cost-effectiveness of *all* DSM programs included in the utility's portfolio. The typical test was far more stringent; it required the utility to demonstrate that each program was cost-effective on its own irrespective of the broader portfolio. According to a review paper written by staff members of the Province's Energy Efficiency Branch (Pape-Salmon et al., 2010), this provision "recognizes that energy savings cannot be directly ascribed to such programs, but are essential to the success of a utility DSM strategy as they help change societal norms and attitudes and build awareness of support for energy efficiency and conservation among British

Columbians." Ultimately, this regulatory change made it more straightforward for BC Hydro to advance and expand its list of supporting DSM programs .

By looking at the complete package of climate change and energy policy changes made during this time, we see that the province's energy strategy for reducing GHG emissions can be summed up as: First, increase energy efficiency across all sectors of the economy and all fuel sources. And second, generate more "clean" energy from renewable sources of electricity in the province.

7.4.2 The Demand-Side Measures Regime

BC Hydro's first major planning document within the province's new climate legislation was its 2008 Long-Term Acquisition Plan (2008 LTAP). In its adjusted load forecast BC Hydro projected an electricity supply shortfall of 13,400 GWh by 2020 and 19,100 GWh by 2027 (BC Hydro, 2008c).

To help it get a better a handle on the demand-side potential to fill this gap, in 2007 BC Hydro conducted a Conservation Potential Review. Using $130/MWh as its updated avoided cost of new supply to evaluate cost-effective DSM[9], the 2007 CPR identified over 15,000 GWh/yr in economically viable energy savings by 2027 if aggressive measures are taken by the utility and supported with government regulatory changes (what BC Hydro refers to as its upper achievable savings).

Using the 2007 CPR as its starting point, the 2008 LTAP proposed using DSM to fill 9,600 GWh of the projected 2020 gap of 13,400 GWh, and 11,500 GWh to fill the projected 2027 gap of 19,100 GWh. The remaining gaps were proposed to be closed with a mixture of new "clean" supply purchased from independent power producers (e.g., run-of-river hydroelectricity and wind generation), upgrades to existing facilities, and other resources (both supply or demand) to be identified in future LTAP filings.

In addition to longstanding reasons of cost-effectiveness, minimizing rate impacts, and mitigating fuel and environmental risks, the reasons for this increased reliance on DSM to fill BC Hydro's projected long-term energy gap were twofold: First, as a result of the new provincial climate change legislation, a number of less expensive thermal options for generating electricity such as coal and natural gas were no longer permitted unless they also used carbon capture and storage technology (for coal) or offsets (for natural gas). The exclusion of these cheaper forms of generation meant a doubling of the marginal cost of electricity since 2006 from $60/MWh to $120/MWh.

Second, although advocates of energy efficiency and conservation said for years that far more can be done, the idea did not gain momentum in the province until it was heralded by leaders within the existing energy regime. As discussed in Chapter 5, in government at this time there was a strong push for more energy efficiency and conservation, particularly by the BC Ministry of Energy and Mines.

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[9] $130 MW represents the avoided cost of new supply plus an additional $10 MWh/yr to help keep the CPR current a little beyond the 2008 LTAP.

BC Hydro's leadership went even further than the government's conservation target in laying out its conservation goals for the next 20 years. Pointing to the findings of the 2007 CPR, in late 2007 BC Hydro's CEO made the following statement about the potential for electricity savings within the province (Elton, 2007, 1):

> Our goal is to develop and foster a conservation culture in BC…we strongly believe that we can go beyond the 50% conservation target set out by the 2007 B.C. Energy Plan and lead a change such that in 2027 we would return to 2007 electricity consumption levels while allowing for growing and economic prosperity.

The image (see Figure 7-2) used by BC Hydro to illustrate its guiding principle for energy conservation is of an electricity demand curve where the x-axis is time and the y-axis is electricity consumption measured as gigawatt hours per year (GWh/yr). The curves starts in 2007 at 55,000 GWh/yr, rises upwards at a decreasing rate for approximately 10 years and then bend downwards at an increasing rate until its ends in 2027 at 55,000 GWh/yr – where it started 20 years earlier. BC Hydro refers to this as "bending the demand curve".

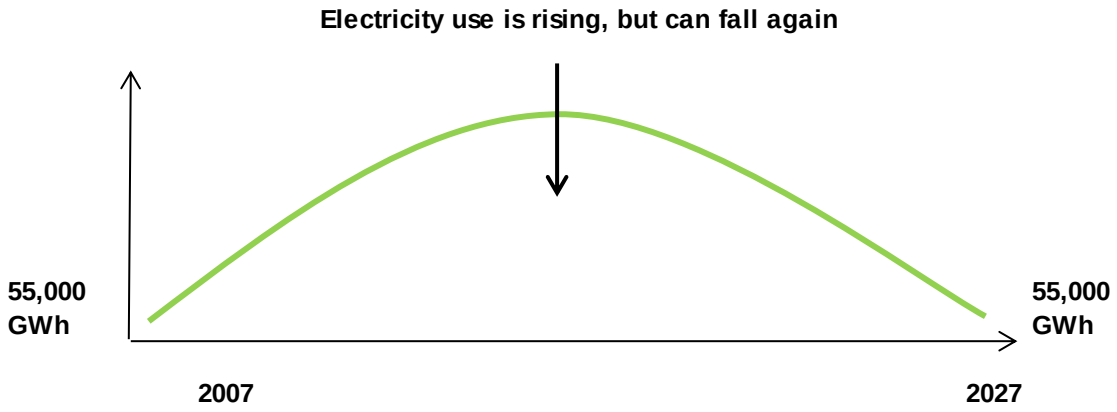


Figure 7-2 BC Hydro's Aspirational 20-Year Bend the Demand Curve Vision

Taken as a whole, rising demand for electricity; climate change legislation; the doubling of the cost of new electricity supply; local resistance to new large scale energy projects; and ambitious energy efficiency and conservation leadership from within the energy regime all signal a rise in the selection pressures for more transformative levels of energy efficiency and conservation than previously sought by BC Hydro. In most cases these pressures were external to BC Hydro. In the case of specific its ambitious "bending the curve" target, though, the impetus was coming largely from within the organization.

In addition to counting on savings from its more typical set of incentive and information-based programs, BC Hydro's 2008 LTAP included for the first time savings that it predicted would come from

its new conservation rates as well as anticipated government energy efficiency codes and standards for buildings and equipment (regulations). It was also seeking to expand its involvement in trying to encourage community-level energy savings through its new Sustainable Communities Programs.

Even though BC Hydro was planning to pursue more electricity savings than at any point in its history, during the BCUC public hearing for the 2008 LTAP, BC Hydro was challenged by a number of interveners as to why it was not planning to pursue more. This debate centred on two DSM options that BC Hydro assessed for its 2008 LTAP – DSM Option A and DSM Option B. In its Plan, BC Hydro recommended pursuing the less ambitious of the two – DSM Option A – even though by its own assessment DSM Option B captured more cost-effective savings. The utility argued that (BC Hydro, 2008a: 5-58. Emphasis added.):

> Based upon DSM's low cost, the uncertainties and costs of supply side options, and *in consideration of the degree of reliance on DSM programs*, BC Hydro concludes that it should set a plan in line with DSM Option A, and that this significant challenge should be the extent of the reliance on DSM savings at this point in time.

In other words, given that the scale of DSM being considered was well beyond what BC Hydro had pursued in the past, from an operational perspective, the risk that BC Hydro may not be able to deliver all of its planned electricity savings was too high to consider pursuing more. It was better, therefore, to plan to leave sufficient space for new supply in its long-term resource mix so that the utility did not end up relying almost exclusively on DSM for closing its projected gap.

Despite BC Hydro's assertions, the BCUC ultimately rejected the utility's 20-year plan in 2009 in part because the BCUC was "unable to state with any certainty where 'cost-effective' DSM becomes 'cost-ineffective' in comparison to any such supply side option" (British Columbia Utilities Commission, 2009, p. 85). However, the BCUC did approve the utility's request to start spending $418 million on DSM Option A between 2009 and 2011 (British Columbia Utilities Commission, 2009, p. 152). At the same time, it rejected the utility's request to issue an immediate Call for 3,000 GWh of new Clean Power – a decision that flew in the face of the Province's clean energy and economic development policy.

7.4.3 BC Hydro's Energy Efficiency and Conservation Niche

The BCUC's funding approval of the 2008 DSM Plan meant that within BC Hydro's Power Smart division a number of new and more leading edge energy efficiency and conservation activities could continue to be pursued or be scaled up[10]. These included the activities of its conservation rate

[10] "continued to be pursued" because the 2008 LTAP decision was not handed down until August 2009. Given that this was already 1.5 years into the 2008 Plan, BC Hydro's Power Smart started work on the Plan in early 2008 with the assumption that the planned expenditures would be approved.

design team, a new focus on programs for low-income ratepayers, its codes and standards team, its Technology Innovation Group, education programming and its Sustainable Communities Program. A number of these corresponded with some of the "adequacy" and "specified DSM" activities that were given special costing treatment within the 2008 DSM Regulation.

In addition to these internal organizational activities, the 2007 Conservation Potential Review and the 2008 LTAP processes provided opportunities for stakeholders to engage with the utility through a variety of close-ended consultation efforts. The most involved of these were the 2007 CPR External Review Panel and three all day “Intervener Workshops” hosted by BC Hydro as part of its 2008 LTAP process.

Turning now to the EC&E, we see that by early 2007 the ongoing stakeholder Advisory Committee was beginning to come into its own. Starting in March 2007 four working groups were formed that reported directly to the EC&E. The working groups were the Rates Working Group, Strategic Framework Working Group, the Challenges to DSM Working Group and the Codes and Standards Working Group. Members of these working groups included EC&E participants, BC Hydro staff and in the case of the rates working group a number of stakeholders who do not sit on the regular EC&E Advisory Committee.

By the fall of 2007, each of the EC&E working groups provided a set of recommendations to BC Hydro. Recommendations forwarded by the Rates Working Group included the adoption of seven rate design principles for rates intended to promote conservation and to advance research on a specific residential rate design idea called the flat dividend rate principles. The Codes and Standards Working Group, meanwhile, recommended to BC Hydro to expand its thinking from policy-oriented savings derived largely from conventional equipment efficiency codes and standards to how regulations at all levels of government can influence energy use. Furthermore, this working group suggested that in addition to providing technical support to governments interested in advancing efficiency and conservation regulations, BC Hydro should support the building of capacity for enforcement, actively build public support around these ideas as well as assist in building a broad based advocacy coalition to advance them politically.

The key piece of work provided by the Strategic Framework Working Group during this time was a multi-level strategic framework for pursuing energy savings. The strategy describes a “framework for societal change,” and argues that such a framework must be followed if BC Hydro is going to realize its aggressive energy conservation and efficiency targets (BC Hydro, 2007:9). Unlike BC Hydro’s historical DSM strategies that concentrated largely on programs promoting individual behavioral and voluntary market and technological change and to a lesser degree setting performance standards, the strategic framework espouses the need for radical change at three levels: individual (behaviors and technologies),

market (the rules of the game), and societal (shared notions of energy-related routines, expectations, and infrastructure)[11]. The Working Group recommended that BC Hydro adopt this framework for thinking about and developing its future DSM Plans. Despite strong protestation from at least one member of the EC&E that the framework's "societal change" focus extended way beyond BC Hydro's operational mandate to deliver reliable and affordable electricity, it was defended by a BC Hydro executive as the appropriate scale of change given the utility's long-term aspirational conservation target and adopted at the end of 2007.

Using the three-level framework as its context, the fourth working group, the Challenges to DSM Working Group, provided BC Hydro with a more reflective look at achieving accelerated levels of energy savings in B.C. It outlined in a report to the utility a number of individual, market and societal obstacles that exist to achieving the utility's stated desired outcome. From this a second document was produced by the Strategic Framework Working Group that laid out a roadmap to demonstrate how different market-level tactics could address each obstacle and the set of actors needed to make these changes happen. What eventually emerged from this work in the winter of 2008 was the identification of eight key areas of research that the EC&E argued were necessary for advancing BC Hydro's long-term efficiency and conservation goals. The eight projects were: market level, net-zero communities, DSM Planning, split incentives in the commercial and multi-unit residential sector, industrial risk management, government policy enablers, societal-level change, and conservation rates. The utility agreed to support this work with financial and knowledge resources.

Over the next two years work advanced on all eight of the projects. For three of these projects – market-level, split incentives, and industrial risk management - early research largely focused on developing a short-list of specific program and policy measures with a high potential for encouraging savings in a relatively short time frame. The preliminary round of market-level work was carried out by a consultant and resulted in a short-list of high priority measures. Upon completion of this initial work, the EC&E recommended that a more systems-oriented perspective of the market needed to be developed by BC Hydro first that identified what and how parameters in the marketplace influenced energy use and efficiency and from this specific tactics could be drawn out, tested in pilots and scaled-up quickly if successful. Research on split incentives in the commercial and multi-unit residential sector by a multi-stakeholder working group resulted in a set of recommendations being advanced to BC Hydro in the spring of 2010 that included a mix of individual- and market-level measures. Although the EC&E

[11] BC Hydro's 3-level strategic framework shares some similarities with the multi-level perspective discussed in Chapter 1. The societal- and market-levels of this framework in particular share common concepts of hierarchical levels of structures. Missing from BC Hydro's strategic framework, though, are notions of innovation niches influencing these higher orders. The individual-level, which represents efforts to influence individual decisions, is more a subset of the energy-services regime.

advanced these recommendations there were concerns raised that there was not enough emphasis on market- and societal-level changes that could help facilitate the desired outcome. Finally, through a scaled-down stakeholder deliberation process, the industrial risk management project worked with BC Hydro to make a number of significant changes to how it designs and delivers its existing industrial DSM programs.

A fourth project, government policy enablers, started with the objective to help build constituencies to support innovative policy approaches for shifting the energy-use market. Similar to the market-level project, members decided to narrow the short-term scope of the project to look at a short list of high-potential policy measures that local governments could take to encourage more community-oriented energy savings. To help them, an energy consultant was hired by BC Hydro who was already working on several innovative policy concepts with a small number of BC local governments.

The intention of the Societal-Level project was to help BC Hydro identify opportunities and priorities for work at this level and to identify areas for BC Hydro's involvement. This project was led by the EC&E's Strategic Framework Working Group. The Working Group commissioned an academic research paper to explore several historical case studies of intentional transitional change toward sustainability. From this study, several recommendations were forwarded to BC Hydro in the spring of 2009. These recommendations asked BC Hydro to: lead the creation of an energy efficiency and conservation advocacy coalition; identify and develop an alternative vision of energy use in the province that is consistent with the utility's long-term goal; communicate this vision; and develop a budget and plan to pursue this initiative further.

The Conservation Rates Project was a continuation of the Rates Working Group that began in the spring of 2007. For the better part of two years the majority of the Working Group's focus was to provide advice to BC Hydro on a number of new rates that the utility was required to introduce in relatively short order. This short-term focus led to tension with the Working Group's desire to explore more innovative ideas about how to use rates to encourage energy efficiency over the long term. In the fall of 2009, BC Hydro started to address some of the working group's longer-term ambitions when it held a one-day rate design charette. The charette focused on defining a broad set of rate-based concepts for BC Hydro to take into consideration and to develop further as part of a long-term rate strategy and development process. In the spring of 2010 the working group advanced two sets of recommendations to BC Hydro regarding conservation rates, including the need for the utility to develop a long-term rate strategy and road map as well as an implementation plan.

The remaining two projects - net-zero communities and DSM Planning – are ones that were led and developed primarily by BC Hydro staff with EC&E members being asked to provide input from time-to-time. For the net-zero communities project, BC Hydro explored the potential for customer-based

district generation (DG) systems in BC to see what role, if any, BC Hydro should play in advancing these systems. Customer-based DG means that this electricity is generated by actors who both buy and sell electricity from BC Hydro. By early 2009, a DG project team began a handful of pilot projects to establish the cost-effectiveness of supporting these types of projects. By the spring of 2010 the pilot projects were up and running but it was still too early to say whether they were cost effective or not.

DSM Planning, the final research project started by the EC&E in early 2008, was set up to increase the EC&E's understanding and influence on how BC Hydro develops, assesses and plans for DSM as an electricity resource. A concern expressed by a number of Committee members was that there was an inherent supply-side biased in how BC Hydro assessed its DSM options because planning energy savings were assumed to be a less reliable resource than the provision of new supply.

From an operational planning perspective, these EC&E members argued that BC Hydro needed to adopt a multiple-scenarios approach to its demand forecasting and electricity planning. Rather than assume that the future will be an extension of current trends (as is done with conventional forecasting), BC Hydro should assume that a range of futures are possible and plan to develop its portfolio of resources in a way that maximizes the utility's flexibility to obtain its objectives in as many of these possible futures as possible. Under such an approach, these members argued, DSM are likely to prove more favourable than supply, particularly because of their adaptivity as well as their capacity to be ramped up or down relatively quickly in response to changing demand trends. This flexibility is attributed to the diversity of integrated tactics and foci that demand resources can use, monitor and adapt as needed (e.g., rates, programs, codes and standards, hard-wired technologies in new and existing buildings and behavioural change). This inherent flexibility contrasts supply resources which once built in a particular way are there whether they are needed or not.

As a first step to address the EC&E's DSM Planning Project, BC Hydro hired a consultant to assess the process it used for developing the DSM Plan that was eventually included in its 2008 LTAP. In the winter of 2009, the consultant's report was complete. It was largely favourable of BC Hydro's existing practices. A few months later, the EC&E responded to the consultant's report with a set of recommendations. The first recommendation suggested that BC Hydro adopt the suggestions laid out in the consultant's report. The remaining five recommendations outlined elements that the EC&E wanted to see in the utility's next DSM Plan. These included: the inclusion of stakeholder input throughout all steps of the next DSM Plan; an increase in the number and scope of DSM options assessed by BC Hydro; an analysis of each DSM Option against multiple demand scenarios as a way to test their adaptivity to changing circumstances; a DSM risk assessment that is comparable to the one used by the utility to assess and mitigate the risk of its supply options; and the incorporation of adaptive management practices into its next DSM Plan.

In the fall of 2009, BC Hydro responded favourably to most of the recommendations put forward by the EC&E, agreeing to incorporate them as best it could into its next DSM Planning cycle (which was actually already underway), with BC Hydro's commitment to update the EC&E on its methods and progress throughout the planning process acting as a check that this was being done

Also in the fall of 2009, the EC&E requested that the work it was pursuing in each of the projects be integrated into the DSM Planning process to help demonstrate the types of new initiatives that were beginning to emerge and could become part of future DSM Plans. BC Hydro agreed to feed the learnings from the different projects into its planning cycle.

Discord Among the EC&E Membership

Despite the advances made by the EC&E, it is important to point out that within the Committee there existed tension regarding the appropriate level of electricity savings BC Hydro should be actively trying to influence. The public hearings held around BC Hydro's 2008 LTAP provide a good example of these differences.

My review of the final written statements submitted by organizations that intervened in the public hearings for the 2008 LTAP shows at least four different positions exist on the appropriateness of BC Hydro's proposed DSM Option A. The first camp consisted of actors representing the interest of energy generating organizations. These actors described DSM as an unreliable energy source and proposed mitigating this reliability risk with more supply. The second camp consisted of a number of consumer groups and environmental or sustainable energy non-government organizations. In the case of these actors, DSM was described as cost-effective, clean, and flexible in terms of its capacity to respond to an unpredictable demand environment. What is more, they advocated that the best way to mitigate any potential DSM deliverability risk was to increase rather than decrease the amount of DSM being pursued. A third group of advocates was made up of two consumer groups. Although both of these organizations expressed their general support for BC Hydro's proposed DSM Plan, they wanted to see specific elements of this Plan removed. The final group of organizations advocated on aspects of BC Hydro's 2008 LTAP other than DSM and did not express an opinion one way or the other on the proposed DSM Plan. Based on the arguments presented during the 2008 LTAP public hearings, then, at least two members of the EC&E Committee wanted to scale back BC Hydro's efforts, while two others thought that the utility could and should do more.

7.5 2010-2012: Vision Quest

7.5.1 The Policy Landscape

The rejection of BC Hydro's 2008 LTAP by the BCUC in 2009 sparked another round of regime rule changes in 2010 by the Province. Its first action was to issue a Special Directive to the BCUC a few months after the BCUC decision was handed down. The Directive required the BCUC to allow BC Hydro to issue a Clean Power Call for 3,000 GWh/yr as originally requested in its 2008 Long-Term Acquisition Plan.

The Province's next major action to ensure that its clean energy development agenda was pursued was the passage into law of the *Clean Energy Act* in June 2010. The overriding energy objectives stipulated in the Act include:

1. Being self-sufficient in electricity generation by 2016 (plus an additional 3,000 GWh of "insurance" by 2020);
2. Becoming a net exporter of electricity from clean or renewable sources;
3. Ensuring that at least 93% of the electricity in B.C. must come from clean or renewable resources;
4. Generating no electricity from nuclear sources;
5. For utilities to take DSM and for meeting at least 66 per cent of BC Hydro's incremental resource needs through conservation by 2020;
6. Ensuring B.C. ratepayers continue to benefit from the low cost of electricity generated from the province's "heritage" hydroelectric facilities.
7. Encouraging switching from high-carbon intensive energy sources or uses to low or no carbon ones;
8. Using and fostering the development in B.C. of innovative technologies that support energy efficiency and conservation and the use of clean or renewable resources;

To help ensure BC Hydro met the first two objectives of the *Clean Energy Act*, the Act made several rule changes around how BC Hydro forecasts the level of energy it expects to receive from its existing supply resources. First, BC Hydro was required to plan as though electricity imports did not exist. Previously BC Hydro was permitted to include in its list of firm supply resources 2,500 GWh/yr from imports.

Second, the Act required BC Hydro to be self-sufficient even in a year when there is a water drought. In BC's hydroelectric dominated energy supply system, the amount of water available in any year dictates how much energy will be produced. In a low water year, BC Hydro generates approximately 4,500 GWh/yr less energy than in an average water year. This requirement means BC Hydro must plan its system under the assumption that every year moving forward will be a low-water year. Prior to the Clean

Energy Act, BC Hydro planned under the assumption that every year moving forward would be an average water year.

Third, the Clean Energy Act requires BC Hydro to plan its system as though the 2,500 GWh/yr of potential energy from its Burrard Thermal generating plant was not available. In practice, the Burrard Thermal Plant was very rarely ever used; it was primarily kept as a backup in case its extra capacity was ever needed on a temporary basis. Instead it was more cost-effective for BC Hydro to acquire this energy from the spot market for the few days of the year that thermal plant's additional capacity was needed. Taken as a whole, these three rule changes meant BC Hydro needed to supply 10,000 GWh/yr more electricity, or 18 per cent of the load in 2010, than it would have prior to the Clean Energy Act.

In addition to these forecasting changes, the Clean Energy Act also reduced the role of the BC Utilities Commission on a number of fronts. First a number of large capital projects that would normally have to be approved by the BCUC before proceeding were approved without any public hearing by the BCUC. Included in these projects was the installation of digital 'smart meters' in all BC homes by the end of 2012. Second, the Act required BC Hydro to submit a new Integrated Resource Plan by the end of 2011 (later changed to December 2012 and again until September 2013). However, instead of submitting the Plan to the BCUC for approval, it would be submitted to the Minister of Energy and Mines for approval. The BCUC, though, would still need to rule on the appropriateness of any capital expenditures (other than the ones already waived by the Province) and revenue requirements that resulted from the IRP.

However, as discussed in Chapter 5, only months after the Clean Energy Act was legislated, Premier Gordon Campbell resigned. By February 2011 a new leader, Premier Christy Clark was in office. In March 2011, BC Hydro filed an application to the BC Utilities Commission that requested permission to raise electricity rates a total of 32% over the next three years. Premier Clark, whose leadership campaign was built around a "family's first" theme, vowed to keep escalating electricity rates to a minimum. In April 2011, she ordered a high-level review of BC Hydro's finances, planning and capital requirements.

Two months later, the three-person review panel released its report that included 56 recommendations (Doyle, Milburn, & Wenezenki-Yolland, 2011). The report effectively marked yet another major shift in the Province's electricity policy away from IPP resource development and DSM toward a focus on minimizing short-term rate impacts. Two of the report's recommendations had a direct impact on BC Hydro's energy efficiency and conservation efforts. The first recommended to the government that it review the Clean Energy Act's self-sufficiency policy. In response to this recommendation, the government announced in early 2012 that the Clean Energy Act would be amended in order to reduce a number of the forecasting requirements stipulated in the original version of the Clean

Energy Act. Specifically, BC Hydro's 'self-sufficiency by 2016' requirement was changed to self-sufficiency for "average water years", reducing its supply obligation by 4,500 GWh/yr and it no longer needed 3,000 GWh of 'insurance' generation by 2020.

However, at the same time that these two demand reduction announcements were made, the government announced its plan to support the construction of a number of liquid natural gas plants in British Columbia over the coming years. Initially, the first two plants were expected to be operating by 2015 and consuming 4,500 GWh/yr of electric energy from BC Hydro's grid. However, in June 2012, the Province announced its intention to amend the Clean Energy Act to allow these Plants to be powered by gas thermal generation. Under the existing Act, any new gas thermal plant would need to be carbon neutral. The proposed amendment, though, would consider gas thermal generation for the purposes of supplying LNG facilities to be 'clean', reversing a key component of the Province's 2007 Energy Plan.

The second recommended from the 2011 BC Hydro Review impacting the utility's energy efficiency and conservation efforts suggested that BC Hydro "Re-evaluate its various energy conservation programs to reduce the overall costs to ratepayers while still achieving value for money." In other words, by the end of 2012, heat was turned on for BC Hydro's DSM regime to reduce its expenditures.

7.5.2 The Demand-Side Measures Regime

Almost as soon as the BCUC ruled on BC Hydro's 2008 LTAP in the summer of 2009, BC Hydro began planning for its next IRP. In February 2012, BC Hydro's 20-year mid-range demand forecast estimated that demand for electricity in the province will increase from 56,000 GWh/yr in 2012 to more than 86,000 GWh/yr by 2031 (BC Hydro, 2012b). This represented an almost 55% increase! By 2020 the supply gap was projected to be 17,637 GWh/yr. To be compliant with the Clean Energy Act, by 2020 at least 66% of this gap (11,640 GWh/yr) needs to be filled with DSM.

In late 2009, BC Hydro began work on the DSM Plan that would feed into its next integrated resource plan. In keeping with the DSM planning recommendations forwarded by the EC&E to BC Hydro in the spring of 2009, the utility began consulting the Committee members on its DSM Plan early in the process. A first step in this process was to develop the DSM strategy that BC Hydro would use to outline the types of actions it will pursue to achieve its long-term conservation goal. To this end, the utility told the EC&E that the DSM strategy will:

- Articulate a vision of electricity use that coincides with BC Hydro's guiding principles for electricity conservation and efficiency[12];

12 The conservation guiding principle adopted by Power Smart is "To foster an energy conservation and efficiency culture in B.C. that leads to customers choosing to make a dramatic and permanent reduction in the use of electricity." This is different than the 2007 statement made by its then CEO which specifically referred to bending the demand curve over a 20-year period.

- Provide one or more broad paths to fulfill this vision and specific actions BC Hydro would take under each; and
- Identify core actions that BC Hydro should pursue

Prior to this strategy work, the most tangible vision of what achieving BC Hydro's long-term energy efficiency and conservation goal would look like was the 2007 Conservation Potential Review. However, the 2007 CPR only indicated where very specific bundles of savings are likely to come from; it was never intended as a complete long-term vision of electricity savings in BC.

The development of Power Smart's DSM Strategy built on 2007 CPR work as well as the project work advanced by the EC&E. To help it articulate the desired future state of its strategy, Power Smart held two workshops: one internal workshop with senior level managers from across the utility and one external workshop with members of the EC&E Advisory Committee as well as several other invited stakeholders. These workshops asked: Where does BC Hydro want to be? What is its vision for DSM in British Columbia? What are the objectives the vision will achieve? How will BC Hydro know when it gets there? And, how will BC Hydro measures its progress and success?

From these "future state" workshops, Power Smart created both a text-based and an imaged-based picture of the future state of its guiding principle for its DSM program. These images envisioned a future energy system where high efficiency energy end-use and system technologies are located within medium- to high-density mixed-use urban environments and are powered by renewable energy inputs that are generated from a blend of centrally generated and district energy sources.

In addition to these images of the energy end-use system, the workshops' facilitators also drew from the discussions a list of five major regime and landscape related factors that participants indicated were necessary context characteristics of the envisioned future state. The first was an economy that pursues efficiency out of an economic necessity to remain globally competitive. Second was the continued pursuit and achievement of the province's legislated greenhouse gas reduction targets. Third was a more integrated view of resource conservation that is built broadly around the concept of sustainability. Fourth was for conservation and efficiency to remain BC Hydro's priority for closing its projected supply gap. And, fifth was for BC Hydro to act as a catalyst for change, pursuing not only savings from measures that fall under its mandate but also supporting and advocating the types of changes that need transpire to see savings from measures that extend beyond the utility's mandate (such as government policies and shifting societal norms).

From this work, Power Smart management identified a high-level strategy for achieving its long-term savings goal. The strategy was built on three integrated platforms. The first platform was to *transform* British Columbia's economy by changing market parameters and shifting societal norms and patterns to increase energy efficiency and conservation. Possible tactics identified by BC Hydro for

changing market parameters included: provincial policies, local government policies, conservation rates, financing, innovation, and training and workforce capacity. Possible societal-level tactics, meanwhile, included: community planning, community engagement, social marketing and education. The second platform of BC Hydro's DSM strategy was to *collaborate* with customers and partners to leverage BC Hydro's efforts. Tactics that would fall under this platform included: targeting the supply chain in the delivering of programs, partnering with all levels of government to influence codes and standards and other public policies; and leveraging community organizations in their efforts to shift societal norms. The third platform of the strategy was to *integrate* with other offers and efforts for greater impact. Tactics that fell under this platform included expanding programs to the limits of cost-effectiveness, coordinating DSM initiatives, and leveraging electricity DSM with sustainability and other resources (e.g., gas, water).

With its vision and long-term strategy in place, BC Hydro's next step modeled an example of a transition pathway that over the course of the next 20-years could lead to its envisioned future. This pathway, was the fifth of five DSM Options that BC Hydro explored as part of its 2012 Integrated Resource Planning Process[13].

What Option 5 envisioned was a tactical-level electricity regime in 2030 where savings are driven by major shifts in broad-based market and societal tactics to promote energy efficiency, particularly energy performance standards. Although utility voluntary incentive and information programs and conservation rates are still important tactical tools, they are designed to reinforce and take advantage of performance standards. This contrasts the tactical-level regime in 2012 which, although placing increasing reliance on government-led activities for energy savings (such as efficiency standards and building codes, carbon pricing, and programs), was largely driven by utility energy planning, voluntary incentives and information programs and rates.

In 2030, for example, Option 5 envisioned that buildings demonstrating a lower energy intensity per square meter will pay less to be hooked up to the grid at the time of construction than ones with a below average efficiency performance. Similarly, the rate signal for the marginal cost of supply will shift from a generic level of total kilowatt-hours per month to one that is sub-sector and building specific. So a customer operating in a building type and sub-sector that has a high efficiency performance rating (e.g., R2000 house), will see a price signal at a lower energy consumption tier than one who is in a building type and sub-sector with a lower efficiency performance rating (e.g., meets the BC Building Code). The

[13] Option 1 shows the level of estimated savings if BC Hydro scales back on its existing DSM programs; Option 2 shows the level of estimated savings if BC Hydro extends its 2008 DSM Plan; Option 3 shows the level of estimated savings if BC Hydro pushes the cost of its Programs to the upper limit of cost-effectiveness (i.e., up to $130/MWh); and Option 4 shows the level of estimated savings from Option 3 plus a set of selected codes and standards and rate structures and some activities to set the stage for Option 5.

rationale for this approach is that it incents *all* customers to take steps to reduce their energy use, not just those who exceed a universally applied threshold..

Efficiency performance standards will also be used to design more customized program offerings. In the case of new buildings, programs will be used to encourage or incent architects, developers and owners to go beyond these standards. For existing buildings, programs can be tied to commitments to reach or surpass a recognized standard. In this way, a more long-term and multi-faceted approach to achieving energy savings can be taken than what is currently done. A precondition for this tactical program approach, though, is establishing recognized energy performance standards.

In May 2012, BC Hydro's released a draft of its IRP (BC Hydro, 2012a). In the draft IRP, BC Hydro recommended pursuing Option 3 as its primary DSM Plan. This Option is essentially an extension of BC Hydro's existing DSM Plan with the addition of pushing its incentive and information programs to the upper limit of their cost-effectiveness. If this was done, BC Hydro estimates it would achieve an additional 1,000 GWh per year of savings by 2020 than its current DSM Plan. Furthermore, given the potential for cost-effective savings demonstrated in its analysis of Options 4 and 5, it also recommended spending an estimated $7 million to continue to advance work on Options 4 and 5.

Interestingly, whether or not any of the DSM Options worked out by BC Hydro meet the requirement in the Clean Energy Act for utilities to meet at least 66 per cent of their incremental resource needs through conservation by 2020 depends on if BC Hydro has to provide "clean" power to future LNG plants. If it does, all of BC Hydro's DSM Options were expected to fall short of the 66% conservation requirement. If it does not, all of BC Hydro's DSM Options, save DSM Option 1, were expected to meet this requirement (BC Hydro, 2012b).

At the time the IRP draft was released, BC Hydro was supposed to submit a final version of the IRP to the Province by the end of 2012. However, this date was postponed by the Province until August 2013 to provide more certainty on the political decision about whether future LNG plants in the province will be permitted to generate their own thermal electricity or be required to use "clean" electricity. The source of this uncertainty is a provincial election in May 2013. Regardless of the outcome of this election, as things now stand, it will be up to the Province to determine if the path advanced by BC Hydro in its IRP is the appropriate course forward or not.

7.5.3 BC Hydro's Energy Efficiency and Conservation Niche

While decisions wait to be made on BC Hydro's recommended DSM Plan for its 2012 IRP, Power Smart continues to work with the DSM Plan contained in its 2008 LTAP. Under this Plan a number of innovative programs continue to advance not only BC Hydro's own DSM activities but also attempt to advance the activities of all levels of government in Canada. Two initiatives in particular stand out in this regard, Power Smart's policies, codes and standards team and its Sustainable Communities

Program. The former provides technical expertise and advice to government officials interested in advancing efficiency policies within their jurisdictions, along with funding for technical standards, market studies and regulatory assessments of proposed standards. The latter, meanwhile, provides funding support to local governments to plan for and pursue such initiatives.

Other BC Hydro DSM Programs worth mentioning because of their more innovative approaches for encouraging energy savings are its New Construction Programs and its industrial integrated power offer. The New Construction Program requires large commercial building developers who want access to a particular set of capital incentives provided by BC Hydro to first follow an integrated design process that is intended to highlight design decisions across multiple disciplines that can lead to improved building-wide efficiencies. A similar BC Hydro program exists for new industrial plants. The utility's integrated power offer, meanwhile, works with the utility's industrial customers to reduce their net electricity consumption from BC Hydro's grid through efficiency improvements as well as on-site energy generation.

Many of these programs also stand out because of their association with the work being undertaken by the EC&E. For example, the Sustainable Communities Program ties in closely to the EC&E's Net-Zero Communities Project and its Societal-Level Project. The work of Power Smart's Policies, Codes and Standards team, meanwhile, is frequently addressed in more market oriented projects such as the Market-level Project, the Split-Incentives Project, and the Government Policy Enablers Project. Finally, many of the changes made in recent years to BC Hydro's industrial programs are credited to the work that is carried out by the EC&E Industrial Risk Management Working Group.

Despite the ability of these EC&E projects to tie into relatively well funded operational activities, beginning in late 2009, many of the projects started in 2008 had reached the end of their initial round of research by 2010. Based on this earlier work, the EC&E had either already issued recommendations to BC Hydro as to how to proceed next or were in the process of doing so.

Three of the projects – market-level, societal-level and rates – all essentially suggested that in addition to trying to advance specific initiatives in the short-term BC Hydro needed to develop a longer-term perspective of what might be desirable and/or possible and then build a strategy and roadmap for moving towards such a future. BC Hydro's response to these recommendations was let's wait and see what comes out of the DSM planning process for the 2012 IRP as it will provide a better sense of direction that the utility will take and the resources available to get there. The problem with this is that because of landscape delays, some of these recommendations are now more than three years old.

Despite these delays, one of the specific market-level initiatives recommended in the 2009 consultant's report that was commissioned by BC Hydro has scaled-up to the policy regime. The initiative is called Pay-As-You-Save or PAYS. It is an on-bill financing tool that ties the payment for major energy

efficiency upgrades to a residence's utility meter rather than to an individual owner. Interestingly, it was not BC Hydro that moved this initiative forward but the BC Ministry of Energy and Mines who through their membership on the EC&E had a copy of the consultant's that recommended it. After more than a year of deliberation with its own stakeholders, the Ministry advanced the Improvement Financing Regulation in 2012 to allow BC Hydro and Fortis BC to implement several small-scale financing pilot programs in the province (Government of British Columbia, 2012)..

Two of other the projects – split incentives for the commercial and multi-unit residential sector and net-zero communities – were removed from the EC&E's active project list in the fall of 2010. A number of the specific measures advanced by the Split Incentives Working Group are now being studied further by BC Hydro's staff and consultants. For net-zero communities, BC Hydro's assessment of its handful of customer-based district generation pilot projects showed that they were not economically viable for BC Hydro or its customers. As a result, BC Hydro's Sustainable Communities Program no longer provides DG incentives for its residential and commercial customers.

The three remaining projects – industrial risk management, government policy enablers and DSM Planning – are all continuing to advance new issues in one way or another. Although the Industrial Risk Management Working Group and the Government Policy Enablers Working Group continue to meet, neither of these has ever advanced any formal recommendations to BC Hydro. In the case of the Industrial Working Group, recommendations tended to be more informal and delivered directly to key decision makers within Power Smart's Industrial team who sit on the Working Group.

The Government Policy Enablers Working Group has been less successful. Instead of providing BC Hydro with ideas about how it can best partner and influence different levels for government to accomplish ECE goals (the working group's stated purpose), it seems to be caught up in a more technically-oriented pursuit of understanding a small number of specific tactical policy measures. While it is positive that these measures are receiving the attention of a small number of government officials, it is likely that this work would advance without the involvement of the working group because it is already on the agenda of actors both inside and outside of BC Hydro. What is more, as early as the fall of 2010, suggestions were made by the broader EC&E Committee that the Government Policy Enablers Working Group needs to expand its focus beyond Municipal government actions in order to start moving provincial policy pieces forward. To date, though, work on this broader focus has not started. Given its focus to date, it is difficult to see how the working group is having any direct influence on energy efficiency and conservation policy or resource allocation either within BC Hydro or outside of it.

The final project, DSM Planning, is arguably the most active and influential one in recent years. Since the DSM Plan is a key institutional component of BC Hydro, any suggestions adopted by the utility has a direct regime-level influence. Unlike most of the other projects, this one was never set up with a

working group. Instead BC Hydro presents to the EC&E on a regular basis its recent thinking, methodology, and assessment of its DSM Plan. Based on this information, the EC&E provides feedback and input on the next steps that it would like to see taken. This ongoing back and forth conversation has influenced what DSM options BC Hydro is developing for its Plan as well as how these Options are assessed relative to one another and supply resources. However, not all of the suggestions made by the EC&E were taken up by BC Hydro. For example, members of the EC&E have suggested that rather than use a static number for the marginal cost of supply BC Hydro should use one that reflects the fact that the marginal cost is likely to change over time. BC Hydro, however, has said that while it finds some merit in this proposal it is something that will have to wait for future Plans.

The DSM Planning Project also provides an indication of the EC&E's expanding influence. Although the EC&E was asked to provide direct input into BC Hydro's DSM Plan and the development of the different DSM Options, advice on how these Options are integrated within the broader Integrated Resource Plan is beyond its mandate. It is, however, within the mandate of the IRP's Technical Advisory Committee (TAC). The TAC is a stakeholder committee established by BC Hydro to provide detailed technical input and feedback to assist the utility in developing its IRP. As with the EC&E, members are invited by BC Hydro to sit on the Committee. Of the eleven organizations represented on the Committee, seven are from organizations who also have a representative who sits on the EC&E. In three of these cases, the same person sits on both the EC&E and the TAC.

In early 2011, a number of concerns were raised by EC&E members about BC Hydro's risk assessment of Option 5. At that point, the savings attributed to Option 5 relied completely on future government policy changes. From BC Hydro's perspective, this was viewed as a high-risk Option because all of the actions needed to achieve the savings were beyond its power of authority. Concerned with these results, the three members of the EC&E who also sit on the TAC drafted a set of recommendations to BC Hydro for resolving this shortcoming. The recommendations were approved by all but one member of the EC&E. Similar recommendations were then made at a TAC meeting. BC Hydro in turn made the suggested changes, thereby significantly reducing the Options risk exposure and increasing its legitimacy as a viable Option.

Although Option 5 was not recommended in BC Hydro's draft IRP as its preferred DSM Plan, the utility did see enough merit in both Option 4 and 5 to recommend $7 million in expenditures to develop these Options further so that it is in a better position for the next IRP to assess their potential.

7.6 Conclusion

In 2006 B.C.'s built environment energy regime was guided by a strategic-level policy of cost-effective resource acquisition and economic development. Under this paradigm, pursuing energy efficiency and conservation was rationalized by its cost competitiveness as compared to the cost of

acquiring new supply and supported by utility revenue "de-coupling" following the 2002 Energy Plan. BC Hydro's tactical activities were dominated by its integrated resource planning process and the supply- and DSM that result from it. The bulk of utility DSM were concentrated on information and incentive programs that were intended to encourage the voluntary development and adoption of more energy efficiency technologies and conservation behaviours. Although BC Hydro's leadership was supportive of the idea of pursuing more transformative levels of energy efficiency and conservation, there was not yet evidence of a strong TEEC niche within BC Hydro.

Starting in 2007, in addition to the existing policy of cost-effective resource acquisition and economic development, BC's built environment energy regime was guided by a provincial-level vision of greenhouse gas mitigation, a legislated target for DSM, and an amendment to the Utilities Commission Act that prioritized DSM over supply in utility resource planning. The clearest impact that the new climate policy had on BC Hydro was the doubling of the marginal cost of supply from $60/MWh to over $120/MWH. According to the 2007 Conservation Potential Review, this increase opened up a wide range of energy savings potential for the utility to pursue. However, as many of the "upper achievable" savings identified in the Conservation Potential Review relied on supportive market conditions and government policy, the utility questioned the reliability of all these savings coming to fruition (BC Hydro, 2008b). As such, the utility planned to pursue only an incremental increase in savings in its 2008 Long-Term Acquisition Plan over its previous Plan. Despite these operational-level concerns about pursuing more transformative levels of savings, the utility's Electricity Conservation and Efficiency Advisory Committee was very active between 2007 and 2009 with using working group to expand the knowledge of its members and BC Hydro employees about more transformative levels of energy savings. In addition, the Committee took up a more active role in recommending to BC Hydro the direction that it would like the utility to take in order to reach its stated "aspirational" 2027 savings target.

However, a number of the more ambitious of these recommendations were put on hold for up to three years as the province's energy and climate landscape experienced multiple waves of change and uncertainty as a result of disagreements between the Province and its public utility regulator, a provincial election in 2009 and an unexpected provincial leadership change in early 2011. As a result of this uncertainty, BC Hydro's Integrated Resource Plan, which was initially scheduled to be released in the summer of 2011, was pushed back to December 2012 and again to September 2013. To be able to move forward on a number of the EC&E's recommendations BC Hydro maintained that it needed to: 1) build space for them into its IRP, 2) have the IRP approved by the Province, and 3) have its expenditures to pursue these ideas approved by the BCUC. Despite this setback, recommendations regarding how BC Hydro planned for electricity savings in its IRP were advanced during the IRP process. As a result of these recommendations and the persistence of EC&E, an extensive DSM strategy process was carried out

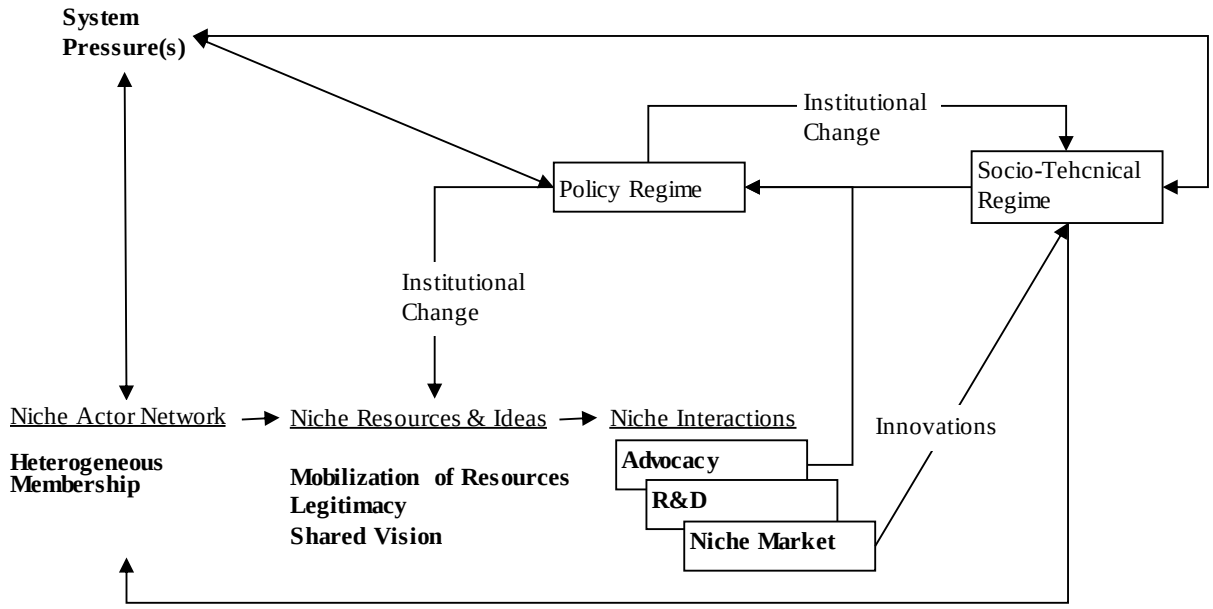
as part of the IRP process. This strategy resulted in five-different DSM options being discussed, developed and analyzed. One of these, Options 5, used visioning and backcasting to work out a single path of tactical-level measures that if taken over the next 20 years could realize BC Hydro's "aspirational" electricity savings target. Although the draft version of the IRP recommended using a more incremental option (DSM Option 3) as its operational plan, it did recommend that $7 million in expenditures be used to develop its two most ambitious DSM Options further (DSM Options 4 and 5). The process that led to the five options being developed as well as the utility's willingness to develop a parallel research program to learn about and experiment with more transformative DSM concepts are both firsts for the utility. Whether or not these recommendations are approved by the Province, however, remains to be seen.

Although it is evident that considerable changes have taken place with regards to how energy efficiency and conservation is thought about and planned for within the utility, it is not yet clear whether or not these changes are leading to the kinds of soft-governance infrastructures that in Chapter 3 I argue are needed to support socio-technical transformation. In order to add such clarity, in the next Chapter I use the evaluation framework from Chapter 3 to assess the success of the efforts to date.

Chapter 8: An Assessment of the Conditions Supporting Transformational Change in the BC Hydro Case Study

8.1 Introduction

In this chapter I assess the efforts of British Columbia's largest public energy utility, BC Hydro, to advance transformative energy efficiency and conservation (TEEC) in the built environment from 2005-2012 (as described in Chapter 7). I will use the same evaluation framework and qualitative analytical procedures as I did for the Provincial case study in Chapter 6. The assessment will be based on the strength of the eight conditions for supporting socio-technical transitions that are included in the analytical framework developed in Chapter 2 (see Figure 8-1). After assessing the state of each of the conditions found to support transformational socio-technical change in the electricity system overseen by BC Hydro as they pertain to TEEC in the built environment, I will then provide my overall assessment of BC Hydro's efforts to steer TEEC.



Arrows depict the flow of resources and/or pressures
Bolded words are eight conditions included in evalatuion framework

Figure 8-1 Analytic Framing of the Conditions that Support Socio-Technical Transitions

8.2 System Pressure(s)

There were a number of system pressures pushing BC Hydro to consider ever higher-levels of energy savings between 2006 and midway through 2012. These included: climate change legislation that

effectively doubled the marginal cost of electricity supply; a projected sharp rise in the demand for electricity over the next 20 years; a provincial electricity system that was operating at capacity and expected to continue to do so throughout most of the case study's duration; a provincial policy of economic development via clean electricity generation which, among other things, restricts the import of electricity as a planning resource; and long-standing tensions between new energy developments and environmentalists, First Nations, and local interests.

Despite these pressures, there was initially a lack of coherence in BC Hydro's response to them. This incoherence was evident from the BCUC's rejection of BC Hydro's 2008LTAP and the back and forth between the BCUC and the Province that ensued from this ruling. Part of this incoherence stemmed from the Province's desire to encourage the development of new 'clean electricity' supply projects as a means to both bolster economic development and reduce greenhouse gas emissions. The fulfillment of this policy was reliant on BC Hydro building into its long-term acquisition plan space for the acquisition of new supply. So the more of BC Hydro's projected supply gap that filled with demand-side measures (DSM), the less space there was to fulfill the government's supply-oriented economic development objectives. One way BC Hydro addressed this problem for its Draft 2012 IRP was to include a DSM Option that pursued super-efficient buildings over the next 30-years (i.e. DSM Option 5). Although not recommended for operationalization, it did at least show what one kind of TEEC response plan could look like.

Another problem lies in how these pressures were translated. For BC Hydro, its base unit for planning and decision-making is power demand measured in watts and electricity consumption measured in kilowatt-hours per year. For the Province, though, its climate change agenda was driven by measures of greenhouse gas equivalent emissions. One result of this is that when the Province spoke about net-zero buildings or communities, it was referring to net-zero GHG emissions. However, when BC Hydro spokes about net-zero buildings or communities it was referring to net-zero from an electricity perspectives or sometimes from an energy perspective. If GHG emissions were the key focus, from BC Hydro's perspective there was little that it could contribute short of switching energy services that are currently filled by fossil fuels to electricity[14]. This is because electricity generated from BC Hydro comes largely from hydroelectric sources. In addition, the Clean Energy Act committed to making the electricity system carbon neutral by requiring it to be net self-sufficient by 2016 and requiring all gas generation to purchase carbon offsets and coal generation to use sequestration. Despite these measures to make BC Hydro's electricity "clean", the utility did not pursue programs to encourage switching from carbon-based fuels to

[14] Whether fuel-switching from natural-gas to electricity is desirable from broader sustainability and efficiency perspectives might be another matter, especially if electricity, which is considered high-quality energy sources from an exergy perspective, replaces thermal energy, which is considered a low-quality energy source, for space heating.

electricity (e.g., heat pumps for space and water heating for customer currently using natural gas or oil to fulfill these services), even though there was a provision in the Clean Energy Act for it to do so. Until a decision is made by the utility to pursue such programs, BC Hydro's contribution to the Province's climate mandate is limited to those actions that can be justified from a traditional IRP standpoint.

Having said this, the one area where the Province's climate objective was strongly translated for BC Hydro was in the utility's marginal cost of supply. By restricting BC Hydro to acquire any new electricity from 'clean' sources, the Province effectively doubled the utility's marginal cost of supply which in turn doubled the supply avoidance benefit attributed to DSM. Despite the increased cost benefit associated with DSM, however, there remains reluctance within BC Hydro, particularly among its IRP planning group, to commit too much too soon to DSM because it is viewed as a less certain resource than supply-based resources. The fact that this reluctance persists, even when the utility's leadership was supportive of pursuing the idea of transformative levels of electricity efficiency and conservation, indicates that a degree of incoherency exists between BC Hydro's strategic- and operational-level objectives.

Based the above discussion, in Table 8-1, I summarize the strengths and weakness of the pressures pushing BC Hydro toward TEEC. What this shows is that although there were considerable TEEC system pressures experienced over the course of most of the case study, conflict with supply-oriented solutions to both BC Hydro's long-term planning and the Province's climate objectives meant that a TEEC option was developed but ultimately not adopted and implemented. Given this information, I assess the strength of the system pressures on BC Hydro to pursue TEEC to be moderate.

Table 8-1 Summary of Selection Pressure Indicators

Indicator	*"Strong" Indicator*	*BC Hydro Strengths*	*BC Hydro Weaknesses*
Multiple Pressures	Multiple pressures in terms of type and level of origin.	Multiple TEEC pressures in terms of type (e.g., economic, biophysical, social, political)	Economic imperative declining with BC Hydro's forecasted supply-surplus in late 2012.
Coherent	Response plan developed, adopted and implemented.	TEEC response plan (DSM Option 5) developed	TEEC response plan (Option 5) not adopted because it is considered too "uncertain"
Translation	Rationale used to address system pressures is consistent with both the problem and the organization's operationalized primary objectives.	Electricity savings performance measures are strongly institutionalized.	Confusion over the role of BC Hydro's DSM program for addressing climate change because the utility is a "clean" energy generator.

Overall Strength: Moderate

8.3 Resources & Ideas

This section looks at how BC Hydro`s efforts to steer TEEC is being supported with the kinds of ideas and resources that my framework argues are necessary to pursue transformational change. Although many different kinds of ideas and resources will ultimately be required to see a socio-technical transition

advance, I now highlight three that the literature tells me are particularly important for furthering this process: a shared vision (idea), legitimacy (authoritative resource), and resource mobilization (authoritative and allocative resources).

8.3.1 Shared Vision

The clearest shared vision of BC Hydro's ambitious energy efficiency and conservation goal was the DSM Strategy work that was undertaken as part of its 2012 IRP. A foundation for this vision was the 2007 CPR and the visionary statement made in 2007 by the utility's CEO (Elton, 2007, 1):

> Our goal is to develop and foster a conservation culture in BC that leads to customers choosing to make a dramatic and permanent reduction in electricity intensity…Following this vision, we strongly believe that we can go beyond the 50% conservation target set out by the 2007 B.C. Energy Plan and lead a change such that in 2027 we would return to 2007 electricity consumption levels while allowing for growing and economic prosperity (Elton, 2007, 1).

While the CPR helped to create an early map of the 'possibility space' of DSM to fill energy services in British Columbia, it was around the CEO's vision that the EC&E's focus was originally set and for which the Advisory Committee developed the multi-level strategic-framework that acted as a heuristic for pointing out some of the technical, institutional and cultural problems that BC Hydro needed to resolve in order to achieve its objective (A. Smith et al., 2005). In turn, these actions helped the EC&E to focus some of BC Hydro's resources toward the eight research projects that it drew from the strategic-framework.

This early vision, however, was not without its critics. For example, concerns were raised by several members of the EC&E that it could be interpreted as desirable to achieve the aspirational target even when it was not cost-effective to do so. In addition, some EC&E members and BC Hydro staff members pointed out that in scenarios of the future that include some form of electrification (e.g., to switch to an electrified transportation fleet) or strong economic growth "bending the curb" back to 2007 levels was highly unlikely and perhaps even undesirable if the myopic pursuit of this specific vision stifled potential economic growth. The original vision, in other words, met with resistance from both inside and outside of BC Hydro because it was deemed to be too inflexible to changing circumstances.

Given these concerns, the DSM strategy process, which began in late 2009, started out with using only the first part of the original vision:

> Our goal is to develop and foster a conservation culture in BC that leads to customers choosing to make a dramatic and permanent reduction in electricity intensity.

The second part of the original vision, which describes the bending of BC Hydro's demand-curve over a twenty year period, was explicitly reduced to a symbolic representation of what such a reduction

might look like. Despite this demotion, it was still emphasized to the members of BC Hydro's staff and the EC&E who participated in the DSM strategy process, that when thinking about what a detailed pathway to achieve this vision might look like (both from an end-user perspective and a tactical DSM perspective), the appropriate frame of reference for change was still on the scale of what it would take to close the gap in 20-years' time.

This higher-level strategy discussion fed into the development of DSM Option 5 that was assessed as part of BC Hydro's 2012 IRP. DSM Option 5 marks a significant increase in the coherence of BC Hydro's long-term DSM vision. It spells out not only "the configuration of artifacts and practices that work in a desired way and deliver certain expectation" but it also spells out a detailed progression of utility and policy tactics that if adopted are argued to stand a good chance of positively influencing such an outcome (A. Smith et al., 2005).

Based on my observations of the deliberations that led to the formation of DSM Option 5 and the EC&E discussions that followed, the desirability of BC Hydro's long-term DSM goal was largely shared among the members of the EC&E, and the BC Hydro staff members and government officials who participated in the DSM strategy process.

In the end, although not recommended by BC Hydro for its 2012 IRP, the utility recommended that DSM Options 4 and 5 by advanced by spending approximately $7 million between 2014 and 2017 to "[e]xplore more codes, standards, and rate options for savings beyond the 9,800 GWh/year target" (i.e., the savings projected in DSM Option 3). If approved (targeted for mid-2013), the activities associated with this funding could serve as a common reference point for actors working toward the realization of Option 5 which in turn would help to stabilize over the next few years the flow of resources need to accelerate the rate and range of innovative activities associated with pursuing TEEC.

Given all of the functions associated with BC Hydro's evolving TEEC vision, it is fair to say that it was and continues to be an important force for moving TEEC forward. Despite these benefits, at least a couple of members of the EC&E critiqued it as being too limited in scope as it reflects only one envisioned pathway for how to achieve BC Hydro's long-term electricity savings objectives. For example, although Option 5 is built on the premise on moving towards a norm of 'net-zero energy buildings' over the course of the next 20-years, it says little about 'net-zero communities'. In addition, it remains very technology-centric. It says little, for example, about how changing patterns of day-to-day life could influence how energy is used. Issues such as these indicate that BC Hydro's current vision may be too inflexible. Moving forward, in addition to advancing DSM Option 5, the TEEC niche should also ensure that the vision being advanced is inclusive enough to simultaneously negotiate and explore other possible pathways.

This struggle between BC Hydro's planning requirements to selecting a single long-term savings objective for the purposes of its IRP and developing a broader set of perspectives of how it aspirational vision might be achieved was an ongoing one. And as will be shown in Section 8.4.1, the dominance of the practical requirements of the IRP process in terms of the flow of ideas and resources meant that a number of more divergent ideas advanced by the EC&E remained idle for several years.

Based the above discussion, in Table 8-2, I reflect the strengths and weaknesses of BC Hydro's TEEC vision based on the evaluation indicators and ratings developed in Chapter 3. It is evident that BC Hydro's aspirational vision has spawned a considerable amount of foundational planning work, encouraged for the most part by the EC&E Advisory Committee. The true test of the vision's strength will be whether these plans are now operationalized and updated as new information becomes available. Given this information, I assess the strength of BC Hydro's shared vision of TEEC to be moderate.

Table 8-2 Summary of Shared Vision Indicators

Indicator	*"Strong" Indicator*	*BC Hydro Strengths*	*BC Hydro Weaknesses*
Mapped out alternative "possibility space(s)"	Multiple alternative arrangements mapped out.	One alternative TEEC pathway mapped out (DSM Option 5)	DSM Option 5 is very technology and economic focus. Does not address aspects of social-scale change e.g., land-use planning, changed expectations about energy services
Heuristic for problem identification	Broad set of problems that need to be addressed identified.	Broad set of problems worked out through multi-level strategic framework process	No strategic plan developed to address most of the problems identified in EC&E report.
Target-setting and monitoring	Target set and monitoring is ongoing	DSM Option 5 demonstrates what a TEEC electricity savings targets would be.	Targets not adopted nor are there plans to monitor.
Actor networks	The vision has helped to maintain niche cohesiveness and has encouraged growth of membership.	EC&E core membership has remained intact. The vision was flexible enough to be adjusted when it met with some resistance during the IRP planning process.	EC&E membership has not grown. (see Section 8.5 for full discussion on actor networks)
Focus of resources	Consistent and timely flow of resources to pursue vision.	EC&E personal time and knowledge as well as BC Hydro supporting the EC&E process with one objective being to help BC Hydro work out how to pursue its aspirational target	Flow of resources for advancing a number of initiatives recommended by the EC&E has been inconsistent. (see Section 8.3.3 for full discussion of resource mobilization)

Overall Strength: Moderate

8.3.2 Legitimacy

In this section I use the general perception of the appropriateness of DSM Option 5 by actors engaged in BC Hydro's IRP planning process as a measure of the level of legitimacy afforded to pursuing TEEC. As was done in the analysis of the Province's efforts to steer TEEC (Chapter 6), this assessment is guided by four indicators identified in Chapter 3 as influencing a positive legitimation outcome, namely, 1) the strength of debate (2004:305); 2) the emergence of new actors and mature ideas that work toward delegitimizing existing institutional structures (DiMaggio, 1991; Fligstein, 1990); 3) the adoption by

established actors of new innovations (Greenwood et al., 2002; Leblebici et al., 1991; Morrill, 2005); and 4) multi-level shifts in widely held ideologies, social structures and the organization of power (Holm, 1995).

In the preceding section, I argued that the desirability of BC Hydro's DSM vision is largely shared by members of the EC&E. However, what is less supported is the achievability of this vision. At the core of the controversy surrounding the achievability of BC Hydro's aspirational DSM vision are two long-standing DSM values: least cost energy planning and the minimization of the risk of energy resource not being there to fulfill energy services when planned for and demanded. We see evidence of both of these values in this brief exchange between two members of the EC&E during a debate about DSM Option 5:

- M1: Is there a difference between a megawatt-hour for supply versus a megawatt-hour from DSM?
- M2: One is real.
- M1: One is cheaper too.

The "one is real" comment refers to supply resources being physically available to service demand after it is built. The implication is that demand-side resources cannot be counted on because they cannot be tangibly turned on and off at the will of a central planning authority but supply resources (once built) can. The "one is cheaper" comment refers to the fact that at the time, a megawatt-hour of savings from DSM Option 5 was estimated to be $60/MWh while a megawatt-hour of electricity from new supply was estimated to be $130/MWh.

If monetary costs were the only consideration, then according to least-cost planning, Option 5 should be pursued. However, the monetary cost does not take into account the risk that these savings may not come to fruition in the time span planned for in the IRP. The question that is up for debate is: At what point does the risk of DSM not delivering their planned savings outweigh the strict monetary cost advantage of these measures?

How one answers this question, says a lot about their perspective of DSM. As described in Chapter 7, a number of members of the EC&E argued that the risk of DSM not delivering the planned level of savings in the time allotted is reduced by the inherent flexibility that comes with the range of tactics (e.g., rates, programs, codes and standards) and foci (e.g., hard-wired technologies, practices and behaviour) included in any DSM strategy. One result of this flexibility is that DSM is dynamic over time as its suite of tactics and foci are monitored and adapted as required. Despite the relative dynamic and flexible use of DSM in practice, conventional IRPs tend to still assume that both demand and supply resources are static once operationalized. Although BC Hydro's risk assessment group for the IRP

acknowledged DSM's inherent flexible and dynamic nature, it conceded that the factoring in of these characteristics into its analysis is still very much a work in progress.

The recognition of these characteristics by BC Hydro led to discussions about how they should be addressed. Tension around this question is evident from the following two excerpts taken from an April 2011 meeting of BC Hydro's Technical Advisory Committee for its IRP:

> I share the short-term concern on DSM and have a nervousness about DSM and achievability and I am wondering how it will shape out with the ultimate operation and planning and how aggressive you can be.
>
> …if BC Hydro is worried about the downside of DSM BC Hydro should do more…Plan on it, rely on it, but spend something more to have the capacity to go to the upside of DSM – same as you are planning on the supply-side.

In the second statement, although BC Hydro's concerns about accurately assessing the deliverability of its DSM measures is acknowledged as valid, particularly when pushed beyond its existing plan, an alternative approach is proposed to addressing these concerns. This proposal suggests that it is more appropriate from both a cost and deliverability perspective for BC Hydro to go after more DSM savings than it plans to achieve. It does this on the supply-side by assuming that a certain percentage of new projects contracted to independent power producers will not get built. So if BC Hydro projects that it will need 3,000 GWh of new supply available by a certain date, it will actually sign long-term power purchase agreements for say 4,000 GWh. However, in its 2008 LTAP BC Hydro did the opposite for its demand resources; it mitigated the estimated deliverability risk of DSM by going after less of it and offsetting this decrease with additional new supply resources.

The level of debate surrounding the operationalization of BC Hydro's DSM Option 5, particularly around how well it aligns with the long-standing utility resource planning values of cost-effectiveness and deliverability, indicates that the idea of shifting to a more ambitious energy savings pathway is very much locked in the process of 'theorization' that proceeds legitimation (C. R. Hinings et al., 2004:305). Perhaps, though, this should not be too surprising given the relatively early phase of the potential TEEC transition in BC.

In terms of adopting the support of an established actor, up to this point in time, BC Hydro, arguably the most established actor in the Province' electricity sector, has been very supportive of exploring ideas related to TEEC. However, the utility's recommendations advanced in its draft 2012 IRP are indicative of its limited support for TEEC. In this report, it advanced the more incremental DSM Option 3 as its operational DSM Plan, while also recommending that exploratory work continue on the

more transformative DSM Options 4 and 5. So while is supportive of advancing TEEC related research, it is not yet perceived as a legitimate operational pathway.

As to the role played by system pressures in the legitimation of TEEC, as already discussed in Section 8.3 although numerous selection pressure appear to exist, they remain poorly articulated in terms of BC Hydro's appropriate response to them. As things now stand, these system pressures are just as likely to lead to doing more of the same than moving the utility to a new energy use pathway. Furthermore, as will be discussed in Section 8.4.3 and 8.5 so far most of these pressures are top-down. TEEC advocacy from both within and external to the green buildings and low-carbon communities niches is still relatively uncoordinated.

Based the above discussion, in Table 8-3 I provide a summary of the strengths and weaknesses of each of the four indicators of the level of legitimacy afforded to pursuing TEEC. By questioning the legitimacy of BC Hydro's TEEC vision, I don't mean to suggest that the niche itself is illegitimate. It is more a question of how far its legitimacy extends and the kinds of action that it can expect to see based on its current level of legitimacy. For example, the very fact that the EC&E was established in 2006 and continues to be supported demonstrates that there is a general perception, at least among BC Hydro and members of the EC&E, that it is a desirable forum for stakeholder input into BC Hydro's expanding demand-side measure activities. Furthermore, the adoption of the EC&E's multi-level strategic framework by BC Hydro acknowledges Power Smart's recognition that in order to achieve its stated long-term goal, it will to have to think differently about how it pursues energy savings. Having said this, the fact that so many of the recommendations raised by the EC&E have been stalled for two-and-a-half years or more, while BC Hydro worked out its DSM Strategy and subsequent IRP (as will be discussed in section 8.4), indicates that without approval by the Province for BC Hydro to carry out exploratory work on DSM Options 4 and 5, the niche has likely reached the bounds of its current level of legitimacy. Looking a bit deeper, the ongoing debate about BC Hydro's handling of DSM risk raises critical questions about the perceived legitimacy of the different types of evidence used to support these arguments and whose argument is being legitimized and why. Given BC Hydro's decision to recommend DSM Option 3 in its Draft 2012 IRP, it is apparent that an underlying battle of legitimacy needed to move the idea of TEEC forward will be the one about the appropriateness of the utility's perception and handling of DSM risk. Given this information, I assess the legitimacy of TEEC within BC Hydro to be weak.

Table 8-3 Summary of TEEC Legitimacy Indicators

Indicator	*"Strong" Indicator*	*BC Hydro Strengths*	*BC Hydro Weaknesses*
Strength of Debate	New sustainability-oriented arrangements are being supported and/or adopted with little debate about the appropriateness of these actions	Appropriateness of TEEC debated not only within EC&E but also within more integrated supply-demand planning of Technical Advisory Committee	The details of this debate are still on the periphery for many actors both within and outside of the EC&E.
Delegitimizing	Pre-existing arrangements are perceived as inappropriate	A small number of actors on the EC&E and the Technical Advisory Committee are actively working to show weaknesses of how BC Hydro currently handles DSM risk.	BC Hydro's treatment of DSM risk in the Draft 2012 IRP was largely the same as it was for 2008 LTAP (i.e., less cost-effective DSM, more supply).
Adoption by Established Actor	New sustainability-oriented arrangements adopted by established actor	Development of DSM Option 5 by BC Hydro a positive step forward.	DSM Option 5 was not recommended by BC Hydro in its Draft 2012 IRP.
Multi-level shifts aligned with TEEC	New sustainability-oriented arrangement aligned with significant shifts occurring across levels.	Numerous system pressures are increasing the desirability of more ambitious levels of energy efficiency and conservation (see Section 8.2)	So far, most of these pressures are top-down. Bottom-up TEEC advocacy is still relatively uncoordinated. Supply surplus suggests less DSM.

Overall Strength: Weak

8.3.3 Resource Mobilization

Tied closely with the level of legitimacy afforded to an innovation vision are the financial and knowledge resources that are mobilized to support it. In terms of actors working to build the TEEC niche, this case study is dominated by BC Hydro and its EC&E Advisory Committee. However, the power held by these two entities differs considerably. While the EC&E contributes ideas drawn from the experiences and knowledge of its individual volunteer members as well as a degree of legitimacy to the niche, BC Hydro has almost exclusive control over the authoritative and allocative resources that hold the EC&E together.

This centralization of resources is a double edged sword. While BC Hydro's deep involvement is positive from a 'prime mover' perspective, it also makes the niche vulnerable. On the one hand, BC Hydro is arguably the most well-resourced organization in the province that is working to advance ideas about TEEC. On the other hand, the allocation of its resources is a highly institutionalized as well as a highly politicized process. Although the utility has some degree of flexibility in terms of how it allocates its resources, it must ultimately work within the parameters of its most recently approved DSM Plan. Anything that falls too far from what is contained in this Plan must either wait to be included in the next Plan or receive special approval from the BC Utilities Commission before it can proceed. For many of the recommendations advanced by the EC&E in late 2009 and early 2010, this has meant having to wait-and-see if and how they will be included in the long-term acquisition plan that will follow the 2012 IRP (see Table 8-5). If the Province decides not to approve BC Hydro's recommendation to expend $7 million in

resources to advance DSM Option 4 and 5, it is very likely that these recommendations will remain stalled for the foreseeable future.

One critical resource controlled by the individual members of the EC&E (and the organizations that many of them represented) was the time that they volunteered to the committee. The only reimbursement made by BC Hydro to individual members was for their personal travel costs. As a result, some members were less resourced than others to participate in an ongoing and meaningful manner. As a considerable amount of the EC&E agenda is driven by its members, those members that were better resourced to participate on a regular basis also tended to drive the agenda more. The fact that some members have a greater capacity to participate in and direct the proceedings of the EC&E points to an imbalance in the relational powers between different EC&E members that is not being addressed by BC Hydro.

Another challenge that the niche faces from a resource mobilization perspective, is the low level of interdependency that exists between its members. Other than their shared connection to BC Hydro, there is little reason for most members of the niche to work with one another in order to continue to fulfill the primary roles that they carry out outside of the niche. This makes coordinating a shared response to BC Hydro's own set of system pressures very challenging. It also helps to explain why, other than the time volunteered by EC&E members, BC Hydro is the niche's sole provider of allocative resources. On the upside the independency of EC&E members meant that the coming and going of different representatives over the course of six-years did not seem to hinder its progress.

Based the above discussion, in Table 8-4 I provide a summary of the strengths and weaknesses of each of the three indicators of resource mobilization for pursuing TEEC by BC Hydro. From this, we see that although BC Hydro has played an integral role in supporting the advancement of ideas pertaining to TEEC, at least two resource issues related to the hard-governance infrastructure in which the EC&E is embedded need to be explored: 1) how can the flow of resources from BC Hydro be timed more appropriately with initiatives raised by the EC&E?; and 2) how can the power afforded to individual members be more equitably distributed? Given this information, I assess BC Hydro's efforts to mobilize resources for pursuing TEEC to be moderate to weak.

Table 8-4 Summary of Resource Mobilization Indicators

Indicator	*"Strong" Indicator*	*BC Hydro Strengths*	*BC Hydro Weaknesses*
Timeliness	The development of TEEC initiatives is ongoing and timely in terms of how smoothly initiatives flow through different phases of development.	EC&E stakeholder process supported for more than six years.	A number of EC&E recommendations have sat idle for more than three years while the updated IRP is developed.
Distribution of resources	Centralized around actor(s) with a strong transformative vision or… Decentralized in a network with a strong shared transformative vision and at least moderate system pressures	BC Hydro controls many of the resources it needs to develop its TEEC vision.	Pace and scale of resource mobilization set through a highly institutionalized and politicized process. Members who are better self-resourced tend to participate more than those who are not.
Interdependency of a network's actors	Interdependent network with a strong shared transformative vision or central actors with one or... Independent network with strong shared system pressures	Independence of EC&E members from one another means that the group is able to adapt relatively quickly to its changing membership.	Individual members of the EC&E are very independent of one another and BC Hydro, this can slow actions and decisions that need cohesion among members.

Overall Strength: Moderate to Weak

8.4 Activities

As was done in Chapter 6, in this section we look at three types of activities that the actors, ideas and resources described above are engaged in – creating new knowledge, niche-market formation and advocacy - and assess the strength of the different outcomes that are resulting from these activities.

8.4.1 Creating New Knowledge

As was done in Chapter 6, my interest in this section is in assessing the creation and application of new knowledge about how to accelerate a market transformation to TEEC in the built environment. To do this, I identify and track as many issues as possible that were discussed during EC&E meeting about how to achieve BC Hydro's long-term aspirational electricity savings objectives as they pertain to the built environment (see Column 2 of Table 8-5).

As was done in Chapter 6, in addition to listing the issues that were raised during this period, Table 8-5 also lists each issue according to five different criteria: 1) the actor group who has taken the lead on advancing them (Column 1); 2) the broad topic area to which the issue pertains (Column 3); 3) the year, according to EC&E meeting notes, it was first raised within the Committee setting (Column 4); 4) the type of social learning likely needed to address the issue (Columns 5-7); and 5) how far the issue has advanced on BC Hydro's organizational agenda since being first introduced (Columns 8-10).

In the first column, issues advanced by the Province represent a top-down agenda setting process, influences by staff and elected officials, but with some interplay between policymakers, the EC&E and BC Hydro. Issues advanced by BC Hydro, meanwhile, represents ones that have emerged horizontally through internal decision-making processes. Finally, issues advanced by the EC&E represent a bottom-up agenda setting process.

Table 8-5 BC Hydro Energy Efficiency and Conservation Issue Agenda

				Tier of Learning			Location on BC Hydro Agenda		
Source of Issue	**Issues advanced for which new knowledge is required to address**	**Topics Explored**	**Year**	**Single -Loop**	**Double Loop**	**Triple -Loop**	**Systemic**	**Institutional**	**Decision**
Province and BCUC	Smart Meters (Installation)	Technology	2007	✓					✓
	On bill financing program	Markets	2011		✓				✓
	Conservation Rates (first set)	Markets	2007		✓				✓
	DSM Planning (e.g., **minimum DSM requirement**; **prioritizing DSM** over supply resources)	Planning	2008		✓				✓
	Fuel switching/ Electrification	Net-zero	2007		✓			✓	
	Community energy efficiency planning	Markets	2007		✓				✓
	Market transformation for equipment and appliances	Markets	2008		✓				✓
	Coordination of utility DSM (strong BCUC role)	Planning	2007		✓				✓
BC Hydro	Emerging energy efficiency technologies	Technology	2007	✓				✓	
	Changes to various Power Smart DSM Programs	Markets	2006	✓					✓
	DSM **Collaboration** strategy	Strategy	2010		✓			✓	
	Community-oriented program offerings	Markets	2008		✓				✓
	A broad & deep energy efficiency work force capacity	Markets	2010		✓			✓	
	Planning for **savings from codes & standards**	Planning	2006		✓				✓
	Attribution of **codes and standards** savings	Planning	2007		✓				✓
	Transformation of BC to an energy efficient economy	Strategy	2010			✓	✓		
EC&E	Split incentives for tenets and landowners	Markets	2007	✓				✓	
	Monitoring and evaluation of **indirect** DSM measures	Planning	2008		✓		✓		
	Conservation rates (going beyond initial set of rates)	Markets	2007		✓		✓		
	Smart Meters (linking to **advanced monitoring**)	Markets	2007		✓		✓		
	Moving to an **energy-centred** perspective of EEC	Planning	2007		✓		✓		
	Building an EEC advocacy coalition in BC	Decisions	2007		✓		✓		
	Advance a long-term rates strategy & **roadmap**	Strategy	2009		✓		✓		
	DSM Planning (e.g., DSM as **dynamic and flexible**)	Planning	2007		✓			✓	
	Energy savings by **influencing** government **policies**	Decisions	2007		✓			✓	
	Advancing EEC **market** measures	Markets	2007		✓			✓	
	Multi-level DSM Strategic Framework	Strategy	2007		✓				✓
	Advance a long-term market-level strategy & **roadmap**	Strategy	2009			✓	✓		
	Advance long-term societal-level strategy & **roadmap**	Strategy	2009			✓	✓		
	Build **Net-Zero** Communities	Net-zero	2007			✓		✓	
	DSM Planning: (**Transformational** DSM Option)	Planning	2008			✓			✓

Bolded text indicates either new framing (double-loop learning) or new context (triple-loop learning)

In the fourth column, I include the year that the issue was first raised within the EC&E Committee in order to see how quickly different issues have advanced (or not, as is the case for a number of issues).

The definitions used for the different topics of learning and location on the province's agenda in columns 5-10 are the same as those defined in Section 6.4.1 of Chapter 6.

When I consolidate the information from Table 8-5, we see that not all of the issues received the same level of attention (see Figure 8-2). By looking at how far different issues have advanced on BC Hydro's agenda, we see that of the 22 issues that advanced to either the utility's institutional- or decision-agenda, 15 were issues that required double-loop learning and five were issues that required single-loop learning. By their definition, issues that require single- or double-loop learning already have relatively clear organizational homes within BC Hydro as they pertain to improving or reframing a pre-existing regime component. Such established places within the regime are less likely to exist for issues requiring triple-loop learning because they require some kind of new context within the organization. Having said this, two triple-loop issues did advance (net-zero communities and the inclusion of a transformative DSM option in the IRP). Both of these were advanced by latching them to pre-existing organizational activities. The development of a transformative DSM option was advanced through BC Hydro's planning process; while the issue of net-zero communities, was advanced through BC Hydro's Sustainable Communities Program. Although a positive outcome, if we look at the total number of issues advanced for each learning type we see that triple-loop issues were less likely to advance: 3 of the 5 triple-loop issues advanced remained on the utility's systemic agenda at the time of writing, while only six of the 21 double-loop and none of the six single-loop issues remained at this same level. Given these results, it is evident that the existing system for creating new knowledge is not as well suited to handling issues that require triple-loop learning.

Moving to who advanced the different issues, we see that although both the Province and BC Hydro placed fewer issues onto the agenda than the EC&E, they both advanced more issues onto the utility's decision-agenda. This speaks to their capacity to use authoritative and allocative resources to achieve a desired end. The EC&E, on the other hand, has little in the way of either of these resources. The exceptions to this pattern are the two issues advanced by the EC&E that made it onto the utility's decision agenda (the development of a transformative DSM option and the multi-level strategic framework). Again, both of these issues were advanced by latching them onto BC Hydro's well established integrated resource planning process.

Stepping down a level, the EC&E had considerably more success with advancing issues onto BC Hydro's institutional agenda. This level of success reflects efforts by BC Hydro to support a number of ideas being generated by the EC&E with resources such as staff time or the hiring of consultants.

However, even with this support more than half of the issues raised by the EC&E remained on the utility's systemic agenda.

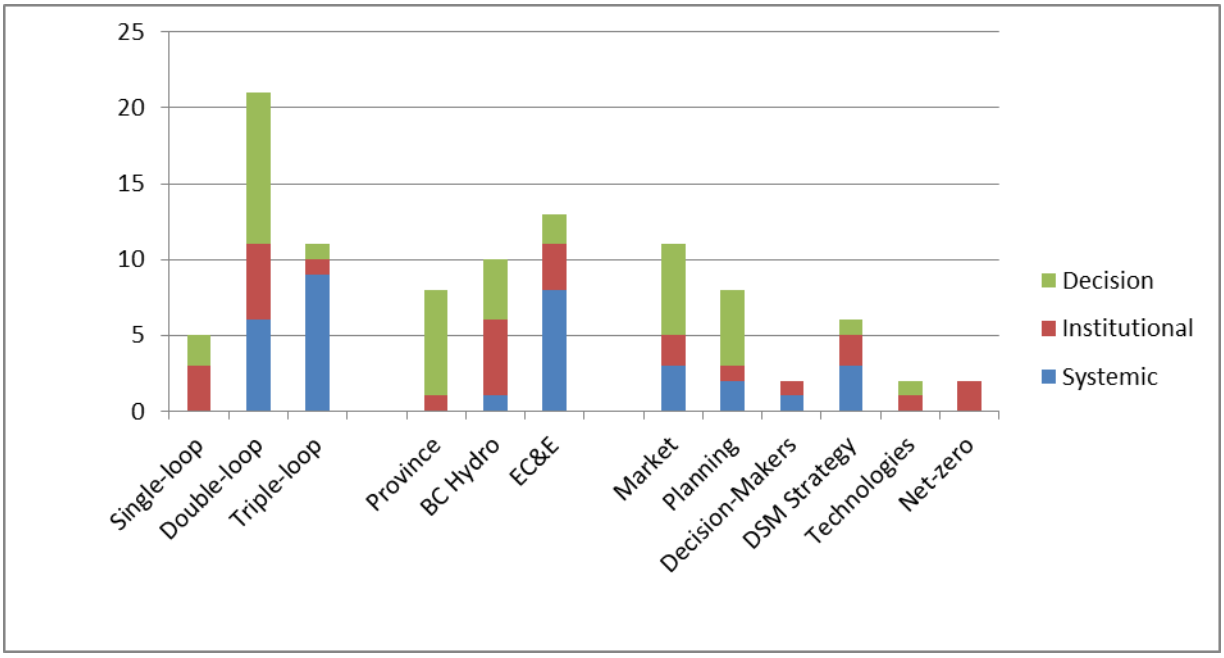


Figure 8-2 Summary of Data Included in Table 8-1

Moving to the topics explored, issues about utility planning and market parameters represent the vast majority of those that advanced onto BC Hydro's decision-agenda. This reflects the push by the Province to create the knowledge needed to address its Energy Efficiency Building Strategy and climate initiative and the coinciding need to adapt the utility's resource acquisition oriented IRP structures to better align with these policy objectives. The rest of BC Hydro's institutional- and systemic-agenda is filled with issues requiring quite a variety of topic areas. The fact that so many of the issues in these categories appeared on the utility's agenda between 2007 and 2009 shows that they are not moving particularly quickly. Furthermore, the number of strategy-related issues still sitting on the systemic agenda indicates a lack of higher-level ideas about where TEEC fits within the organization's broader objectives.

Based on the description above, a summary of my assessment of the strengths and weaknesses of BC Hydro's efforts to create new knowledge about TEEC is presented in Table 8-6. It is evident that issues requiring single-, double- and triple-loop learning were identified as necessary to address TEEC in the built environment. It is also evident that effort is being made to create new knowledge to address these issues. However, it is important to point out that just because an effort was being made to create new knowledge to address a double- or triple-loop issue does not mean that this effort was also successful. For

example, the EC&E`s Government Policy Enablers Working Group was established to learn about how to best partner and influence different levels of government to accomplish its EEC goals. However, to date the group has been ineffectual because it was mired in the technical details of a small number of market-type measures for municipalities without any clear discussion about the advocacy needed to see measures such as these advance.

Furthermore, not all issues are advancing with the same level of success. According to my analysis, there are at least three path-dependent factors that are influencing the types of issues getting attention from BC Hydro: 1) who comes up with the issue, 2) whether it requires single-, double- or triple-loop learning to address; and 3) whether the proposal could be tied to an existing program or initiative. The first of these speaks to the advantage that actors within the existing regime have to achieve their desired outcomes. The second highlights a bias toward addressing issues that fit well within the existing regime context (i.e., require single-loop or double-loop learning). And the third speaks to the advantage of linking up an issue to an idea/institution that already has resources flowing to it. However, it needs to be noted that although BC Hydro appears willing to advance next-generation type issues onto its institutional agenda, its decision-agenda is largely reserved for issues that either come directly from the Province or tie into the Province's energy efficiency and conservation policy agenda; thus tying back to the issue of who comes up with the issue. As a result of these path dependent biases, a number of more transformational issues brought forward by both the EC&E and BC Hydro have remained stalled for three years or more. Given this information, I assess BC Hydro's efforts to create new TEEC knowledge to be weak to moderate.

Table 8-6 Summary of Indicators for the Creation of New Knowledge

Indicator	*"Strong" Indicator*	*BC Hydro Strengths*	*BC Hydro Weaknesses*
Tier of learning pursued	Most double- and triple-loop issues advanced onto the institutional or decision agendas.	A significant number of double-loop learning issues, suggesting BC Hydro is changing its context for how it thinks about and approaches DSM (most noticeably toward a market transformation framework).	A limited number of issues requiring triple-loop learning advanced, suggesting that considerable work needs to be done on creating knowledge about societal-level aspects of BC Hydro's TEEC vision.
Diversity of perspectives	A relative equal ratio between the number of issues advanced by each actor and the number of each actor's issues on the institutional and decision agendas.	Almost half of the TEEC-related issues raised by the EC&E advanced onto BC Hydro's institutional or decision agenda.	Disproportionately low number of TEEC-related issues raised by the EC&E advanced onto BC Hydro's institutional or decision agenda, when compared to the Province and BC Hydro.
Diversity of topics explored	A relative equal ratio between the number of different types of topics raised and the topics on the institutional and decision agendas	A strong blend of market-oriented and societal-oriented topics advanced onto BC Hydro's institutional agenda.	The decision agenda is dominated by more immediate topics relating to market transformation and BC Hydro planning issues related to supporting this new context.

Overall Strength: Weak to Moderate

8.4.2 Development of a Niche Market

The next transition activity I look at in my assessment of BC Hydro's efforts to steer TEEC in the built environment is its level of success in developing niche markets for TEEC. As was the case with Chapter 6, my framework distinguishing between three tiers of policy measures: regulated performance baselines, (dis)incentives, and voluntarism and information. In Table 8-7, each policy measures is assigned a rank – zero, weak, moderate, or strong - that coincides with the ranking scale developed in Chapter 3 (Section 3.3.3.2).

Table 8-7 Summary of Niche Market Development Indicators

Indicator (Energy Policy Type)	*Niche Formation Action Tier*	*Description of Existing Activity*	*Strength of Indicator*
Command-and-control regulations[15]	1	Power Smart's policies, codes and standards team support all levels of government with information & technical expertise. Limited indication of the rate or direction of future updates.	Weak
Cap and tradable permits[2]	1	Nothing in place	Zero
Niche market regulation[2]	1	BC Hydro is to acquire all cost-effect DSM before new supply resources. The Province's target is 66% .Option 3, BC Hydro's recommended DSM Option for its 2012 IRP, is estimated to capture 56% of estimated demand growth by 2020 (with LNG). However, opportunity for Ministry of Energy to require more as well as for judgment of appropriateness to be made by BCUC.	Weak-to-moderate
Financial disincentives[16]	2	Conservation rates – marginal price signal kicks in at a generic level of consumption. No indication of future rate plans.	Weak
Financial incentives	2	Multiple Power Smart programs. Programs focusing on community- and building-level savings. No fuel-switching programs.	Moderate
Voluntarism and information	3	Power Smart marketing and education campaigns, consumer engagement, community energy and emissions plans, community energy managers, upstream decision-makers.	Strong

Overall Strength: Weak

To date, the development of niche EEC markets by BC Hydro is largely done by financial incentives and voluntarism and information (see Appendix C). In recent years, there has been an increase in residential- and commercial-sector programs built around savings from community and building efficiency gains (as opposed to more conventional programs that seek energy savings from discrete energy-use technologies such as appliances and equipment). Part of this push has been an increase in the

[15] The authority to set these policies is held by various levels of government.

[16] Any major design change to BC Hydro's existing conservation rates will likely require a directive from the Province.

channels and messages that it uses to share information with key energy-decision makers in the built environment (e.g., community energy managers, organizational energy managers, architects, and developers). Some of the channels used to share information include education, training, technical support, and plan development in addition to more generic mass marketing campaigns.

On the incentive side, in 2012, savings from BC Hydro's four building efficiency programs accounted for a little more than 50 per cent of the actual electricity savings attributed to Power Smart's residential and commercial programs (BC Hydro, 2012d). This level of commitment will likely increase over the next few years as these current programs are based on the 2008 Long-Term Acquisition Plan which is somewhat less ambitious than the DSM Plan recommended in the Draft 2012 IRP. In addition, for some aspects of these programs, there has been a push to move beyond a no-strings attached voluntary nature, to requiring certain actions related to energy use to be taken as a prerequisite to receiving further benefits. From a niche formation perspective, this is a step up from conventional DSM programs because it requires a specific action or set of actions to be taken first in order for a market participant to gain access to a particular suite of voluntary benefits. While continuing to encourage more generic energy efficient technologies and practices to be adopted, it also effectively creates a protected space for the prerequisite activity.

So for customers who are already using electricity, BC Hydro is expanding the range of building-level efficiencies that it is trying to influence through its programs. However, it is being less proactive when it comes to developing niches for energy services that do not currently use electricity as a fuel input. According to Section 18 of the 2010 Clean Energy Act, utilities are permitted to develop rate-payer funded programs for the purpose of reducing greenhouse gas emissions in British Columbia. Fortis BC, for example, started a program to switch heavy vehicles from diesel fuel to less carbon intensive natural gas. Although BC Hydro is able to develop similar fuel-switching opportunities (e.g., oil-based space heating to ground source space heating), it has so far not developed any such programs. As a result, the range of niches that it is developing through its programs is more limited than it may need to be.

Since 2007, BC Hydro has added electricity conservation rates as a financial disincentive for using electricity. However, the existing rates are relatively weak as a means to encourage an EEC niche because no consideration is given to the context in which electricity is being used (e.g., number of square feet per person, building type). Instead, a generic level of total kilowatt-hours per month is used for all customers as the measure for when the marginal rate comes into effect. A stronger conservation rate suggested by the EC&E would see the rate signal for the marginal cost of supply shift from a generic level of total kilowatt-hours per month to one that is sub-sector and building specific. Such a rate would send a pricing signal to all electricity consumers and likely encourage the growth of the province's energy

services sector (i.e., the sector of the economy providing energy efficiency and conservation solutions to rate payers).

In terms of policy measures that require an energy performance baseline, BC Hydro is limited in what it can do although it does provide active support to all levels of government with regards to setting energy-efficiency related policies. It does, however, have some more direct control over two areas of regulation: 1) the Province's policy for BC Hydro to pursue all cost-effective DSM before acquiring new supply, and 2) the Province's goal to have BC Hydro meet at least 66% of its expected increase in demand by 2020 with DSM and conservation (Province of British Columbia, 2010). The first of these seems to have had a definite effect on BC Hydro. In its 2012 Draft IRP, the utility, for the first time, recommended for its DSM Plan the upper limit of its estimated "achievable" economically-feasible savings.

However, the effect of the second policy goal is less clear. Prior to the winter of 2012, the 66% target was largely irrelevant from a planning perspective as BC Hydro's existing plan (DSM Option A from its 2008 LTAP) was expected to perform well above this level of savings. However, the Province's announcement in February 2012 to pursue the development of liquid natural gas processing facilities over the next decade sharply increased BC Hydro's projected demand for electricity. Prior to the LNG announcement, all but one of the five DSM Options assessed for BC Hydro's 2012 IRP were expected to exceed the 66% target (See Table 8-8); when the new LNG load is taken into account, all of the DSM Options are estimated to fall considerably short of this target. However, as there are no measures in place to penalize the utility for not meeting the Province's 66% target, it is questionable how much of an impact it actually has on the utility's recommended plan. Having said this, it does at least provide a point of reference for the Province (who decides on the appropriateness of BC Hydro's IRP) as well as for interveners who participate in the public hearings held by the BCUC for BC Hydro's rate and expenditure applications. Although this provides some discursive strength to those who want the utility to pursue more DSM, I ranked it as weak-to-medium because of the existing uncertainty around how closely it must be followed.

Table 8-8 DSM Savings as a Percentage of Load Growth

DSM Options	Accumulated Savings from DSM by 2021 (GWh)	Percentage of Increase in Demand Captured by DSM with no LNG Load	Percentage of Increase in Demand Captured by DSM with LNG Load
Option 1	8,392	65%	48%
Option 2	9,348	71%	53%
Option 3	10,109	76%	56%
Option 4	10, 260	78%	58%
Option 5	10,388	78%	58%

Based on the above discussion, most of BC Hydro's strength for developing niche markets currently comes from its voluntarism and information and incentive programs. According to utility market transformation strategies, these activities are important for "priming" the market for higher-tired regulated energy performance standards and codes. However, the timing and level of updated energy performance standards is ultimately set by either the provincial or federal governments. Furthermore, since BC Hydro's DSM Plan is closely tied to advancing already announced codes and standards, the bulk of its efforts are generally focused on supporting the next incremental round of these. While this is positive from the perspective of long-term market transformation, there is far less capacity in BC Hydro's arsenal to try to accelerate more experimental TEEC niches such as super-efficient buildings. Given all of these points, I assess the overall strength of its efforts to create a niche TEEC market to be weak.

8.4.3 Advocacy

Advocacy is the process by which an individual or a group tries to influence policy and resource allocation decisions. As BC Hydro is one of BC's most powerful actors in terms of influencing how energy is produced and used, there are numerous entities trying to influence its policies and resource allocation decisions. At the same time, as BC Hydro pursues more ambitious levels of electricity savings, it acknowledges that its ability to achieve these savings becomes more reliant on the types of policies and resources allocated by all levels of government[17]. As a result, BC Hydro is both a target and source of advocacy that is directed toward advancing TEEC.

In the short- to medium-term, the energy efficiency and conservation actions that BC Hydro is able to take are strongly influenced by what is included in its Integrated Resource Plan and Long-Term Acquisition Plan. As a result, there is considerable formal advocacy that occurs around the processes that lead to these documents. In addition to these more closed-ended processes, BC Hydro's EC&E Advisory Committee provides another venue for actors to try to influence the utility's energy use policies and resource allocation decisions.

My review of the organizations and individuals who participated in the BCUC hearings for the 2008 LTAP, the EC&E or the Technical Advisory Committee for the 2012 IRP, gives a good indication of the number and range of actors who actively advocate to BC Hydro. In total 27 organizations or individuals participated in at least one of these processes. Of these nine actively participated in at least two of these processes (See Table 8-9).

However, not all of the actors who participated in these processes were interested in transformative energy efficiency and conservation. For example, a review of the final written statements submitted by organizations that intervened in the 2008 LTAP process shows at least four different

[17] This correlation between higher savings and rising regime interdependency is also reflected in the five DSM Options developed for BC Hydro's 2012 IRP.

positions being advocated on the appropriateness of BC Hydro's proposed DSM Option A. In the end, organizations who advocated for a more ambitious DSM Plan achieved a partial victory. Although the Commission approved BC Hydro's plan to pursue DSM Option A, it also ruled that for its next LTAP BC Hydro needed to do more work on demonstrating that all cost-effective DSM was being pursued. This ensured that issues raised by those concerned about the appropriateness of BC Hydro's DSM risk assumptions and mitigation strategies would at the very least be advanced to the utility's institutional agenda. This also demonstrates the power that the BCUC had in influencing TEEC prior to the passage of the Clean Energy Act. Under the Clean Energy Act, the power to decide on the appropriateness of BC Hydro's IRP now rests with the Minister of Energy who, unlike the BCUC, has no public deliberation requirement.

Table 8-9 Organizations or Individuals Who Actively Participated in Two or More BC Hydro Processes

Organization/Representative	Interest	2008 LTAP	EC&E	TAC for 2012 IRP
1. Clean Energy Association (Formerly Independent Power Producers of BC)	Energy – Private Producers	☑	☑	☑
2. Fortis BC (formerly Terasen Gas)	Energy – Gas Utility	☑	☑	☑
3. Association of Major Power Consumers (formerly Joint Industry Electricity Steering Committee)	Consumers – Industrial	☑	☑	☑
4. Commercial Energy Consumers	Consumers – Commercial	☑	☑	☑
5. British Columbia Sustainable Energy Association	ENGO	☑	☑	☑
6. First Nations Representative(s)	Government - First Nations	☑	☑	☑
7. Canadian Office & Professional Employees Union (COPE)	Energy – Utility Employees	☑		☑
8. Pembina Institute	ENGO		☑	☑
9. Ministry of Energy and Mines	Government – Province		☑	☑

Although BCUC hearing processes, such as the 2008 LTAP, provide a venue for advocates of TEEC to express their views on the proposed BC Hydro DSM Plan, they are limited both from a time and a deliberation perspective. These hearings are held for a few months every few years after BC Hydro files its complete LTAP proposal to the Commission. Given that the Plan is already well formulated and that the process is intended to inform a final decision on how hundreds of millions of dollars will be spent, the stakes are high to say the least. Not surprisingly, then, these deliberations are generally highly adversarial. At such a late stage in the decision-making process, there is also little room for recommendations to be advanced and acted upon to alter the Plan's course in any significant manner.

Contrasting the LTAP process is BC Hydro's EC&E Advisory Committee. In addition to working with BC Hydro to create new knowledge, the EC&E also made recommendations to the utility throughout

the planning process regarding the direction that it would like to see it take on a number of electricity efficiency and conservation related ideas. Without the pressure of an imminent system-wide decision in the lurch, BC Hydro is able to take these recommendations into consideration and determine how to respond and what course of action, if any, is needed to address it.

In addition to more informal recommendations made during deliberations, the EC&E also submitted a number of formal recommendations to BC Hydro (see Table 8-10). Formal recommendations are ones that were written and submitted to BC Hydro by the Committee for an official response. The dates beside each of the recommendations included in Table 8-10 are when they were submitted.

In all but one case, the decision by the EC&E to advance these recommendations to BC Hydro was a consensual one. However, based on my observations, the genesis for the vast majority of the recommendations came from a subset of members who sit on the EC&E's Strategic Framework Working Group and/or its Rates Working Group. What is more, the recommendations from these groups tended to be more strategic in scope in terms of the level of action required to address the issue at hand. Once drafted, the members of these working groups, needed to pitch the recommendations to the broader EC&E membership and rework them until they were in a form that was satisfactory for nearly all of the members to endorse.

My look at the formal recommendations put forward by the EC&E since 2006 revealed that they generally asked BC Hydro to take one of five types of actions: advance strategic-level work; advance research on a number of specific tactical measures; make changes to BC Hydro's planning institutions; adopt specific roles to help advance its long-term energy efficiency and conservation objectives; and in one case to desist with a specific operational-level decision. Although in most cases BC Hydro responded favourably to these recommendations, I wanted to see how far each one advanced on the utility's policy agenda (i.e., systemic agenda, institutional agenda, and decision agenda). As discussed in Chapter 3, a systemic issue is one that at some point in time was at least taken under consideration by decision-makers for further action. Meanwhile, an issue on the Province's institutional agenda is one for which some level of action was taken to explore it further (i.e., resources were mobilized). While an issue on the decision-agenda is one for which an informed decision was made or is about to be made about whether or not to implement it. Each recommendation was ranked according to BC Hydro's formal response to them as well as any evidence of a subsequent effort to address them.

Table 8-10 Formal Recommendations Forwarded to BC Hydro by the EC&E Advisory Committee

Type of Action	Specific Action Requested (dates requests were made)	Systemic	Institu-tional	Decision
Advance strategic-level work	Adopt **multi-level strategic framework**: individual, market, societal lenses on tactics (Sep 2007)	✓		✓
	Expand research on understanding and identifying **market parameters** that influence energy use and develop a plan to address these parameters (Sep 2009)			
	Develop budget & plan to pursue **societal initiatives** (Sep 2009)	✓		
	Give Rates Working Groups a mandate to pursue ongoing long-term **rate development** (Mar 2008)		✓	
	Develop long-term **rate design** strategy along with resources to support process (Apr/ Jun 2010)	✓		
	Embark on multi-year process of **rate experimentation & innovation** (Apr 2010, Jun 2010)	✓		
	BCH needs to assess, prioritize and rank **concepts** developed in rates charette (Apr 2010, Jun 2010)	✓		
	Work on **tax measures and split incentives** should be pursued by the EC&E and government	✓		
Advance tactical-level Work	Include two **rates** put forward by working group in residential rate review process. (Jul 2007)		✓	
	Pursue all existing & potential **market related** projects in list presented by BC Hydro (Jul 2008)		✓	
	Pursue all of consultant's **market-level** recommendations (Sep 2009)	✓		
	Pursue all tactics included in consultant's **market-level** evaluation (Sep 2009)		✓	
	Move as many potential **distributed generation** projects forward as possible (Jul 2008)			✓
	Pursue all five tactics listed in the **Split Incentive** Working Group's report (Jun 2010) – one leading to the government's on-bill financing legislation		✓	
Make changes to BC Hydro's planning institutions	**Expand codes & standards focus** more generally to policies (such as local government efforts, despite their limited jurisdiction) (Sep 2007)			✓
	DSM needs to be considered **equal to supply** (Jul 2007, May 09, Feb 2011)			✓
	Multiple DSM pathways need to be explored (July 2007, Sep 07, May 2009)			✓
	Process for how BC Hydro responds to **EC&E recommendations** needs to improve (May 2008)			✓
	DSM flexibility & resiliency needs to be factored in Integrated Resource Plan (Jan 2009, Feb 2011)	✓		
	Incorporate **adaptive management** approach into next Plan (May 2009)			✓
	Articulate electricity savings with **greenhouse gas emissions** (Sep 2009)			✓
	BCH needs to integrate **conservation rate concept**s from rate charette with more immediate rate design process (Apr 2010, Jun 2010)			✓
	Ensure DSM Option included in IRP that relies on **market & societal** level measures (Feb 2011)			✓
Adopt roles to advance EC&E in the Province	Continue existing technical & financial support role for **codes & standards** (Sep 2007)			✓
	Expand role in codes and standards to building an **advocacy coalition** & public support (Sep 2007)	✓		
	Lead creation of **advocacy coalition** (Sep 2009)	✓		
	Identify, develop & communicate **alternative scenario of societal change** (Sep 2009)	✓		
Desist with an operational decision	EC&E does not support BC Hydro's residential inclining block **rate** as it is viewed as not promoting conservation. (Sep 2007)			Bypassed by BCUC ruling

✓ - level of advancement, (month, year) – date that the recommendation was advanced

When I do this, we see a clear discrepancy in the level of attention received. In all but a few cases, the EC&E recommendations that advanced to the highest level of the organization's agenda (i.e., its decision-agenda) are the ones that pertained to making changes to its planning institutions. In almost every case, the ideas contained within these recommendations were elevated to the utility's decision-agenda via the 2012 Integrated Resource Planning process.

As discussed above, BC Hydro's approved DSM Plan holds considerable dispositional powers in terms of structuring Power Smart's authoritative and allocative resources. Looking at the specific planning-focused recommendations included in Table 8-7, it is clear that the overall objective is to expand the authority and resources allocated to DSM in BC Hydro's Integrated Resource Plan. If successful, the changes should expand the places within Power Smart for pursuing many of the other issues advanced by the EC&E (and others).

In Table 8-10, we also see that there has been a moderate level of action taken on the tactical level ideas advanced by the Committee. In this case, one recommendation pertaining to distributed generation pilot projects advanced to the organization's decision agenda and the bulk of the others, that pertained to very specific program-related DSM measures, advanced to the institutional agenda .

Despite these gains, recommendations to advance strategic-level ideas or for BC Hydro to adopt new roles for advancing TEEC in the province have, for the most part, not advanced beyond the organization's systemic agenda. The explanation given for the delay on many of these ideas is that they need to be built into an approved IRP and LTAP before BC Hydro can act on them in any substantive manner.

The request to not establish a particular electricity rate because in the Committee's view it did not promote conservation was not followed because the utility was ultimately told by its regulator to adopt the rate in question.

Another important space for advocates of more ambitious energy efficiency and conservation measures was BC Hydro's Technical Advisory Committee for its 2012 IRP. Public records of TAC meetings show that many of the planning-related ideas recommended by the EC&E were also brought up during TAC discussions. Perhaps this is not surprising given that many of the organizations with representatives sitting on the TAC also have representatives sitting on the EC&E. This spillover of ideas, however, is important because it demonstrates how some of the ideas that are being worked out in the EC&E can scale up to more formal planning processes. It also demonstrates the value of having a Committee that looks more in depth into energy efficiency and conservation matters than would be possible by the TAC because of its time and agenda constraints.

Given all of these factors, how strong is the advocacy supporting TEEC (see Table 8-11)? From a utility planning perspective, it appears to be quite strong, particularly given that so many of the EC&E's

planning-oriented recommendations to BC Hydro were applied during the 2012 IRP process. We also see a significant amount of movement on topics related to tactical-DSM initiatives. The fact that many of these have not moved to BC Hydro's decision-agenda is in part because they reflect "next" generation type ideas. However, since 2010, the EC&E has been less successful in maintaining the momentum for its tactical-ideas, not to mention those relating to TEEC-oriented strategy and advocacy development. Given these results, the overall strength of the advocacy of BC Hydro's TEEC niche is moderate.

Table 8-11 Summary of Advocacy Indicators

Indicator	*"Strong" Indicator*	*BC Hydro Strengths*	*BC Hydro Weaknesses*
Number of topics addressed	At least half of the issues have made it to the institutional or decision agenda.	More than half of the recommendations advanced by the EC&E advanced onto BC Hydro's institutional or decision agenda.	Nearly half of the recommendations made are still awaiting advancement onto BC Hydro's institutional agenda.
Timeliness	Time between issues being first raised and picked up and advanced on the organizational agendas of key actors is relatively short (1 to 2 years).	Recommendations relating to planning have kept pace with BC Hydro's IRP process.	Many recommendations have sat idle for more than two years.
Diversity of topics addressed	A relative equal ratio between the number of different types of topics raised and the topics on the institutional and decision agendas	Planning topics advancing to decision-agenda. Tactic-oriented topics advancing to institutional agenda.	Topics pertaining to developing a strategic shift toward TEEC and advocacy are not advancing.

Overall Strength: Moderate

Despite successes such as these, I need to be careful to not call the EC&E an advocacy coalition. Sabatier (1998, p. 103) defines an advocacy coalition as being "composed of actors from various governmental and private organizations who both (a) share a set of normative and causal beliefs and (b) engage in a non-trivial degree of co-ordinated activity over time." In addition to including actors who on first blush are natural allies of advancing energy efficiency and conservation, such as environmental organizations and First Nations, it also includes a number of actors who may be threatened by the expansion of BC Hydro's energy saving efforts, such as independent power producers and other utilities. Given the persistent aversion of at least two EC&E members to stronger TEEC measures, the beliefs of its members are arguably too diverse to meet Sabatier's definition.

Given its diversity, I found that EC&E members advocated to one another as much as they did to BC Hydro or other potential decision-makers. A benefit of this intra-niche advocacy is that it has the potential to increase the learning and thinking of a far broader set of interests and decision-makers than might happen within a strictly advocate coalition setting. On the flip side, it may limit or stall action on those issues that are viewed as more controversial or experimental. Although we see evidence of both of these outcomes in my case study, it is also true that all but a couple of the recommendations advanced to BC Hydro from the EC&E received the full endorsement of the membership. For those that received near

consensus support, the recommendations were still advanced but with a disclaimer explaining that it was not endorsed by all members[18].

8.5 Actor-Networks

In this section, I assess the strength of BC Hydro's actor-network for steering TEEC. To help me differentiate between the three indicators for actor-networks that were established in Chapter 3 - the diversity of communities-of-learning, the diversity of actors participating in communities-of-learning, and prime movers – I assess each of these separately throughout this section. The reason for this change in format is to reflect the nested nature of these three particular indicators.

Communities-of-Learning

To be considered transformative, actors seeking to steer TEEC must look beyond what currently exists to thinking about how the energy services regime, or at least major components of it, might be radically changed. Within BC Hydro, the EC&E Advisory Committee represents a hub for advancing such transformational thinking. In its earliest days the EC&E was a blend between a stakeholder project team assembled by BC Hydro to help it achieve its more immediate electricity savings objectives and a network for exchanging preexisting knowledge about more ambitious levels of energy savings. As a network, the EC&E mutually negotiated both the challenges implied in BC Hydro's aspirational 20-year savings target as well as the strategic approach BC Hydro would need to take to address it.

Once the parameters of BC Hydro's long-term aspirations were negotiated by the members of the EC&E, the Committee next sought to produce and evaluate new knowledge about TEEC through the intentional selection of research-related projects. These types of objectives are reflective of an epistemic community-of-learning. To pursue these projects, many of BC Hydro's internal functional groups played an important role in generating and sharing information. In addition to the functional groups, for a number of research areas the EC&E began to organize itself into project teams. The project teams consisted of consultants, EC&E members, project-specific stakeholders and BC Hydro staff members. Updates and findings from these projects were reported to the EC&E over a two year period.

In addition to developing a shared agenda for pursuing BC Hydro's aspirational electricity savings target and trying to develop and codify new knowledge about the types of measures needed to achieve it, by late 2009, the EC&E also took on some characteristics akin to an advocacy-oriented community-of-practice. It did this by first putting forward a number of detailed recommendations to BC Hydro based on the knowledge produced during the previous two years. Then, throughout the 2012 IRP process it pushed the utility to change how it thought about and planned for long-term electricity savings.

[18] An example of a recommendation that did not receive full consensus was one for BC Hydro to pursue a number of actions intended to advance TEEC through "societal-level" changes.

Despite the advancement of a shared set of recommendations, as indicated in Section 8.4.3, I need to be careful to not think of the EC&E as an "advocacy coalition". Although many actors within the EC&E were consistently supportive of encouraging BC Hydro to do more to pursue its aspirational electricity savings goal, there was a small number of members who were just as consistently wary of BC Hydro pursuing this stated goal. Further to this, although nearly all recommendations advanced by the Committee received consensus, only a subset of the members were *actively* engaged in building the background knowledge and support needed to get them to the point where a decision could be made about whether to advance them or not to BC Hydro. These members also tended to be the ones who were most supportive of pursuing TEEC. This more proactive subset of members within the EC&E is more accurately thought of as a shadow advocacy coalition within the broader Committee. Part of the success of this coalition is likely due to the fact that it consisted of members who represented a reasonable cross section of interests. Although the individuals differed from one issue to the next, this advocacy coalition was most consistently represented by environmental, youth, academic and commercial consumer members.

In many regards, then, the EC&E filled the role of multiple communities-of-learning from 2006 to 2012. However, I could not find any evidence of a TEEC application-oriented community-of-practice between EC&E members nor between the EC&E and BC Hydro. Given that this is more of a policy-niche, perhaps this omission should not be surprising. However, there may be some missed opportunities here, particularly between BC Hydro's functional groups and teams and members of the EC&E. For example, although BC Hydro's DSM Option 5 emerged from a recommendation advanced by the EC&E, the work undertaken to develop this Option was carried out exclusively by BC Hydro staff. It was not until the Option was fairly well developed before it was brought back to the EC&E for comments. Given the strong influence of engineering and energy economics on utility planning, the Option developed was strongly reliant on market-based measures and technological change. While these aspects will likely play an important role in any TEEC future, it missed the mark on more "societal-level" measures such as land-use planning and cultural shifts. It is possible that a deeper collaboration between the two groups (or at least between some members of these groups) could have captured some of these other ideas as well.

Another shortcoming with the existing actor-network arrangement is its lack of a persistent experimentally-oriented epistemic community-of-learning. Although the EC&E tried to fill this role for some period of time, many of the recommendations that came out of the first round of intentional learning required subsequent rounds of experimentation, evaluation, codification and so on. However, there is no process in place to carry out such work on an ongoing basis.

Diversity of Actors

As discussed in Chapter 7, the EC&E represents a broad range of stakeholder interests relating to BC Hydro's energy efficiency and conservation practices in BC (see Appendix A for a full listing of EC&E members in 2007). Even so its makeup still missed members from a number of key sectors related to how energy services are fulfilled in the built environment. These include, among others, building design and construction, developers, urban planners, energy services, and residential consumers. In addition, of the members who do participate, a number were consistently less represented, including all levels of government, First Nations and academia. Although these omissions likely have more to do with the willingness or availability of these actors to participate than it does with BC Hydro's willingness to have them participate, it nevertheless indicates a gap in the existing actor-network. If TEEC requires structural and cultural changes in how I build and interact with one another within the built environment, the participation of those actors with resources dedicated to the planning and building of these spaces is critical.

Prime Mover(s)

In Chapter 3, I argue that prime movers (i.e., actors with a strong capacity to exercise allocative and authoritative resources within and outside of the niche), are critical to transition niches because they are well situated to accelerate both the niche's legitimacy and development. Looking at the EC&E membership, there are a number of actors with the potential to play a prime mover role; these include BC Hydro, Fortis BC, the federal and provincial governments and the Association of Major Power Consumers of British Columbia (at least for industrial energy efficiency and conservation). Of these, BC Hydro was the only organization to step up in this role at least as far as the EC&E policy niche was concerned. Given that this niche was formed by BC Hydro, this should perhaps not be surprising. However, what is easy to overlook is the fact that so much of the Committee's efforts were focused on the question of how to achieve BC Hydro's aspirational target. This focus says a lot about the utility's (or at least Power Smart's) desire to achieve this target.

In terms of where the rubber hits the road, in addition to supporting the operational component of the EC&E, all of the strategic agenda building, research, and advocacy activities that were undertaken by the EC&E were supported with BC Hydro resources. The flow of these resources to the EC&E in turn hinged on the ongoing support of these processes by Power Smart's Senior Management. Although there are a number of examples of how BC Hydro's staff supported the EC&E process, one of the clearest examples is when the appropriateness of pursuing BC Hydro's aspirational target was strongly challenged by one of the EC&E's more powerful members (both in terms of who s/he represented and her/his capacity to participate both discursively and organizationally) shortly after the Committee was first

assembled. This suggestion was swiftly and explicitly denounced by one of the most senior executives of the utility who was present at that particular meeting. Although this issue was raised again from time to time, one of the responses to it by BC Hydro staff was a reminder of the comments made by the BC Hydro executive about the appropriateness of directing the Committee toward helping the utility achieve its aspirational objective.

What is less certain, though, is Power Smart's influence beyond BC Hydro in terms of advancing the ideas and initiatives pursued by the EC&E. In terms of BC Hydro's efforts to advocate TEEC to other decision-making authorities, this is being done largely by Power Smart's Policies, Codes and Standards Team and its Sustainable Communities Program. Rather than actively lobbying for one set of policies over another, the primary function of these two entities is to provide technical information and expertise to various levels of government who are interested in exploring and possibly advancing energy efficient and conservation policies and programs. The focus of these efforts, though, is more incremental in nature than transformational.

Another intended avenue for trying to influence government decision-makers was the establishment of the EC&E`s Government Policy Enablers Working Group. To date, though, the group has been ineffectual. Although assembled to provide BC Hydro with recommendations as to how to best partner and influence different levels of government to accomplish its EEC goals, the group has instead been mired in the technical details of a small number of market-type measures without any clear discussion on the advocacy needed to see measures such as these advance.

So while individual members of the EC&E may externalize certain aspects of the ideas and initiatives developed (such as the Province's on-bill financing policy which was spurred by an EC&E market-focused study), there does not appear to be a coordinated effort to do so by a prime mover.

In Table 8-12 I summarize the strengths and weakness of BC Hydro's actor-network. On the surface, all three indicators are positively represented by the existing orientation of the EC&E within BC Hydro. However, when I scratched a little deeper we see that the EC&E's capacity is stunted by the limited breadth and depth of all three of these indictors. Given these factors, I find BC Hydro's actor-network to be moderate-to-weak in strength.

Table 8-12 Summary of Actor Network Indicators

Indicator	*"Strong" Indicator*	*BC Hydro Strengths*	*BC Hydro Weaknesses*
Diversity of communities-of-learning.	All four higher-order TEEC communities-of-learning are active and ongoing (i.e., networks, application-oriented communities-of-practice, advocacy-oriented communities-of-practice, and epistemic communities)	EC&E adapted its role to reflect numerous types of communities-of-learning (i.e., network, advocacy-oriented community-of-practice; epistemic community).	Lack of an application-oriented TEEC community-of-practice between the EC&E and BC Hydro Short-lived experimentally-oriented epistemic community-of-learning
Diversity	Broad range of energy-services and governance regime actors participating in the different communities-of-learning.	EC&E membership reflects a relatively broad range of stakeholders	Lack of representation, particularly from building and energy services sectors, residential customers and urban planning. Inconsistent representation from local governments, First Nations, federal government, and academia.
Prime Mover	Prime mover is active in advancing niche both internally and externally	Power Smart within BC Hydro.	Other than a few isolated issues (e.g., on-bill financing by the Province), it is difficult to see evidence of the TEEC ideas generated within the EC&E moving beyond BC Hydro.

Overall strength: Weak to Moderate

8.6 Conclusion

By looking in turn at each of the conditions found to support transformational change in socio-technical systems (see Table 8-13), we see that there have been a number of positive developments with regards to BC Hydro's efforts to influence transformative energy efficiency and conservation in the built environment. To start with, there are multiple system pressures pushing the utility to take a more considered look at what it can do to influence how electricity is used in BC. There is also the existence of the EC&E Advisory Committee, a core and diverse group of actors who, although existing very much within BC Hydro's institutional framework and not providing input to the broader utility policy / regulatory framework (the province and the BCUC), has proven successful at prompting it to not only think differently about energy savings but to invest resources on leading edge research in this direction as well. Perhaps most importantly, the EC&E has managed to legitimate at the regime-level its ideas about how the utility needs to think about and plan for more transformative DSM. Building on this progress, BC Hydro has modeled a qualitative and quantitative picture of what its vision of what TEEC might look like in 20 years as well as a potential pathway for getting there. This marks the first time in the utility's history that such a vision has been articulated.

However, whether and how this vision is put into action remains to be seen. Although BC Hydro has recommended in its 2012 IRP that $7 million should be invested to expand its understanding of the transformative DSM Option 5 (as well as DSM Option 4), it is not certain whether this expenditure will be approved by the Province. Countering beliefs about the need to actively pursue Option 5 were deep seated values from at least two EC&E members about the cost-effectiveness and risk associated with relying "too much" on demand-side resources. These minority players see demand-side resources as less

dependable than supply-side resources and are institutionalized by a planning practice of relying less on the former and increasing the latter to mitigate these concerns. There are also concerns about the capacity and appropriateness of a utility to actively influence the market- and societal-level changes needed to influence TEEC. At the heart of these legitimacy questions are issues about what and whose evidence is deemed legitimate and credible. Critical to advancing TEEC, then, will be the validation of TEEC knowledge and the flexibility of DSM over supply-side resource options.

At a more landscape-level, over the course of my observations, I saw how the pursuit of TEEC is strongly influenced by provincial energy policy. In the heydays of the Province's climate initiative TEEC had the potential to run counter to the Province's ambitions to foster economic development through the proliferation of new sources of clean energy generation throughout BC. More recently, as the province goes through an economic slowdown and BC Hydro is forecasting a supply surplus for the next eight years, there are political concerns around the potential impact of DSM on rates. As changes at the provincial level can eliminate the whole goal of TEEC, these provincial issues play a dominate role in influencing how far and fast BC Hydro can pursue it.

Working to overcome these challenges, are many of the members of BC Hydro's EC&E Advisory Committee, a niche that was assembled by and is solely supported by BC Hydro, the regime's most dominant actor. Whether these actors are successful or not depends in large part on the continuation and likely the ramping up of this support in the years ahead.

As is evidenced from the three phases of change described in Chapter 7, the conditions supporting TEEC in the Province's electricity system were not created through a single deliberate act. Instead, they were built up through a series of events and actions that cumulated in several different regime-level institutional changes. In 2005, the institutional change was the requirement by the BCUC for BC Hydro to assemble an Advisory Committee to provide it with advice on its growing DSM program. This was followed by the adoption of the EC&E's three-level strategic DSM framework by BC Hydro which in turn helped to legitimize the need for research on the eight projects related to this framework. With the cessation of most of these projects in late 2009, the next institutional opening was the Integrated Resource Planning Process that followed in the wake of the BCUC's rejection of BC Hydro's 2008 Long-Term Acquisition Plan. By adopting at the onset of this process the planning recommendations made by the EC&E in the spring of 2009, a window was open for the first time to develop and assess the benefits and costs associated with pursuing a TEEC pathway, not as part of an academic or sustainable energy advocacy project, but as part of the mainstream energy planning process of the province's most influential electricity utility. Each of these changes allowed BC Hydro to provide its niche with expanded levels of authoritative and allocative resources to continue support its emerging ideas of what needed to be done. Furthermore, this ongoing cycle of idea generation, development and implementation signal how crucial a

role the longevity of the EC&E played in these changes, allowing BC Hydro and the EC&E to both learn and improve the quality and sophistication of their activities.

While these gains are commendable, it is evident by the lack of organizational attention and resource mobilization afforded to a number of higher-order issues raised by the EC&E as well as the limited use of higher-tier market formation policies that the idea of TEEC is nearing the end of the existing rope of legitimacy that has been extended to it by BC Hydro. If the Province agrees to support BC Hydro's recommendation to expend $7 million in allocative resources to advance work on DSM Options 4 and 5, the idea of TEEC will likely spiral up to its next level of its legitimacy. An important question in this case is how willing BC Hydro will be to extend resources to advance the higher order issues raised by the EC&E, or continue the activities of EC&E itself. Furthermore, will it be able to simultaneously support multiple communities-of-learning (something which it has thus far failed to do)?

If BC Hydro's recommendation is rejected by the Province, the strength of the niche will be measured in part by the level of debate that it is able to stir around why this recommendation was not supported. Given that such a rejection would come from the Province (which is identified as a critical tactical agent for realizing Option 5), this debate would need to critically question the role that existing cultural structures are playing in limiting the capacity of both the regime and its niche to advance TEEC. Another sign of the niche's strength in such a circumstance will be its capacity to find another institutional lever with which to try to continue building its legitimacy and mobilize resources.

What this assessment shows me, then, is that while gains have been made, BC Hydro's existing process for steering TEEC has thus far led to an incomplete set of conditions for steering a socio-technical transition. In the chapter that follows, I will use the theoretical concepts of governance developed in Chapter 2 to untangle the role that hard-governance structures played in producing these results. I will also use this theory to recommend how existing hard-governance structures might be organized differently in order to further bolster conditions that support socio-technical transitions. Just as importantly, I will discuss how some of the lessons learned from my case study can be applied to the evolving literature of transformational change.

Table 8-13 The Strength of the Conditions Supporting Transformational Change in 2012

Supporting Condition	Strength	Explanation for Assigned Strength
System pressures	B	• Strength: Multiple system pressures exist; pressure was particularly coherent when reinforced by rising marginal supply costs and large projected supply gap. • Weakness: Incoherency between Province's "clean" energy objectives and least cost resource planning, also between strategic and operational objectives of BC Hydro; Province's objectives translated into GHG reductions while BC Hydro's translated into energy savings caused confusion given BC Hydro's clean energy profile.
Shared Vision	B	• Strength: Distinct vision was strong enough to attract and hold EC&E Committee and preliminary planning resources with the potential for more as per draft IRP. • Weakness: Only one path to vision mapped (DSM Option 5); DSM Option 5 is very technology and economic focused; Problems identified from vision need a strategy.
Legitimacy	C	• Strength: Most within EC&E support concepts within DSM Option 5; resources recommended to develop DSM Option 5 further; some actors on EC&E and Technical Advisory Committee working to delegitimize existing handling of DSM risk • Weakness: BC Hydro not ready to recommend DSM Option 5 for operationalization; Supply surplus puts strain on DSM argument; BC Hydro's handling of DSM risk has not changed much from 2008 LTAP
Resource Mobilization	B-	• Strength: BC Hydro has resourced EC&E Committee since 2006 as well as developed its detailed DSM Option 5 scenario as part of its formal planning process. • Weakness: BC Hydro resourcing was limited to its most recently approved DSM Plan which leaves little room for developing unexpected ideas and directions. Resource capacity of EC&E members to participate on a regular basis varied considerably.
New Knowledge	C+	• Strength: New knowledge about issues that required double- and triple-loop learning was created and implemented; nearly half of EC&E issues advanced. • Weakness: Favourable treatment given to issues by the Province and BC Hydro; focus tended to be shorter-term, many "next" practices/strategies issues stalled.
Niche Market Formation	B-	• Strength: Financial (dis)incentives and voluntarism and information measures were supported with relatively stable resources; Conservation rates are positive step. • Weakness: Few measures required a minimum energy performance. Cost-effectiveness rationale means few next-generation TEEC practices and technologies.
Advocacy	B	• Strength: BC Hydro made itself very open to receiving recommendations advanced by its EC&E Advisory Committee and providing feedback on them. • Weakness: Issues regarding TEEC strategy development and supporting advocacy have not advanced on BC Hydro's organizational agenda.
Actor Networks	C+	• Strength: EC&E was able to transform itself into different types of communities-of-learning; BC Hydro acting as strong internal prime-mover, providing important functional and project-level support. • Weakness: Lack of application-oriented community-of-practice between BC Hydro & EC&E; experimental epistemic-community was short-lived; stronger representation from building/construction sector, energy services sector, residential customers and urban planning. More consistent representation from all levels of government, First Nations, and academia.
OVERALL	**B-**	

A – Strong, B – Moderate, C – Weak, D – Very Weak, F – Non-Existent

Chapter 9: The Hard-Governance Infrastructure for Steering Transformative Energy Efficiency and Conservation in British Columbia's Built Environment

9.1 Introduction

In Chapters 5-8 I described and assessed two efforts in British Columbia (BC) to steer transformative energy efficiency and conservation (TEEC) in the built environment. When I assessed these efforts based on the strength of the eight conditions that I identified in Chapter 3 as supporting transformational change, I found that they led to only moderate to weak transformational conditions. In this Chapter I look to see if the underlying "hard governance" approaches used to steer TEEC in British Columbia can help to explain the state of these conditions. And if so, could the relationship between these governance infrastructures and the TEEC outcomes that they led to be used to develop a set of propositions about how TEEC should be steered to achieve strong conditions for supporting transformational change?

To do this, I briefly revisit some of the underlying theoretical concepts of transition governance that were discussed in Chapter 2 to help me differentiate between the approaches used by the Province and BC Hydro to steer TEEC. Next, I identify the hard-governance infrastructure used by each of the efforts to steer TEEC and then analyze how these structures influenced TEEC outcomes. Finally, through this analysis I develop 15 propositions about how TEEC should be steered in BC.

9.2 Theoretical Concepts of Hard-Governance Infrastructures

In Chapter 2, I argued that central to efforts to steer transformational change is issues of power. Using a dualistic perspective of power, I described processes of change as being co-determined by agencies seeking to achieve a desired outcome and the relatively stable structures within which these agencies are embedded (e.g., institutional, technological, economic, political) (Arts & Tatenhove, 2004; Giddens, 1984; Healey, 2006a). Based on this understanding of power and change, I proposed that any effort to steer a socio-technical transition needs to address both aspects of power.

Next, I introduced two approaches to steering transformational change: modernist governance and reflexive governance. A modernist governance approach for addressing sustainability transitions is based on the premise that these problems can be solved through a combination of rational planning, representative democracy, and functional differentiation. Reflexive governance, meanwhile, is based on the premise that a sustainability transition will always be a moving target because the elemental and temporal complexity and uncertainty in which the problem is shrouded means there will never be perfect knowledge about it, much less about how to solve it. Given these assumptions, a reflexive governance approach relies on the following suite of elements to steer sustainability transitions:

- Ongoing and iterative processes;
- Participatory interactions and decision-making between a diverse range of actors;
- Transdisciplinary knowledge;
- Normative goals;
- Knowledge created through experimental and anticipatory processes; and
- Adaptive institutions and strategies.

In addition to enabling the adaptive capacity of agents seeking to achieve change, these practices are also argued to actively lessen the structural powers that the dominant socio-technical regime holds over the way that things are thought about and done and decisions made. It does this by purposely building alternative socio-technical visions and frameworks and expanding the support for these alternatives by involving both regime and non-regime actors throughout all aspects of the transition planning and implementation process. So, while reflexive governance does not neutralize the power imbalance between the incumbent regime and alternatives to it, it does at least represent a strategic process by which it might be increasingly reduced over time.

Given these differences, I proposed that not only does governance matter for steering TEEC but reflexive governance is a more appropriate approach for doing so. In addition to addressing sustainability transitions as a long-term, complex and uncertain problem, reflexive governance also intentionally tries to level the imbalances of power between emerging alternatives and the deeply–entrenched incumbent regimes. As such, a reflexive governance approach should lead to stronger system conditions for supporting TEEC. If these theoretical concepts of power and transition governance hold up, they should help to explain the strength of the system conditions for supporting TEEC that I assessed for the Province and BC Hydro in Chapters 6 and 8. To do this, I need to first identify the hard-governance infrastructure used by each of the efforts to steer TEEC and then analyze how these structures influenced TEEC outcomes. If I can demonstrate that a particular hard-governance infrastructure does contribute to stronger TEEC outcomes, propositions about how TEEC should be steered in BC can start to be developed.

9.3 The Hard-Governance Infrastructures Used to Steer TEEC in British Columbia

In this section, I use Voß and Kemp's (2006) governance strategies to address sustainability challenges that were discussed in Chapter 2 to help me identify the most typical hard-governance infrastructure used by the Province and BC Hydro to steer TEEC in the province's built environment. Although their description of sustainability challenges includes both the typical modernist governance and reflexive governance responses, in Table 9-1 I only list the reflexive strategies to these challenges as these are the benchmarks that line up most closely with my hypothesis that reflexive governance is the most appropriate hard-governance infrastructure for steering socio-technical transitions.

9.3.1 Province – Modernist Governance

Looking at Table 9-1, we see that the Province used a largely modernist governance approach to steer TEEC between 2005 and 2012. During this time, the overarching direction for energy efficiency and conservation in the built environment was set by the Provincial Cabinet and the Minister of Energy and Mines through broad policy announcements. Other than the 2005 EEBS, which was based on an extensive consultative process, the more specific targets, system analysis, and strategy development that was undertaken to fit these polices were formulated by energy and building experts working within and hired by the government and acted upon if approved by the Minster. Although some stakeholder consultation took place around individual policy initiatives such as greening the building code, requirements for carbon neutral local governments, and new energy performance standards for appliances and equipment, these were generally limited in terms of their time and scope to specific functional aspects of energy efficiency and conservation rather than the much broader concept of TEEC throughout the built environment.

In some ways the Climate Action Team, the BC Partnership for Energy Conservation and Efficiency, and the four stakeholder working groups assembled briefly in 2008 by the MEM to address energy efficiency in buildings, communities, industry, and transportation were exceptions to these approaches because of the broader mandate that they were assembled under and/or the more indefinite duration they were originally thought to be assembled for. However, the influence of each of these bodies on the Province's hierarchically-steered and expert-informed approach to governance was limited because they were either disassembled by the Province shortly after being formed, not responded to, or used more as a space to test the waters for emerging government ideas rather than for a multi-directional flow of new ideas to be shared and worked through.

The one reflexive governance strategy that the Province came closest to practicing was anticipating the potential future consequences of existing and potential measures to reduce the intensity of energy and greenhouse gases in the built environment as part of its Vision 2020 initiative. It did this through the use of forecasting and backcasting methodologies. However, the impact of this knowledge was limited because it was contained within a closed government process. Since this initiative was shelved in late 2010, ideas about transforming the province toward a super-efficient/net-zero built environment were essentially removed from the Province's lexicon. This sputtering momentum demonstrates the inherent weakness of the existing governance approach which relies heavily on a small number of powerful actors to envision, authorize, and mobilize resources to pursue a desired outcome. Given the strength of low-efficiency building practices, if, for whatever one of these actors does not signal their intention to pursue a particular transformation path, the best one can hope for is gradual incremental changes.

Table 9-1 Approaches Used by the Province and BC Hydro to Address Sustainability Challenges

Roles of Governance & Sustainability Challenges	Reflexive Governance Strategies to Address Sustainability Challenges	Province's Governance Approach	BC Hydro's Governance Approach
Goal formulation			
Sustainability goals involve value trade-offs and are endogenous to transformation	Iterative participatory goal formulation	All goals were set unilaterally by the Province (other than the 2005 EEBS) and had weak connections to pre-established goals and little commitment to ongoing goal development.	Aspirational DSM goal established unilaterally by BC Hydro but subsequently used to focus participatory discussions about how to achieve ambitious levels of electricity savings.
System analysis treatment			
Co-evolution of heterogeneous elements (society, technology, ecology) across multiple scales	Trans-disciplinary knowledge production	Market transformation looked at primarily through technological change lens.	Energy efficiency and conservation limited to electricity savings. Primary lens used to address electricity savings was potential for cost-effective technological change.
Uncertainty and ignorance about transformation dynamics and effects of intervention	Experiments and adaptivity of strategies and institutions that is balanced with a capacity to make decisions and produce outputs.	Small-scale and disjointed demonstration and pilot projects. Little in the way of adaptability for strategies once they are instilled as they are tightly tied to provincial budget cycles and policy commitments.	Uncertainty of electricity savings operationally addressed by relying less on demand and more on supply resources. Recommendation made to expend resources to increase knowledge about more transformative DSM Options to reduce future uncertainty.
Path-dependency of structural change contributing to high societal impact	Anticipation of long-term systemic effects of implemented and potential measures	Modeling carried out to see impacts on energy use and GHG emissions of different policy measures.	Detailed analysis of economic, social, environmental impacts is part of modeling undertaken for long-term planning. Backcasting used to assess potential path to achieve long-term normative savings goal.
Strategy development			
Capacities to influence transformation are distributed among actors	Interactive strategy development and implementation	Other than 2005 Energy Efficient Building Strategy, strategies developed internally with some stakeholder input on specific issues.	DSM strategy development included ongoing input from stakeholders but all final strategy decisions were made by BC Hydro.

Adapted from Voß and Kemp (2006)

9.3.2 BC Hydro –Reflexive Governance Practices Embedded Within Modernist Structures

BC Hydro's efforts to steer TEEC in BC resembled a mix of modernist and reflexive approaches (see Table 9-1). The clearest example of the use of a reflexive governance strategy was the inclusion of participatory and trans-disciplinary stakeholder processes for carrying out the formulation of goals, system analysis and strategy development that eventually led to the DSM Plan included its 2012 Draft Integrated Resource Plan (and which will presumably feed into the final version of this plan which is expected to be submitted to the Province in August 2013). BC Hydro also used and planned to use experimentation to address some aspects of the long-term uncertainty that it associated with pursuing more ambitious levels of electricity savings with the intention of using the knowledge created from these experiments to adapt existing strategies and institutions accordingly. Furthermore, in addition to its long standing practice of forecasting different electricity system scenarios as part of its long-term planning process, it also undertook a detailed backcasting exercise to understand a possible pathway for maximizing cost-effective electricity savings over the next 20 years as per its aspirational DSM goal.

While these practices helped to enable the organizational and discursive capacities of agencies within the EC&E and Power Smart to expand ideas about TEEC, it is important to bear in mind, though, that these reflexive practices were for the most part encapsulated within more conventional modernist structures. To start with, the consultative processes that stakeholders participated in did not grant them with any decision-making power. Instead they reflected what Arnstein's (1969) "ladder of citizen participation" categorizes as "degrees of tokenism"; that is informing (one-way information flow), consultation (weak two-way information flow), and placation (i.e., advising or stronger two-way information flow). The EC&E Advisory Committee and the Technical Advisory Committee for its Integrated Resource Plan are both examples of placation. In the end, all final decisions were made by BC Hydro staff and management, including what processes to use, who is involved, what goals are set, how the system is analyzed, and what strategy is developed and approved for implementation.

In addition to how decisions were made, the lenses used to analyze the energy use system were for the most part reduced to economic and technological functions. Although other structural forces such as land-use planning and cultural and individual factors were also recognized by both BC Hydro and the EC&E Advisory Committee as important in terms of their influence on how energy is used, these variables were held constant for all of the forecasting and backcasting carried out by BC Hydro, including DSM Option 5.

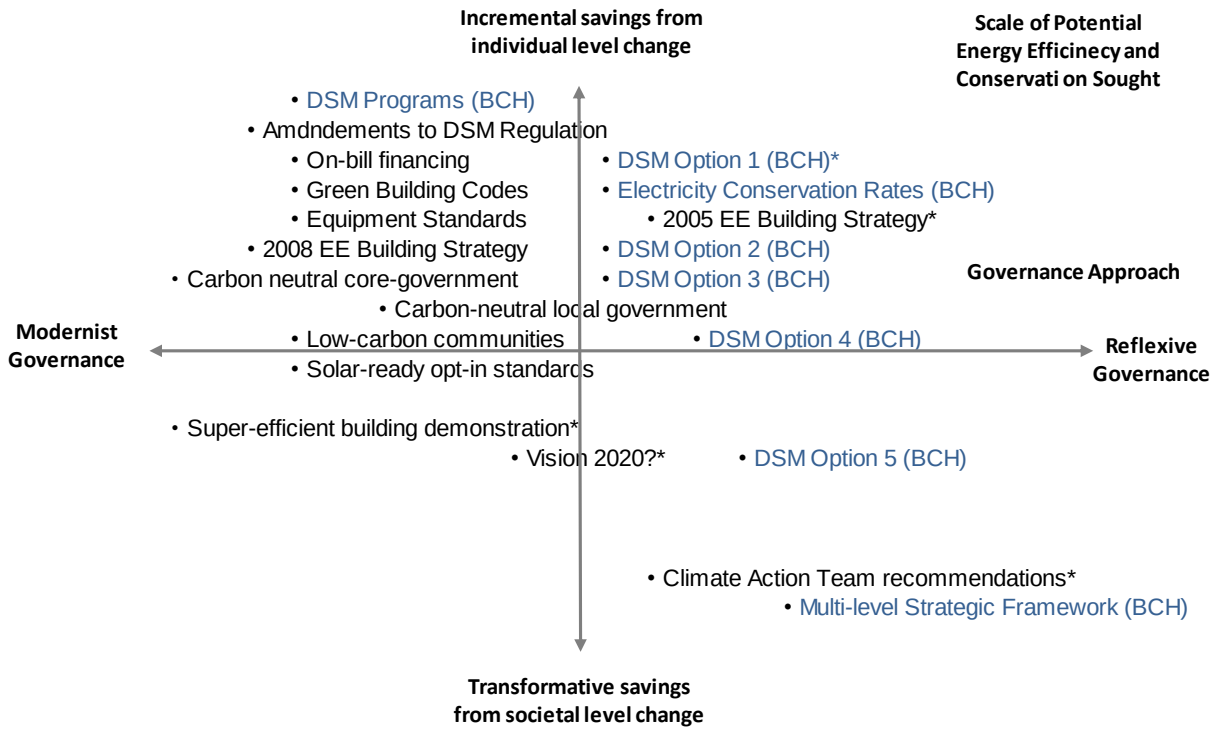
Now that I know what type of hard-governance infrastructures were predominately used to steer TEEC in BC, I next need to assess the impact that these approaches had on creating TEEC outcomes. This

will help me to determine what influence if any the type of governance approach used had on creating the conditions for supporting TEEC that were assessed in Chapters 6 and 8.

9.4 Comparing the Hard-Governance Infrastructures Used to Steer Energy Efficiency and Conservation Outcomes

To help me understand the effects that each of the hard-governance structures used by the Province and BC Hydro had on their level of success with steering TEEC in BC, I mapped the kinds of savings sought by each entity through the energy efficiency measures and long-term strategies described in Chapters 5 and 7 against the governance processes used to develop these different kinds of energy efficiency and conservation (EEC) outcomes (to help distinguish between those outcomes led by the Province and those led by BC Hydro, Provincial outcomes appear in black text and BC Hydro outcomes appear in blue text). When I do this, I get a 2x2 matrix (see Figure 9-1). The horizontal axis represents the primary approach to governance used to arrive at a particular EEC outcome (e.g., DSM program, codes and standards, rates, strategies). EEC outcomes on the far left were created, developed and implemented predominately by a small group of experts who advise senior-level decision-makers. The further to the right one moves along this axis the more one sees strategies more indicative of reflexive governance i.e., iterative and participatory goal formulation, transdisciplinary knowledge creation and use, uncertainty addressed through experimentation and adaption, forecasting and backcasting, and participatory strategy development and implementation. The far right of the axis indicates EEC outcomes that were developed with strong practices of all of these reflexive measures.

The vertical axis indicates the level of potential energy efficiency and conservation sought by an EEC outcome. It is important to emphasize the word “potential” here because the EEC outcomes included in Figure 9.1 include both actual programs as well as strategic planning documents. EEC outcomes near the top of this axis are ones that seek energy savings from relatively short-term and individual technology or behavioural changes e.g., traditional energy acquisition focused DSM programs. As one moves down this axis, the focus of the EEC outcomes becomes more focused on achieving more permanent energy savings from market- and societal-level changes. The axis flips from incremental to transformative when the goal of intervention changes from stepwise gains in existing practices and technologies to building- and community-scale dynamic equilibrium. In the case of the built environment this means super-efficient/net-zero buildings and communities, with EEC outcomes located at the bottom of this scale seeking super-efficiency not only through in the physical structures of buildings and communities but through changes in day-to-day practices and routines as well.



* EEC outcome no longer used or actively advanced
? - scale of outcome is approximated because final results are confidential

Figure 9-1 The Influence of Hard-governance Infrastructures on Energy Efficiency and Conservation Outcomes

EEC outcomes included in the top-left quadrant are ones which seek energy savings from step-wise changes in energy-related technologies or practices and for which the majority of goal setting, analysis and strategy development was carried out by policy or program experts within or hired by the Province and/or BC Hydro. Low-carbon and carbon-neutral outcomes are included in this quadrant because it is unclear what the energy efficiency component of these are, particularly given the emphasis placed on carbon offsets by the Province. Other than BC Hydro's DSM programs, all of the EEC outcomes listed here are provincially-led initiatives. Although spread vertically most of the non-carbon oriented EEC outcomes listed in Figure 9.1 are actually quite similar as they are seeking step-wise savings through market-level changes. BC Hydro's portfolio of programs, though, seeks savings from a mix of individual- and market-level measures. In terms of governance, other than the Province's carbon neutral government program, all of the outcomes used some level of engagement with external stakeholders. The most extensive of these was the multi-year negotiations that took place between local governments and the Climate Action Secretariat to set the definitions and rules for local government operations to be considered "carbon-neutral". In most other cases, the level of participation was

consultative with input sought from stakeholders at different key points of development but with the overall goal and direction of the process being very much controlled by the Province or BC Hydro. All of these EEC outcomes are either still being actively developed or continue to be used.

In the bottom-left quadrant, we see a small number of more transformative EEC outcomes that were advanced via the Province's modernist governance approach. Of these, Vision 2020 went the furthest both in terms of its objective and its use of reflexive governance techniques. However, as this process was both internal and confidential it is difficult to know exactly how far it pushed the idea of TEEC. What I do know, is that a) the Minister responsible for this process wanted it to focus on very ambitious building and community-level savings and b) the same Minister issued a challenge to the building community in 2010 to be working toward building net-zero energy ready new houses by 2020. At the time of writing, only the solar-ready opt-in standard is still active at the time of writing. Although according to one of the Provincial interviewees with whom with spoke, its implementation thus far is weak.

Moving to the top-right quadrant, we see a shift from largely provincially-led outcomes to BC Hydro-led outcomes. The only Provincial outcome included in this quadrant is the 2005 Energy Efficient Building Strategy which was developed and implemented with extensive stakeholder participation. All of the DSM Options listed here were developed for the 2013 IRP process. Of these, only DSM Option 1 has not received some level of endorsement by BC Hydro: DSM Option 2 reflects the programs currently operationalized by BC Hydro, DSM Option 3 was recommended to be operationalized in BC Hydro's DRAFT 2012 IRP, and funding was recommended by BC Hydro to continue to develop some of the concepts contained in DSM Option 4. Also activated from this group of outcomes was BC Hydro's conservation rate and the 2005 EEBS which was replaced a couple of years later by the 2008 EEBS.

Similar to the modernist-transformative savings quadrant, the lower-right quadrant lists only three EEC outcomes. All three of these involved strong external stakeholder participation in goal setting, system analysis and strategic development. The BC Hydro outcomes were led by the EC&E Advisory Committee and the provincial outcome was led by the provincially-appointed Climate Action Team. Of these, DSM Option 5 is ranked the least transformative because its scale of focus does not extend beyond the building or process level. The Climate Action Team's recommendations and BC Hydro's multi-level strategic framework, meanwhile, both recognize the potential for a much deeper level of savings via changes in the built environment as well as shifts in cultural norms. However, of these three outcomes, only the two developed by BC Hydro continue to be actively used or pursued.

By mapping the governance used to develop EEC outcomes against the potential scale of savings sought from these measures, a number of interesting observations can be made. First, the favouring of a modernist governance approach by the Province and a more reflexive approach by BC Hydro is very

evident in the left/right divide. This speaks largely to BC Hydro's regulated requirements to a) consult with stakeholders, including the EC&E Advisory Committee, and b) carry out long-term planning that includes load forecasting and projecting the conservation potential from cost-effective savings. Both of these practices are institutionalized through integrated resource planning.

Looking at the scale of savings sought, there is a strong tendency to pursue more incremental outcomes. Of the six transformative outcomes listed in the lower half of the matrix, three of the four advanced by the Province are no longer used or being actively developed. However, both outcomes advanced by BC Hydro via its EC&E Advisory Committee are still either being used or actively advanced.

Finally, three of the four outcomes that pursued transformative savings through the highest scale of change favoured a reflexive governance approach for steering TEEC. The one outlier in this case was the Province's Vision 2020 which used elements of reflexive governance (e.g., forecasting and backcasting, interdisciplinary knowledge and stakeholder participation) but was limited by the decision to keep the process closed and its results confidential. The boundaries of TEEC ideas and thinking then are closely aligned with the boundaries of reflexive governance practices. For the Province these boundaries are fairly stunted. They extended the furthest in 2008 with recommendations advanced by the Climate Action Team and funding for a couple of experimental initiatives pursued as part of the 2008 EEBS. By 2010 they were still being pushed on with the Ministry of Housing's short-lived intra-governmental Vision 2020 planning initiative before quickly receding back to more incremental ways of thinking about energy efficiency and conservation in the built environment.

For BC Hydro, the boundaries of activities supporting TEEC extend as far as the EC&E and the utility's recommendation in its Draft IRP to spend approximately $7 million on advancing research on DSM Options 4 and 5. In some ways, the boundaries of its reflexive governance practices extend even a little further as members of the EC&E have advanced a number of structurally-oriented recommendations which are still awaiting action from BC Hydro. If and how BC Hydro responds to these will say a lot about how far it is willing to go to not only support the capacity of agencies to advance ideas about TEEC (as it has largely done to date) but to also support their capacity to start lessening the structural impediments to it as well.

Summing up, this analysis of the hard governance infrastructure used and the type of EEC outcomes sought shows a strong link between the reflexive governance practices used by BC Hydro and the Province and the TEEC outcomes that each of these efforts led to. In the next section I provide an analysis of why this was the case. Based on this information, I also begin to build propositions to answer the thesis's underlying question, namely, how should TEEC be steered in BC's built environment.

9.5 Exploring Why Reflexive Governance Practices Led to Stronger TEEC Outcomes

The association shown above between reflexive governance practices and TEEC outcomes in BC begs the question why? To start with, there seems to be a tacit understanding that pursuing ambitious and long-term transformative goals toward sustainability requires a different way of thinking about and approaching problems. It is something that cannot be done by a small number of experts working to solve a problem that is defined and prioritized by an even smaller number of elected officials. Not only because the problem is complex, uncertain and unwieldy but because the solutions to it-which will take place over years and involve or at least affect countless numbers of actors, institutions, and technologies-are complex, uncertain, and unwieldy as well.

Looking back to my case study, a distinct difference between BC Hydro's application of reflexive governance practices and the Province's was the duration with which these practices took place. Both the Climate Action Team and Vision 2020 processes were short-term in nature and oriented toward providing a system analysis and solution identification. However, there was no plan in place to pursue or develop these ideas on an ongoing basis. Prior to 2006, BC Hydro followed a similar process where stakeholder participation was largely limited to providing input into issue- and time-specific projects (such as the Conservation Potential Review) or on measures and plans that were already well advanced. However, since the formation of the EC&E Advisory Committee in 2006, participants are able to provide on an ongoing basis input into just about every aspect of BC Hydro's planning process that relates to DSM i.e., goal formulation, system analysis and strategy development.

Not only did this group help to create new thinking about what are appropriate objectives for BC Hydro's DSM program, it was also instrumental in introducing to and advancing within the utility a more complex perspective of how it should think about and analyze the electricity-use system as well as the different strategic options that exist for pursuing electricity savings. Undoubtedly, the high level of critical-creative thinking that the EC&E brought to BC Hydro is indicative of the transdisciplinary nature of the group. However, another important but easy to overlook reason why the EC&E had the level of success that it did within BC Hydro was the fact that it was allowed to evolve enough to not only develop an initial set of ideas and direction but to build on these, adapt them, and push them through the planning process. In other words, these ideas were not allowed to fade away almost as soon as they were created. This level of duration and commitment is in sharp contrast to the Province's Climate Action Team and the lack of maturation on the set of recommendations it advanced to the Province for achieving its 2020 Climate Action targets.

In addition to creating unique synergies for new ideas and relationships, the group's diversity also helped to secure its legitimacy with BC Hydro because it could not be easily dismissed as representing one particular set of interests (e.g., environmental, consumer groups, First Nations, independent power

suppliers etc…). Instead, the level of support or opposition given by the EC&E to emerging ideas and initiatives provided a reasonable barometer to BC Hydro staff of how they would be received externally, whether through a BC Utilities Commission regulatory filing or otherwise. When the feedback received was supportive, it helped to propel some of these initiatives to the next stage of development because they were pre-legitimized by stakeholders. When the feedback received was less supportive, it allowed staff to adapt these ideas and initiatives while still in a relatively early stage of work and within a relatively protected space. In addition, these early signals and responses helped to share the sense of ownership of these initiatives between the utility and its stakeholders

Another easy to overlook aspect of why the reflexive governance approach used by BC Hydro led to the development of ambitious TEEC outcomes that are still being used or developed today is the high level of legitimacy, openness, responsiveness and support afforded to the EC&E participatory stakeholder process by BC Hydro. It is important to remember that many of the EC&E members were also interveners in the quasi-judicial regulatory hearings that BC Hydro's plans and expenditures are subjected to on a regular basis. These proceedings are often quite adversarial. The utility, then, demonstrated a high degree of trust in opening up to these participants its planning ideas and processes that were very much works in progress. Fortunately, this trust was not broken. This two-way respect ultimately allowed for a far more creative, adaptive and interactive DSM planning process than BC Hydro had ever undertaken before. Two results of this process was the development and adoption of the multi-level strategic framework and the inclusion of DSM Option 5 in the 2012 Draft IRP.

The EEC outcomes associated with the ongoing and active participation of the diverse group of stakeholders used by BC Hydro to assist it with all aspects of its long-term DSM planning process certainly demonstrate the strength of these elements of reflexive governance for steering TEEC. However, before I can answer whether or not the hard-governance infrastructure used by the Province and BC Hydro to steer TEEC affected the conditions supporting transformational change that I assessed in Chapters 6 and 8, I need to look also at the planning context within which these elements were created to see how they may have influence the use of these practices.

It is important to remember that the formal planning processes undertaken by the Province and BC Hydro all required a vision, the authority to carrying out these processes, and the human and financial resources needed to coordinate and support them. For the Province, the goal of reducing carbon emissions by 33% by 2020 came from the Premier's office as did the authority to assemble the 2008 Climate Action Team and the allocative resources to support the work of the CAT. Using the carbon emissions goal as its impetus for transformational change in the province's Built Environment, the authority to proceed with the Ministry of Housings' Vision 2020 planning initiative came from the Minister as did the allocation of resources to support this process. For BC Hydro's EC&E Advisory Committee, although the requirement

for assembling the EC&E Advisory Committee came out of a BC Utilities Commission ruling, the authority to direct the attention toward the utility's aspirational goal of "bending the demand curve" over a 20-year period came from BC Hydro's CEO and its Vice-President overseeing its Power Smart division. It should also be mentioned that as a crown corporation, some level of support for pursuing these ideas, informal or otherwise, was also needed from the Province. The financial and human resources supporting this initiative came from the utility's Power Smart division which receives its funding through BC Hydro's rate-payer funded energy efficiency program.

Each of these planning endeavours, then, were started with top-level authority and ideas about ambitious sustainability-oriented change and supported with existing human and financial resources. However, at the time of writing only the work carried out by BC Hydro's initiative was still being actively developed and pursued. What was different about BC Hydro's context that allowed it to maintain its momentum while the other two processes quickly faded from influence?

A major difference between the Province's efforts to plan for its ambitious targets and BC Hydro's was that the Province's processes were specially organized, one-off affairs, while BC Hydro's process was closely connected to its institutionalized IRP. As a result, the EC&E's agenda at any given time included a mix of exploratory ideas and initiatives and the practical scaling-up of these initiatives into tactics for BC Hydro's Power Smart as well as the utility's integrated resource plan. Although the EC&E was formed in part to create new knowledge to help BC Hydro achieve its aspirational target, it is the IRP that grounded these ideas to a timely planning process with very real consequences in terms of the flow of authoritative and allocative resources for advancing energy efficiency and conservation, not to mention potential rate impacts. In addition, as one episode of planning wound down, work on the next one was already starting up. While the integrated resource planning process that followed the 2008 Long-Term Acquisition Plan was different than anyone could have predicted at the time that the 2008 Plan was submitted, there was no question in anyone's mind about whether or not a subsequent planning process would follow. So once the 2008 LTAP was submitted, the knowledge, trust, and legitimacy that the EC&E Advisory Committee had gained in its first two years started to be applied to the next integrated resource plan without losing any of its momentum. In addition to these network benefits, the requirement for a decision to be made on an integrated-resource plan means that even if rejected, it still needs to be developed and debated by the utility and its stakeholders, and decided upon by officials with final decision-making authority. Unfortunately, no similar accountability measure existed for the TEEC planning initiatives undertaken by the Province.

Another major advantage of the IRP process is that it provides BC Hydro with a relatively predictable flow of resources with which to plan for and implement DSM, some of which supported the work of the EC&E Advisory Committee. With these resources, BC Hydro's Power Smart division is able

to simultaneously explore multiple innovative measures within its broader DSM portfolio. Examples of such projects explored during the course of my observations included funding for community energy managers, more stringent energy performance codes and standards, district energy pilot projects, a conservation rates charette, and a research paper on influencing societal shifts toward sustainable practices. In some cases, these efforts contributed to fully resourced DSM programs (e.g., community energy managers) or provincial policy changes (e.g., codes and standards upgrades by the Province), while in others they either led to a decision not to advance a program (i.e. district energy subsidies) or were stalled indefinitely until it was known whether pursuing these actions further was in keeping with the next iteration of the utility's integrated resource plan (e.g., conservation rates, societal-level change).

Although the actual amount of expenditures recommended and permitted will vary from one IRP to the next, provided that an electricity resource gap is forecasted, some level of DSM is required as per the Clean Energy Act's minimum 66% demand-side measures (DSM) requirement. Other than a brief period during the late 1990s and early 2000s, this predictable flow of resources has meant nearly 25 years of unbroken institutional development and memory. The level of resources flowing to the Province to advance energy efficiency and conservation, in contrast, is completely dependent on the political agenda and varies unpredictably from one budget cycle to the next. The sense of short-term policy and program uncertainty (never mind medium- to long-term uncertainty) that this creates was evident in many of the comments made by the Provincial officials with whom I spoke. One way that the Province has gained some additional resources is through amendments to the DSM regulation that allow utilities to reclaim costs incurred for assisting the Province with the analysis and development of new efficiency codes and standards. While a positive step, these expenditures are quite tightly defined.

While the IRP provides obvious advantages to BC Hydro's capacity to steer TEEC, the fact that BC Hydro is required to carry out, report on and implement an IRP does not mean that this will lead to TEEC thinking. Indeed the opposite may be true as the institutionalized energy efficiency and conservation goals of BC Hydro's IRP emphasize low-cost and reliable electricity for consumers, a balance that in the past has led to considerably less DSM being pursued than what is estimated to be cost-effective. To help extend the utility's thinking beyond the conventional boundaries of integrated resource planning, the language used in the letter from the utility's CEO that formally announced its aspirational "bending the demand curve" goal justified it not solely as a question of economics, but also according to the environmental and social imperatives of reducing the energy intensity of energy services in British Columbia (Elton, 2007). In other words, the goal of what should be achieved was elevated when looked at as a normative sustainability imperative.

Next, recognizing the operational challenges facing the implementation of such a plan, rather than instill it as an absolute and final target, it was used to stretch thinking and spur deliberation both within

and between the utility and the EC&E Advisory Committee as part of BC Hydro's DSM planning and IRP requirements. These deliberations were not only about how to achieve the target but about its appropriateness as well. Through its strategic planning process, it was decided that although inspirational the "bending the curve" vision was only one potential energy savings outcome of a TEEC future. As a result, the vision was modified to increase its flexibility, an outcome that satisfied some of the EC&E's more skeptical members while also retaining enough coherency for DSM Option 5 to be developed and included in the IRP. Although the operationalization of DSM Option 5 was not recommended in the utility's Draft 2012 IRP, it did at least spur the creation of new knowledge about how it might be achieved. In addition, this work helped to lay the groundwork for stakeholder understanding and support for the ideas relating to TEEC.

The open and deliberative process that was used by BC Hydro to set its TEEC vision contrasts once again the approach taken by the Province. In this case, an absolute and final target was more-or-less unilaterally set by the Premier's office. Instead of starting with the question of whether this target was appropriate or not, planning that resulted around it focused instead on the kinds of activities needed to achieve it. Given the lack of support for almost all of the recommendations coming out of the Climate Action Team Report and the buried results of the Province's Vision 2020 initiative, one can argue that the outcome of these are the same as BC Hydro's DSM Option 5. However, in the case of the latter, there is now a more flexible, while still coherent, vision that BC Hydro along with the stakeholders who helped to formulate it are still actively working to achieve.

Given all of these factors, it is clear that BC Hydro's reflexive hard-governance infrastructure was more appropriate for building the kinds of conditions that support TEEC outcomes than was the Province's modernist hard-governance infrastructure. More specifically, the contributions made by BC Hydro's EC&E Advisory Committee demonstrate the critical-creative push that diverse stakeholder participation can bring to high-level strategy thinking about energy transitions. Based on my observations of both the knowledge and advocacy benefits created by EC&E Advisory Committee I advance two propositions regarding how TEEC should be steered in BC:

> Proposition 1: *A governance framework to steer TEEC in BC should include the active and ongoing participation of stakeholders for all aspects of planning*.
>
> Proposition 2: S*takeholders who participate in the direct governance of TEEC in BC should represent a diverse range of knowledge, perspectives and roles within the built environment energy services system.*

Furthermore, the involvement of BC Hydro's EC&E Advisory Committee with the utility's integrated resource planning process demonstrated the strength of twinning efforts to steer TEEC with regularly scheduled institutionalized planning processes that directly feeds into decisions about the long-term direction of energy systems as well as the allocation of resources for developing plans and tactics to move in the desired direction. Given these benefits, my third proposition about how TEEC should be steered in BC is as follows:

> Proposition 3: *The governance of TEEC should be tied to an institutionalized planning process that requires regular updating and adaptation of goals, system analysis and strategies.*

Another important lesson taken from the tie between BC Hydro's efforts to steer TEEC and its IRP, is the relatively predictable flow of resources that it provided. Given the scale and time needed for transformational change, the more predictable the flow of resources to entities trying to advance TEEC, the more likely they will be able to maintain the momentum of accompanying research, planning, program development and coordination needed to see it through. I therefore propose that:

> Proposition 4: *The governance of TEEC should include a flow of allocative and authoritative resources that is both predictable and appropriate for the scale of change sought for all aspects of planning and implementation e.g., experimentation, niche development, energy efficiency programs, and codes and standards.*

Finally, as demonstrated by BC Hydro's aspirational target, pushing the envelope on TEEC will require thinking that extends beyond an energy plan's economic and deliverability. While important, a more visionary scope of what is possible was created when the social and environmental sustainability consequences of our energy decisions was also given strong and open consideration. It is important to keep in mind, though, the additional support and critical thinking that arose from BC Hydro's deliberative process for setting its guiding strategic vision. As such, I make the following proposition for how TEEC should be steered in BC:

> Proposition 5: *The governance of TEEC should be guided by a long-term normative sustainability goal that is understood to be an aspirational starting point to spur ongoing deliberation and adaptation rather than a final and objective target.*

Although BC Hydro's reflexive hard-governance structure was more successful at creating the kinds of conditions that support TEEC than the Province, it is important to remember that the conditions created were not especially strong, as per my assessment in Chapter 8. In the section that follows, I answer the question why these conditions were not stronger and what, from a governance perspective, should be done to strengthen them moving forward. From this analysis, several propositions will be developed about how to make the hard-governance infrastructure for steering TEEC in BC more appropriate for achieving this outcome.

9.6 Identifying and Addressing the Structural Limits of BC's TEEC Hard-Governance Infrastructure

In the preceding section I advanced five propositions about how TEEC in BC should be steered that are based on the strength of existing practices. While a good start, these propositions alone are unlikely to maximize the potential of TEEC in BC if the higher-order institutions within which existing energy efficiency and conservation decision-making are embedded are not also aligned more appropriately with the objectives of TEEC. More specifically, based on my description and analysis in Chapters 5-8 of efforts to steer TEEC in BC from 2005 to 2012, I have identified three institutional structures that I argue need to be addressed in order to accelerate efforts to achieve TEEC: relational, organizational, cultural.

These three levels of institutional structures are consistent with the multi-level framework of transformational change that was discussed in Section 2.2.2. As discussed in Chapter 2, relational-level institutional structures reflect the resource and discursive capacities of agents who through episodic interactions with one another consciously attempt to achieve particular outcomes. This represents the space where decisions are made, policies and programs developed, and new ideas explored.

However, the capacity of agents to influence the outcome of these interactions is not shared equally among the actors participating in them. This is because the collectively organized rules-of-the-game under which these interactions take place and the disproportional distribution of resources means that some agents will be positioned more favourably than others in these interactions not because of personal attributes but because of organizational ones. Organizational institutional structures, then, routinize how and what agents interact with each other in different types of settings. This has the effect of structurally reinforcing the relational power dynamics that exist within episodic interactions between agents.

The third level of institutional structures, cultural, reflects the broadly accepted norms and values that through their manifestation in political, legal, economic and social institutions shape how societal functions are fulfilled and agents interact with one another.

In this section, each of these is discussed in turn as they relate to how TEEC was steered in BC along with propositions for how to address them in a way that can improve the conditions for advancing TEEC.

9.6.1 Relational-level Institutional Structures

Despite the success of the EC&E Advisory Committee to get BC Hydro to adopt its multi-level strategic framework and include DSM Option 5 in its Draft 2012 IRP, when you look at the types of EEC measures that were actually operationalized by BC Hydro they were not that dissimilar to the type of measures operationalized by the Province. Given the finding that BC Hydro's reflexive governance practices are more appropriate for addressing sustainability-related problems, how did this happen?

The answer lies in differentiating between how issues were raised and how learning to address these issues was undertaken. For the most part, the participatory processes used by the Province and BC Hydro to help them understand and work out what it would require to achieve their energy efficiency and conservation goals were focused on raising ideas and issues about what should be done. However, the actual research to address these ideas and issues were mostly undertaken by energy and building experts either within BC Hydro or the Province or hired by them. For example, although BC Hydro's DSM Option 5 was prompted by the multi-disciplinary EC&E, the actual development and analysis of Option 5 was done by energy and building experts within BC Hydro who looked at the problem as predominately a technical one. As a result, even though BC Hydro's multi-level strategic framework suggests that TEEC will likely require co-evolutionary changes in individual technologies and behaviours, market parameters and societal expectations and norms (e.g., land-use planning, day-to-day routines), the problem of achieving TEEC was simplified for planning purposes by looking at it through the functional lens of technological change within buildings. So although the issues raised were trans-disciplinary, the actual creation of knowledge tended to remain within more conventional disciplinary siloes, which in energy use and efficiency means engineering and economics.

Nelson and Winter (1982, p. 259) identified this tendency for technicians to think about and try to solve a problem according to what has always been done in their seminal work *An Evolutionary Theory of Economic Change*. According to these authors, technological regimes represent the cognitive bounds of what technicians' and engineers within a particular field of expertise believe to be "feasible or at least worth attempting", notions outside of these regimes are not explored because they simply do not exist as reasonable possibilities. To help overcome this structural barrier to knowledge, a fuller understanding of the spectrum of pathways that might exist for achieving TEEC, trans-disciplinary knowledge needs to be applied throughout all aspects of the planning and strategy development process. To this end, I advance a sixth proposition about how TEEC should be steered in BC:

Proposition 6: T*rans-disciplinary knowledge should be applied to all aspects of TEEC governance (i.e., goal formulation, system analysis and strategy development)*.

In addition to knowledge silos within planning, TEEC innovation is also limited by the cognitive bounds of people working directly within the energy services regime as well as by more general expectations about how energy services should be fulfilled. To stretch these bounds, experimentation that is appropriate to the scale of the solution sought is a must. However, as described in Chapters 5 and 7, the majority of energy-efficiency research projects undertaken in the province concentrate on individual- to building-level innovations. While experimenting at these levels is necessary, TEEC will also very likely require changes to how energy generation, distribution, and use are organized and practiced at the neighbourhood and community scales. Although there are a handful of neighbourhood-level projects in BC striving to build and use sustainable energy systems, the support for these projects as well as the opportunities for learning that come from them tend to be ad hoc. At the community-level the situation is even direr because local governments are legally limited in the ways that they can try to accelerate energy efficiency and conservation across their jurisdictions, other than the City of Vancouver. To help build the relational-capacity of actors seeking to advance TEEC, the governance of TEEC should ensure that learning and innovation is taking place within a diverse portfolio of experiments that represent all levels of energy organization and use. With these observations in mind, I make my seventh proposition for how TEEC should be steered in BC:

Proposition 7: *The governance of TEEC should ensure that the scope of experimentation undertaken to pursue it is consistent with the scale of change sought i.e., buildings, neighborhoods and communities*.

9.6.2 Organizational-level Institutional Structures

One of the most telling indicators of the organizational limits of TEEC was BC Hydro's decision to recommend spending approximately $7 million to advance knowledge on DSM Options 4 and 5 for their possible adoption in future IRPs rather than operationalizing them at the earliest possible date. Although a positive step forward, it is important to bear in mind that the recommendation to extend funding to explore DSM Options 4 and 5 is not inconsistent with recommendations made in previous IRPs. More specifically, in its 2006 IRP BC Hydro included a number of DSM options that demonstrated a high-potential for savings beyond its operationalized plan at the time but for which the utility had little direct experience with. An important difference, though, between the recommendation included in the 2006 IRP and the most recent one is that in the 2006 IRP BC Hydro built the projected savings from these

more uncertain options into its long-term load-resource balance, thereby reducing the space available for acquiring new supply options. The fact that the savings from measures still needing to be worked out were included in the 2006 long-term load-resource balance demonstrated a strong commitment by the utility to pursue them. For its 2012 Draft IRP, BC Hydro recommended spending money to learn more about DSM Options 4 and 5 but did not include their estimated savings in its long-term load-resource balance, demonstrating a lower level of commitment. All of this is to say, that the request to advance Options 4 and 5 via further research is in keeping with BC Hydro's pre-existing structural powers and if anything does not go as far as these power might allow it to.

The key reason given by BC Hydro (2012a) for not recommending DSM Options 4 or 5, despite their estimated cost, economic and environmental benefits, was their perceived deliverability risk. This refers to the risk that an Option will under deliver the amount of savings planned for in the time required by the IRP, leaving the utility in a supply shortfall position. The worst case being that there is a) a significant and widespread DSM underperformance, and b) it took several years for BC Hydro to recognize this and react[19]. From the utility's perspective, the greater the electricity savings planned for, the greater the possible amount of underperformance (BC Hydro, 2012a). By this logic, any DSM Option with more savings will always represent a higher deliverability risk to the utility.

In addition to this inherent risk of striving for higher levels of savings, BC Hydro also noted that "Options 4 and 5 are novel in their combination of DSM tools…This magnifies the uncertainty of moving to DSM targets that are outside of past experience." And what is so novel about the combination of DSM tools included in Options 4 and 5? Largely that they rely heavily on a host of future regulatory changes to achieve the level of cost-effective savings predicted (such as more stringent energy performance requirements, permissions to develop more customized conservation rates, and mandatory building energy labeling) and to which the Province has not yet committed to supporting one way or the other. Given these uncertainties, the current default from an IRP planning perspective is to assume that there will be no regulatory changes made beyond existing or publicly announced regulatory commitments. Given that the Province's current practice is to make any such announcements only in single-step increments, the utility's planning projections that rely on these announcements to map out the probable direction of the province's energy future are structured to display a strong bias toward the present development path.

As discussed in Chapters 7 and 8, BC Hydro's response to these uncertainties was to recommend to the Province DSM Option 3 in its 2012 Draft IRP. Although DSM Option 3 was more ambitious than

[19]According to BC Hydro's Draft IRP, the most significant consequence of DSM under delivering is increased cost as the shortfall could likely be made up with either an increase in DSM efforts or purchasing additional electricity either from the domestic market or import market.

its current DSM Plan, it still fell short of the level of cost-effective savings demonstrated in Options 4 and 5. In the meantime, BC Hydro's strategy to advance DSM Options 4 and 5 was to increase its certainty with regards to the potential savings from these measures by carrying out additional research and sharing this information with the Province. On the surface, this strategy is consistent with reflexive governance's experimentation and adaptation approach to uncertainty in system analysis. However, hidden beneath it are a number of institutional shortcomings.

First, as pointed out on a number of occasions by several members of the EC&E, BC Hydro's handling of risk for its DSM Plan takes an opposite approach to its handling of risk for supply-side resources. In the case of supply-side resources, the utility assumes that a certain percentage of new projects contracted to independent power producers will not get built (i.e., a deliverability risk). For example, if BC Hydro projects that it will need 3,000 GWh of new supply available by a certain date, it will actually sign long-term power purchase agreements for say 4,000 GWh, assuming that one quarter of these will never get built. If it took a similar approach for its DSM resources, it would work to achieve a certain level of savings but only plan on say 80 per cent of these being delivered in the time required by the IRP. Of course one difference between these two approaches is that BC Hydro never pays for supply-resources that do not get built but it does pay for its DSM efforts regardless if they deliver the desired savings or not. Even so, the cost-advantage of DSM is so much greater than it is for supply-resources, that even if only eighty percent of these savings come to fruition, the utility could plan to still be ahead from a cost perspective. However, instead of trying to achieve more savings but planning for less, the utility both tries and plans to achieve less than is optimal from a cost-effectiveness perspective. Given this ongoing disparity between the handling of supply- and demand-side risk, I make the following proposition:

> Proposition 8: *The management of risk for new supply- and demand-side resources should be treated in a symmetrical manner*.

Another issue regarding BC Hydro's handling of DSM risk raised by some members of the EC&E is that it failed to account for DSM's inherent flexibility. This flexibility stems from the fact that its DSM strategy is built on an integrated range of tactics (e.g., rates, programs, codes and standards) and foci (e.g., hard-wired technologies, practices and behaviours). Although the DSM Plan reflects one iteration of how these tactics and foci can be integrated, in reality (and practice), the Plan is dynamic and can be adapted to multiple iterations of these as new information is learned and the utility's context changes. Despite this capacity to adapt as it moves forward, thereby increasing the likelihood of delivering its planned for savings (albeit likely in a different configuration than was conceived of at the time that the Plan was made), BC Hydro's IRP continues to assume that its DSM Plan is fixed in time. As

one of the underlying principles of reflexive governance is the adaptive management of institutions and strategies, I advance the following proposition for how TEEC should be steered:

> Proposition 9: *The governance of TEEC should reflect the flexible nature of demand-side measures to respond in a timely manner to new knowledge and changing circumstances.*

Even if proposition 8 and 9 are followed, as per a reflexive governance approach, there will always be a number of initiatives for which further research is required. However, the potential to advance more transformative measures in an accelerated timeline is far from assured because of at least two organizational-level institutional obstacles associated with the existing IRP process.

First, there can be systemic delays in the flow of resources for creating and advancing new knowledge that stem from the twinning of these resources with the IRP. BC Hydro's integrated resource planning regulatory environment means that the utility's latitude to move is narrowly defined and timed according to the rules which determine how and on what it collects and expends its resources. In Chapter 8 we saw how many of the issues advanced by the EC&E that required higher-orders of learning were very slow to advance on the utility's agenda. A partial explanation for the delay is that many of these issues went beyond the scope of its 2008 Long-Term Acquisition Plan under which its expenditures for DSM are currently approved. To advance them further, BC Hydro needed to ensure that they were a) consistent with its updated IRP and b) expenditures were approved to pursue them. However, delays in releasing an updated IRP because of the province's shifting political and economic environment means that a number of issues advanced by the EC&E have sat idle for more than two years.

An even worse resource situation exists for the Province where TEEC-related research so far consists of a few sporadic and one-off announcements to fund demonstration projects (i.e., the 2008 EEBS). If an ongoing process of experimentation contributing to strategic and institutional adaptation are intricate aspects of TEEC governance, as is suggested by the reflexive governance approach, a more predictable and timely flow of resources to support these activities will be required. For example, in the State of California a public benefits research fund surcharge is applied to the energy bills of customers of investor-owned utilities. The energy research program which is overseen by the California Energy Commission receives approximately $65.5 million annually from this surcharge (a further $62.5 million is raised for renewable energy research), a sizeable portion of which goes to energy efficiency and conservation research which is managed by the California Energy Commission (Database of State Incentives for Renewables and Efficiency, 2013). In BC, a similar surcharge funds the Innovative Clean Energy Fund but the majority of the monies raised goes to commercial-ready supply-oriented projects. To

help accelerate the rate of institutional and experimental adaptation in BC's energy services niches and regime, I put forward the following proposition:

> Proposition 10: *The flow of resources for experimentation and innovation should be timed to the pace of emergent ideas and advances in research.*

Another challenge relating to BC Hydro's recommendation to use resources acquired through the IRP process to expand learning about some of the measures contained in DSM Options 4 and 5, is that despite the IRP's institutionalized mechanisms for acquiring resources on a pseudo regular schedule, the granting of these resources is far from assured. Prior to the 2010 Clean Energy Act, expenditure requests made by BC Hydro in its IRP had to be approved by the BC Utilities Commission. Since the passage of the Clean Energy Act, this approval must now be granted by the Minister of Energy. In both cases, the impact of expenditures on rates in the near- to medium-term is a major criterion used to assess the Plan's appropriateness.

Given the longer-term and non-linear nature of transformational change, the potential rate-related benefits of many TEEC experimental measures will likely occur in the medium- to long-term, while many of the rate-related experimental costs of these measures will occur in the short-term. Although never eliminated, the level of uncertainty about the future can be somewhat reduced by localized experimentation of potential measures to be taken. However, this creates a temporal mismatch by trying to minimize uncertainties about the future with resources from the present, something that existing IRP planning and evaluation practices are not well designed to address.

To overcome this bias toward present costs as opposed to future benefits, efforts to steer TEEC will need to establish a process of funding evaluation that accounts for this temporal mismatch. The Province has done this to a certain extent through an amendment to the DSM Regulation that permits utilities to value the cost-effectiveness of their research and development expenditures based on the impact of these expenditures on the utility's entire portfolio of DSM measures. However, a utility's 'technology innovation program' is currently limited to market ready technologies (up to the scale of building design) that are not commonly used in BC and which could directly or indirectly result in significant reductions of energy use or significantly more efficient use of energy. In other words, it is limited to technologies with potential wide spread gains in the relative near future, criteria which will not apply to many leading edge super-efficient/net-zero building concepts (technological and otherwise) for some time. In the meantime, an experimental gap persists. Although the exact measure for overcoming this gap is beyond the scope of this study, this temporal mismatch will need to be addressed if TEEC

experimentation is to be accelerated. In this light, I advance the following proposition for how TEEC should be steered in BC:

> Proposition 11: *TEEC-related experimentation should be rewarded according to the long-term contribution that it will make to the accelerated diffusion of future initiatives that improve the public benefit*.

9.6.3 Cultural-level Institutional Structures

Although Propositions 8 to 11 should help to increase the rate and size of the resources that flow to experimental TEEC measures, such as the ones recommended in BC Hydro's 2012 Draft IRP for expanding knowledge on DSM Options 4 and 5, they do not address one of the major deliverability risks identified by BC Hydro for these Options, namely, that they rely heavily on a host of future provincial regulatory changes to achieve their predicted level of cost-effective savings. The Province's substantial powers to mobilize resources, create new knowledge and introduce policy measures to nurture the development of high-efficiency and/or low-carbon niche markets power was demonstrated by the burst of activity it led to advance energy efficiency and conservation in the built environment between 2007 and 2009. Given the suite of complex cultural-level conditions that contribute to the pervasive use of inefficient technologies (e.g., market structures and barriers, expectations and norms of how energy services should be fulfilled, and deeply embedded technological infrastructures), the Province's capacity to coordinate authoritative and allocative resources toward a shared "cultural" vision of TEEC will need to be a central component of any TEEC governance effort. Furthermore, as many of the tactics identified in BC Hydro's Option 5 require provincial authority before they can be put into practice (such as establishing more stringent energy performance codes and standards, intensity-based conservation rates, and mandatory energy building labeling and disclosure), the Province will need to be a key partner in any effort to steer TEEC. To this end, the thesis's twelfth proposition about how TEEC should be steered emphasizes the need for strong provincial leadership.

> Proposition 12: *The Province will need to be a key partner in the governance of TEEC*.

Even with the Province's participation, it needs to be emphasized that the Province's position in any partnership, whether it is willing to accept it or not, is that it is first among equals in terms of the power that it wields. In the existing governance approach, the Province holds the bulk of the authoritative power that will likely be needed to advance TEEC, while BC Hydro and the province's other major energy utilities hold the bulk of the allocative powers needed to advance it. While this arrangement may

not in and of itself be problematic, what is problematic from a transition perspective is when it is not clear whether these two elements of power are working to achieve the same notion of TEEC in terms of the desired level and rate of change sought. As was demonstrated in BC Hydro's Draft 2012 IRP, without this clarity the default from an IRP planning perspective is to assume that there will be no regulatory changes made beyond existing or publicly announced regulatory commitments. Given that the Province's current practice is to make any such announcements only in single-step increments, the utility's planning projections that rely on these announcements to map out the probable direction of the province's energy future will necessarily display strong path dependency. Until the Province and utilities share and commit to a more transformative "cultural level" vision of TEEC and layout a probable pathway for getting there, any utility resource-mix suggesting a more transformational development path will be considered a high deliverability risk according to existing utility planning practices and therefore very unlikely to be operationalized. To ensure that this trend does not continue, I make the following proposition:

Proposition 13: *TEEC in BC should be steered by a single shared province-wide vision*.

Unfortunately, as the provincial effort to steer TEEC to date shows, the political attention span for transformational change can ebb and flow relatively quickly and with it many of the resources needed to advance TEEC. Seeing a transformation through, though, will require a consistent, long-term commitment. To help keep the Province on track, then, I make the following proposition:

Proposition 14: *The mandate to ensure that the province's shared TEEC vision is being appropriately planned for and pursued should be overseen in close and ongoing collaboration with a diverse multi-stakeholder advisory committee*.

As was demonstrated with the involvement of the EC&E with BC Hydro, such participation should not only help to ensure that some level of knowledge creation and diffusion may still advance even during periods of a low political appetite for change but also increasing the political stakes attributed to backing away from its TEEC commitments.

9.7 Integration of Propositions

As discussed above, each of these propositions are intended to show the different elements needed to form a hard-governance infrastructure for steering TEEC in BC. They are built on the theoretical premise that socio-technical transitions require not only building stable conditions for niche innovations to be developed and expanded, but also a regime environment with a strong capacity to

support an ongoing and mutual flow of ideas and resources between itself and these sites of experimentation. In other words, it assumes the need for mutually-reinforcing horizontal and vertical relationships between transition niches, the existing socio-technical regime, and efforts to steer a desired transition. As such, these recommendations are intended to be taken as a whole rather than as a menu of independent measures from which one can pick and choose. If the latter is done, what will likely result is a system of governance that is similar to what BC has at the moment, that is, one where a level of limited agencies is created but which the structures within which these agencies are embedded remain largely untouched, resulting in only incremental changes to the status quo.

Furthermore, these propositions are advanced in a spirit of reflexive governance. If the history of modernist governance has taught me anything, it is that we have an uncanny capacity to fix problems only to create new ones. As such, these propositions should be thought of as only the first iteration to the question: How should TEEC be steered? In addition to reflecting upon the governance framework that currently exists to steer energy efficiency and conservation in BC, the propositions themselves and any future application of them need to be applied in an ongoing reflexive manner. With these two theoretical conditions in mind, I advance my final proposition:

> Proposition 15: *The governance of TEEC requires all of the propositions advanced to be implemented in an integrated and reflexive manner.*

Finally, to help understand how my findings create a hard-governance infrastructure for steering TEEC in BC, I have organized the 15 propositions developed in this chapter under one of three categories: ideas and frames of reference, authoritative resources, and allocative resources (see Table 9-2). These categories are the same ones used by structuration theorists to describe the concept of structures being created by the mutually reinforcing and self-sustaining flow of ideas and resources (e.g., Giddens, 1984; Healey, 2003; Sewell, 1992). Although a number of these recommendations could arguably be placed under more than one category, I feel that the order used is a good representation of the individual components needed to build and maintain each structural element. Furthermore, given the case-specific context of these findings, I list them in Table 9-2 as recommendations to highlight their specificity to efforts to steer TEEC in BC.

Table 9-2 How should TEEC be Steered in BC?

Ideas and Frames of Reference:

Recommendation 1: The governance of TEEC requires all of the propositions advanced to be implemented in an integrated and reflexive manner. (Proposition 15)

Recommendation 2: TEEC should be guided by a single shared provincial-scale vision. (Proposition 13)

Recommendation 3: The governance of TEEC should be guided by a long-term normative sustainability goal that is understood to be an aspirational starting point to spur ongoing deliberation and adaptation rather than a final and objective target. (Proposition 5)

Recommendation 4: Stakeholders who participate in the direct governance of TEEC in BC should represent a diverse range of knowledge, perspectives and roles within the built environment energy services system. (Proposition 2)

Recommendation 5: Trans-disciplinary knowledge should be applied to all aspects of TEEC governance i.e., goal formulation, system analysis and strategy development. (Proposition 6)

Recommendation 6: The governance of TEEC should be tied to an institutionalized planning process that requires regular updating and adaptation of goals, system analysis and strategies. (Proposition 3)

Recommendation 7: The governance of TEEC should ensure that the scope of experimentation and niche markets developed to pursue it are consistent with the scale of change sought i.e., buildings, neighborhoods and communities. (Proposition 7)

Authoritative Resources:

Recommendation 8: The Province should be a key partner in the governance of TEEC. (Proposition 12)

Recommendation 9: A governance framework to steer TEEC in BC should include the active and ongoing participation of stakeholders for all aspects of planning. (Proposition 1)

Recommendation 10: The mandate to ensure that the province's shared TEEC vision is being appropriately planned for and pursued should be overseen in close collaboration with a diverse multi-stakeholder advisory committee. (Proposition 12)

Allocative Resources

Recommendation 11: The governance of TEEC should include a flow of allocative and authoritative resources that is both predictable and appropriate for the scale of change sought for all aspects of planning and implementation e.g., experimentation, niche development, energy efficiency programs, and codes and standards. (Proposition 4)

Recommendations 12: The management of risk for new supply- and demand-side resources should be treated in a symmetrical manner. (Proposition 8)

Recommendation 13: The governance of TEEC should reflect the flexible nature of demand-side measures to respond in a timely manner to new knowledge and changing circumstances. (Proposition 9)

Recommendation 14: The flow of resources for TEEC experimentation and innovation should be timed to the pace of emergent ideas and advances in research. (Proposition 10)

Recommendation 15: TEEC-related experimentation should be rewarded according to the long-term contribution that it will make to the accelerated diffusion of future initiatives that improve the public benefit. (Proposition 11)

9.8 Conclusion

I set out in this chapter to see if the underlying hard-governance infrastructures used to steer TEEC in British Columbia can help to explain the state of these conditions. And if so, could the relationship between these governance infrastructures and the TEEC outcomes that they led to be used to develop a set of propositions about how TEEC should be steered to achieve strong conditions for supporting transformational change.

When I mapped the kinds of savings sought by BC Hydro and the Province against the governance processes used to develop these different kinds of energy efficiency and conservation outcomes, I found a strong correlation between the use of reflexive governance practices and TEEC outcomes. Furthermore, of the two efforts to steer TEEC in BC between 2005 and 2012, BC Hydro's effort was clearly more indicative of reflexive governance. The fact, then, that my assessments in Chapters 6 and 8 found that BC Hydro was also more successful in creating the types of conditions that support transformational change than the Province, which used a strong modernist governance approach, is consistent with the hypothesis that reflexive governance is a more appropriate approach for steering transformational change. My review of BC Hydro's reflexive governance approach led to the development of five propositions about how TEEC should be steered in BC (see Table 9-2).

However, despite the success of BC Hydro's EC&E Advisory Committee to advance TEEC onto the utility's planning process, further analysis showed that the level and rate of TEEC outcomes in BC was capped by pre-existing institutional elements within which efforts to steer it are embedded, namely, the cognitive bounds of existing energy efficiency and conservation practitioners, organizational rules of integrated resource planning processes that bias the future toward the present, and powerful provincial authority over almost all aspects of TEEC governance in the Province, particularly over key prime movers such as provincial ministries, utilities, and communities. To better align these structures with efforts to steer TEEC, I advanced an additional nine proposition (see Table 9-2).

Finally, as each proposition represents a different element of a TEEC governance regime but does not in and of itself represent such a regime, I proposed that TEEC governance requires all of the propositions to be implemented in an integrated and reflexive fashion. The significance of this final proposition cannot be understated. If implemented, it requires nothing less than a system-wide transition to a culture of reflexive governance.

Chapter 10: A Final Reflection on Steering Transformative Change

10.1 Summary of the Case Study and Key Findings

I started this thesis with what seemed like a simple question: How should transformative energy efficiency and conservation be steered? However, my review of the sustainable transitions literature in Chapter 2 soon showed me that transformational change, at whatever level, is far from a simple process. It requires me to willfully commit to depart from deeply-entrenched ways of doing things and embark on a journey over an unknown duration of time to an unknown destination to find what is hoped to be a more sustainable and equally satisfying way of doing things. For TEEC, it requires a transition from the existing complex but relatively stable arrangement of socio-technical elements (e.g., technologies, institutions, and actors) that allow me to fulfill energy services in a particular way to building alternative socio-technical arrangements that allow me to fulfill a similar suite of energy services but which over time is expected to be a far more sustainable means to do so.

If building alternative socio-technical arrangements was the only requirement to making this transition, the road ahead would undoubtedly be challenging but in many regards rewarding as the focus of these endeavours would be creating something new, innovative and ultimately "good". However creating new sustainable arrangements is only half of the challenge, and likely represents far less than half of the effort needed to see a transition through. The other half of the challenge is overcoming the deeply entrenched arrangements that already exist and those actors with an interest in maintaining the status quo (cognizant or otherwise). These two aspects of transitions – creating something new and overcoming something deeply entrenched – speak to the two sides of power that efforts to steer transitions must address. To this end, my perspective of change is fundamentally represented by the following idea:

> Enduring transformative change is both a horizontal exercise of building and expanding innovative arrangements of sustainability ideas and authoritative and allocative resources (i.e., niches), as well as a vertical exercise of prompting change by gaining legitimacy and structural support for these innovative niches and scaling them up over time by increasing their structural pervasiveness.

This concept of change is based on a multi-level perspective of power. According to this concept the process of change is one that is co-determined by agencies seeking to achieve a desired outcome and the relatively stable structures within which these agencies are embedded (e.g., institutional, technological, economic, political).

To help us understand how we might address the challenge of getting from the world in which we live today to the sustainable worlds of the future, I looked to the transitions governance literature in Chapter 2. From this literature, the thesis developed a theoretical frame of socio-technical transitions in which it I proposed that a reflexive hard-governance approach to steering socio-technical transitions is

more conducive to creating the kinds of soft-governance conditions that generate the momentum required for transformational change (see Figure 10-1). In essence there are two sets of theories here. The first is that certain conditions are more likely to lead to transformational change than others. The second is that a reflexive governance approach is more likely to lead to these supportive transformative conditions.

Reflexive "Hard" Governance Strategies to Address Sustainability Challenges	Leads to…	Strengthened "Soft" Governance Conditions for Supporting Transformative Change	Leads to…	Desired Long-Term Outcome
Iterative participatory goal formulation Trans-disciplinary knowledge production Experiments and adaptivity of strategies and institutions that is balanced with a capacity to make decisions and produce outputs. Anticipation of long-term systemic effects of measures Interactive strategy development		System Pressures Resources and Ideas: • Shared Vision, • Legitimization, • Resource Mobilization Activities: • Creation of New Knowledge, • Formation of Niche Markets, • Advocacy Actor Network • Heterogeneous membership		Transformed socio-technical system

Figure 10-1 Analytical Frame of Socio-Technical Transitions

As to the first of these, based on the kinds of conditions that contributed to transformational change in other socio-technical systems (e.g., northern Europe's renewable energy sector), the thesis developed eight conditions that I argue are important for creating the kind of momentum needed to propel transitions forward.

Although these conditions may emerge independent of any formal effort to steer a sustainability transition, the thesis's second major theoretical component essentially tried to provide an answer to the question of whether or not the governance approach used to steer a transition matters in terms of building and maintaining these kinds of conditions. This is an important question to ask because moving from the left-side to the right side of this figure is a long journey fraught with many challenges, setbacks, and detours, and, given the dynamic nature of sustainability, one that is never fully completed. One explanation for why intentional socio-technical transitions are so fraught with challenge is that the soft-governance structures that these transitions are embedded within are poorly aligned with the hard-governance infrastructures of the systems that they are attempting to change.

This more meta-level line of questioning adds considerable theoretical value to the thesis because it highlights the argument that efforts to steer transformational change need to take a double-lens approach to steering socio-technical transitions. That is, they need to assess and reflect upon not only the socio-technical aspects of a transition (as is conventionally done) but also *overtly* assess and reflect upon the governance framework within which socio-technical systems are nested and the influence that these frameworks have on both the capacity to steer change as well as the capacity of existing structures and actors to resist it.

To help me hash out this question of governance, I took a theoretical look at two ideal types of governance. The first, modernist governance, is grounded in the traditions of hierarchical decision-making, rational planning (e.g., reductionism and objectivism), and the division of responsibilities. It suggests: "The art of governing transitions becomes one of recognising which context for transformation prevails, and which drivers offer the best leverage for guiding change in a desirable direction" (A. Smith et al., 2005). The implication here is that the right kinds of knowledge will lead to the right kinds of action. This is indicative of what Sarewitz (2012) refers to as a “knowledge-first” approach to sustainability. While seemingly powerful from an agency perspective, it is based on major assumptions about the structural environment within which such decision-making is done, namely: 1) there exists a generally agreed-upon desired path forward, 2) we have the right kind of knowledge to make the decisions needed to move us onto and along that path, and 3) there is sufficient support to start moving ideas, actors and resources onto and along this path.

The second approach, reflexive governance, starts from the viewpoint that not only do these supportive structures likely not exist but even if they do they are uncertain, locally-derived and temporary. Given this spatial and temporal fluidity, sustainability governance is as much a process of building and adapting these structures over time as it is about working to develop and implement the best solutions possible within this shifting context. This second tier of sustainability governance is indicative of what Robinson (2008, p. 78) refers to as procedural sustainability. In this view, sustainability is “the emergent property of a conversation about desired futures that is informed by some understanding of ecological, social and economic consequences of different choices”. Through such conversations desired pathways are identified and shared, new knowledge about the problem and possible solutions to it are created, and support is built to start moving ideas, actors and resources onto and along the desired pathways. Reflexive governance, though, is more than just conversations; they are conversations that are informed by ongoing processes of experimentation, forecasting and backcasting, monitoring, and adapting, as well as scaling-up.

In addition to enabling the adaptive capacity of agents seeking to define and pursue a desired sustainability pathway, reflexive governance also aims to actively lessen the structural powers that the

dominant socio-technical regime holds over the way that things are thought about and done and decisions made. It does this in a number of ways: First, by purposely pursuing experimental alternative socio-technical arrangements and adapting existing institutions and strategies to the knowledge created through these experiments, reflexive governance is also building a structural counter force to the latent path-dependent power that is buried within existing ways of thinking about and doing things. Second, the deep participation of regime and landscape-level actors is strongly encouraged in all roles of reflexive governance (i.e., goal formulation, system analysis, and strategy development). These actors bring with them important knowledge and legitimacy to the process, they also provide critical links for scaling up new structures and providing resources to innovative niches. Finally, in addition to attracting actors who are interested in building the horizontal structures of niches, alternative niches also attract advocates who over time push vertically on the organizational and cultural levels of power to make the types of institutional changes that are needed to level the niche's playing field with the incumbent regime. So, while reflexive governance does not neutralize the power imbalance between the incumbent regime and alternatives to it, it does at least represent a strategic process by which it might be increasingly reduced over time. Given reflexive governance's intentional effort to simultaneously shape and change structures while also increasing the capacities of agencies to evoke change, I hypothesized that it is a more appropriate approach for steering TEEC in BC.

However, before recommending a restructured approach for steering TEEC that is based on reflexive governance, I needed to understand and assess the approaches already being used in BC to try to achieve TEEC in the built environment. So I asked:

> How well is the existing built environment energy services regime working to achieve the transformative energy efficiency and conservation objectives set out by BC Hydro's long-term Demand-Side Measures Strategy and the Province's 2020/50 climate change goals?

To answer this question, in Chapters 3 and 4 I developed a theory-based analytical and methodological framework to unpack and assess the success of two independent but interrelated efforts to steer TEEC by the Government of British Columbia (Chapters 5-6) and BC Hydro (Chapters 7-8) between 2005 and 2012.

The evaluation framework was based on the theory discussed above (see Figure 10-1) which argues that reflexive governance practices help to create the conditions needed to support transformative energy efficiency and conservation. Given the relatively early phase of transformational change taking place in BC, my assessment relied on the kinds of conditions for supporting transformational change that were being created by these efforts rather than their actual physical outcomes to date such as energy

savings and greenhouse gas reductions. Once the strength of these conditions were known, I then used the theoretical concepts of reflexive governance to untangle the role that hard-governance structures played in producing these results.

In Chapter 3, I listed the indicators of a reflexive hard-governance approach to steer socio-technical transitions (see Table 3-1) as well as the 27 indicators developed to assess the strength of conditions supporting socio-technical transitions (see Table 3-2). The indicators used to detect the presence or absence of reflexive governance practices were drawn from the detailed theoretical discussion of reflexive governance in Section 2.4 of the thesis. The 27 indicators developed to assess the strength of each of the eight innovation conditions listed in Table 10-1, meanwhile, were drawn from a variety of different literatures. These included: sustainable energy policy, new institutional theory, systems innovation, organizational learning and socio-ecological systems governance. The fact that so many literatures were used reflects the complexity that is inherent in efforts to understand and ultimately steer socio-technical systems toward more desirable objectives.

Moving to the application of the thesis's theory-based framework, in Chapter 5 I described two niches in British Columbia - green buildings and low-carbon communities – that among other things have been trying to advance ideas about and build the institutional and physical structures of transformative energy efficiency and conservation in the built environment for more than a decade. Based on the growth of British Columbia's green building niche, actors operating within the green building niche demonstrated a strong capacity over the past decade to expand not only the resources mobilized to construct green buildings but its legitimacy as well. Similarly, the concept of low-carbon communities has also gained some momentum over the past decade with a small number of local governments in the province developing transformative visions and planning pathways for their communities as well as implementing some initial measures intended to encourage a higher-efficiency built environment. The expansion of each of these niches between 2002 and 2012 demonstrates the capacity of actors within them to build, secure and integrate their ideas and frames of reference with authoritative and allocative resources. However, despite the expansion of these niches, they remain the exception rather than the rule in the province.

As far as the Province's role in enabling the capacities of agencies trying to expand or normalize these niches, in Chapter 6 I determined that to date these efforts contributed to only weak-to-moderate conditions for supporting transformational change. In fairness to the Province, a number of new initiatives were introduced since 2005 that helped to level the playing field between standard lower efficiency buildings and higher-efficiency buildings over the past decade. However, most of the initiatives advanced or planned to be advanced tend to fit relatively smoothly with the existing energy services regime. They are, in other words, more incremental in focus than transformational. Although there was moderate legitimacy afforded by the Province to the more transformative ideas of super-efficient/net-zero buildings

and low-carbon communities as well as some short-term commitments between 2005 and 2008 to make allocative resources available to advance a small number of leading edge projects related to these ideas, there is still no clear vision about how far and fast these ideas should be pursued in BC. As such, there was no strategy being developed to advance them beyond what was already committed in the 2008 Energy Efficient Building Strategy. This means that for buildings there are virtually no plans in place to extend or expand authoritative or allocative resources to some of the more leading edge market transformation concepts introduced in the 2008 strategy. And for communities, local governments wanting to lead on climate initiatives in the built environment will continue to be hemmed in by restrictive legislation that is applied universally to all local governments in BC other than the City of Vancouver.

In Chapter 8, we saw how BC Hydro's efforts to steer TEEC (as described in Chapter 7) contributed to moderate to weak conditions for supporting the desired transformational change. A key aspect of BC Hydro's effort to expand and normalize TEEC was the participation of its Electricity Conservation and Efficiency Advisory Committee, a stakeholder demand-side measures (DSM) policy niche within BC Hydro. Major strengths of this policy niche were the strong vision of electricity savings put forth by the utility's leadership; the legitimacy, openness, responsiveness and support afforded to the Electricity Conservation and Efficiency Advisory Committee participatory stakeholder process which started in 2006; and the critical and creative thinking that the members who participated in the Committee not only brought to the discussion table but also created and advanced vertically through BC Hydro's planning agenda. Beginning in 2006, EC&E participants were able to provide input into just about every aspect of BC Hydro's planning process related to DSM. Another important enabling element of BC Hydro's approach for steering TEEC was the availability of resources to support it via its integrated resource plan.

In Chapter 9, by comparing each of the processes used to steer TEEC to my indicators for the presence or absence of reflexive governance practices, I determined that the governance approach used by the Province to steer TEEC was more indicative of modernist governance, while the approach used by BC Hydro was more indicative of reflexive governance approaches. The fact that my assessments in Chapters 6 and 8 found that BC Hydro was also more successful in creating the types of conditions that support transformative change was consistent with the hypothesis that reflexive governance is a more appropriate approach for steering transformative change. More generally, by comparing the hard-governance infrastructures used by the Province and BC Hydro to the energy efficiency and conservation outcomes achieved by these efforts, as hypothesized by my analytical framework, *I found a positive correlation between the use of reflexive governance practices and stronger TEEC outcomes.*

More specifically, I drew out five practices that were consistent with the reflexive governance strategies listed in Table 10-1 that I found helped to maintain BC Hydro's momentum for pursuing TEEC even after the Province starting to decelerate its efforts in early 2010:

1. Setting ambitious but adaptive long-term savings objectives (as opposed to absolute quantitative targets);
2. Tying long-term energy savings objectives to more normatively defined economic, ecological and societal benefits (as opposed to an almost exclusive economic-based rationalization);
3. The active involvement of a diverse-range of internal and external stakeholders throughout all phases of the planning process (as opposed to hierarchically derived goal formulation and expert-led system analysis and strategy development);
4. Ongoing and adaptive steering processes (as opposed to processes that are tightly defined in terms of their agenda and time); and
5. Twinning TEEC to an institutionalized and strategic integrated resource plan (as opposed to relying solely on the whims of more immediate political agendas and budgets).

Looking at this list, a few points relating to the theory of reflexive governance used in the thesis are worth mentioning. First, in some respects BC Hydro's long-standing practices of integrated resource planning, "triple-bottom line" cost-benefit analysis, and stakeholder consultation laid the structural foundation for TEEC to be pursued. However, the pursuit of TEEC did not start to take off until the organization articulated its ambitious vision and then backed up the pursuit of this vision with the active and ongoing involvement of its EC&E Advisory Committee. Although the momentum that was started following the addition of these second two practices in 2006 might make it tempting to say that they were more important than the other three, I am very hesitant to take this approach because I feel that it is important to emphasize that it was the collective application of these practices that created the systemic momentum that ultimately drove TEEC forward.

Second, there is little said in the literature about the twinning of transition efforts with existing institutionalized processes. If anything, existing planning processes are often characterized as working against efforts to steer transitions because of their embeddedness within a modernist framework. While I won't disagree that such embeddedness may limit the long-term potential of these efforts, they should also not be too hastily overlooked as potentially important institutional gateways for starting transition conversations and steering processes. In the case of BC Hydro, the utility's IRP process provided the backbone for the resources and processes that the EC&E Advisory Committee was able to tap into and try to influence over a six year period.

Third, although we saw some evidence in the BC Hydro case study of each of the five reflexive governance strategies listed in Figure 10-1, reflexive practices that received noticeably less attention were

the development and application of new knowledge via experimentation and adaptation and interactive strategy development. Given the relatively early phase of the study's particular transition, this delay in these two more action-oriented (as opposed to planning-oriented) elements of reflexive governance is perhaps not surprising. Based on a study of the 25-year transition of the Dutch water governance regime, van der Brugge (2009) suggests that early transition activities should focus first on the formation of an alternative niche-structure, including its vision and participant selection. Once these basic building blocks are establish, learning via actor interactions and experimentation and efforts to align niche solutions with the power needed to scale them up can begin in earnest. So rather than think about the application of reflexive governance as an all or nothing affair, it is more realistic to think of it as an evolving transition.

Fourth, an aspect of the BC Hydro case study that is easy to overlook is the fact that much of what is discussed in Chapter 7 was a single, ongoing deliberation process that started in 2006 and ran until the end of 2012. The longevity and flexibility afforded to this process by BC Hydro not only allowed new ideas to be discussed, but to a certain extent to be developed and implemented as well. In addition to BC Hydro's support, an important reason for this progression of ideas was the fact that the EC&E Advisory Committee pushed BC Hydro for results and demanded a certain level of accountability from the utility in order for the process to be deemed legitimate in their eyes. An important emphasis missing from Voß and Kemp's (2006) discussion of reflexive governance, then, is that practicing reflexive governance is not simply about ticking off the right procedural boxes for any single planning initiative. Instead, it is more importantly about the recursive application of these practices over time. In this way they have an increased likelihood of becoming institutionalized rather than one off exercises of idea exploration.

Despite creating somewhat stronger conditions for supporting transformative change than the Province, it is important to not lose sight of the fact that BC Hydro's efforts were also hemmed in by the structural context within which these efforts were embedded. In keeping with these observations, I now move to my findings that address the dissertation's second research question:

> From a governance perspective, what is preventing or at least slowing transformative energy efficiency and conservation in B.C.?

Given that my evaluation found a positive correlation between the use of reflexive governance practices and stronger TEEC outcomes, a hasty answer to this question might be that the continued use of modernist governance practices are slowing TEEC in BC. But do my findings so far really prove that a reflexive governance approach does indeed lead to stronger TEEC outcomes? Could the same practices not also be established *and* flourish within a modernist governance framework which is typified by hierarchical decision-making, rational planning (e.g., reductionism and objectivism), and the division of

responsibilities? If practiced in its purest sense, probably not. However, in practice such ideal types of modernist governance are rare and likely unrealistic in mature democracies. Indeed, what we saw in the case studies was more of a sliding scale of mixed modernist and reflexive governance approaches.

In both cases efforts to steer TEEC in BC were prompted by goals and the flow of resources from powerful central actors – the Government of British Columbia and BC Hydro. Furthermore, these efforts led to some degree of new TEEC-related activities being pursued; most noticeably knowledge creation and the development and implementation of policies and programs intended to support emerging high-efficiency practices and technologies in the built environment. Given these patterns of centrally led change, one can argue that hierarchically-legitimized leadership and resource flows bound to rational planning practices were critical factors in driving TEEC in BC (particularly between 2007 and 2009).

However, within this hierarchy some more reflexive practices were used. For the Province, two of the strongest examples of TEEC being led by more reflexive governance practices were the Climate Action Team's Report and the Vision 2020 initiative. Both instances were led by ambitious goals, included some degree of stakeholder involvement, and used some form of forecasting and backcasting techniques to create better anticipatory information about TEEC and the steps likely need to achieve it. Interestingly, both of these examples, like BC Hydro's Integrated Resource Plan, represent high-level, strategic processes to define and map out a pathway toward some desired long-term outcome. Perhaps then, in some way, reflexive governance practices are likely inherent in many efforts to think about and plan for a future that is intentionally different than the present. So what's the big deal?

The big deal is that these strategic reflections should act as a gateway to expanded knowledge production, innovation, market formation, adaptation, and ultimately system change. Instead what we saw happening in the case studies were strategic reflections followed by inaction (as happened with both the Province's Climate Action Team Report and Vision 2020 initiative and by the end of 2012 what appeared to also be happening with BC Hydro's DSM Option 5 as the utility shifted to an anticipated supply-surplus position). So although some reflexive practices were evident in early phases of TEEC planning and development, they were not followed up with other practices such as developing an agenda for experimentation, strategy development, monitoring and evaluation, and adapting strategic and institutional structures based on the new knowledge coming out of from these processes.

So although it can be argued that hierarchically-legitimized leadership and resource flows bound to rational planning practices were critical factors in driving some aspects of TEEC in BC, it is also true that by failing to continue to overtly support TEEC after 2009 this same hierarchy was a critical factor in slowing down efforts to drive it forward in BC. Hierarchically driven goal-formulation and resource flows, then, are double-edged swords.

Furthermore, as the BC Hydro example demonstrates, the benefits of its more reflexive governance approach only extended as far as it was used by BC Hydro's planning regime. That is to say, it was effective in developing high-level concepts and even having several of these concepts adopted by BC Hydro or used in its integrated resource planning analysis. But when it came to putting these ideas and plans into practice, their progress was halted or at least slowed considerably by the pre-existing modernist governance institutions within which these efforts to steer TEEC were embedded.

Given these findings, I suggest that one key element preventing or at least slowing TEEC in BC is the continued organizational- and cultural-level predominance of existing modernist governance approaches. Although individual reflexive practices may not necessarily be inconsistent within existing modernist governance regimes, it seems as though the recursive application of them may be so. At some point, either these practices are limited by the higher-level structures within which they reside or these higher-level structures must themselves be redefined in a manner that is more consistent with reflexive practices in order to allow the gains in knowledge and shifts in power to flourish that these practices are purported to lead to.

The important point here is not whether reflexive governance must exist completely independent of modernist governance, but whether or not the higher-order structures of governance in which they are embedded give enough space to allow reflexive processes to emerge and continue to pursue and advance transformative objectives. In instances where it can, then some level of balance between modernist and reflexive modes of governance should be evident. However, when it cannot, hard questions need to be asked about the appropriateness of the higher-order institutional contexts in which these episodes of transformational change are embedded. This second order of questioning is very much in keeping with one of the underlying principles of reflexive governance thinking, reflecting on the role that governance systems play in achieving desired objectives. Reflexive governance, in other words, assumes a hard-governance infrastructure that is both fluid and dynamic.

In keeping with this approach, to help me understand the specific governance-related institutions that were preventing or at least slowing down TEEC in BC, in Chapter 9 I carried out an integrated analysis of the two case studies to identify and explain how different relational, organizational, and cultural institutional-structures were impeding efforts to advance TEEC in BC. By doing this, I found a number of significant institutional hindrances. For example, important institutional barriers at the relational level were the cognitive bounds of the energy efficiency and conservation practitioners who were trying to develop and apply ideas related to TEEC. At the organizational-level, meanwhile, the normative rules that BC Hydro used to help guide its integrated resource planning process were slowing-down the rate at which TEEC progressed. Finally, at the cultural-level, I found that the lack of a persistent Provincial commitment to pursuing TEEC was hindering the scaling-up of the TEEC-related norms and

values that were being expressed through more reflexive relational-level exercises such as the Climate Action Team's Report, Vision 2020 and BC Hydro's DSM Option 5.

As a way to begin a broader conversation about how I might start to address these institutional barriers in order to help advance and accelerate TEEC in BC in a timeline that is consistent with the long-term objectives stated by the Province and BC Hydro, I next advanced 15 evidence-based propositions to answer the thesis third major research question:

> How might the energy efficiency and conservation governance regime be organized to increase the capacity of agencies to achieve transformative energy efficiency and conservation in order to increase the likelihood of achieving BC Hydro's and the Province's long-term transformative EEC objectives?

The first set of propositions recommend a deeper integration of transdisciplinary knowledge production and a more ambitious TEEC experimentation agenda as ways to enhance opportunities for relational-level TEEC knowledge creation and learning. To increase the vertical flow of resources between the province's built environment energy services regime and its various TEEC niche's, the second set of propositions suggest a number of ways to increase the adaptive capacity of the energy services building regime to not only pursue and support new TEEC initiatives but to scale them up as well. Finally, recognizing that the scale and rate that TEEC is pursued in BC is strongly influenced by hierarchically-based Provincial powers, the third set of recommendations are aimed at building a coherent and consistent provincial commitment to advancing TEEC.

As a way of providing a single answer to the question of how TEEC should be steered, in Chapter 9 I organized the 15 propositions according to the three types of elements that structuration theorists (e.g., Giddens, 1984; Healey, 2003; Sewell, 1992) argue represent the basic building blocks of social structures – ideas and frames of references, authoritative resources and allocative resources. When taken as a whole, I conclude that these propositions represent the hard-governance infrastructure that is needed for steering TEEC in BC. In keeping with the multi-level and multi-directional theoretical perspective of transformations that was developed in Chapter 2, they reflect a governance framework that not only seeks to horizontally build, secure, and integrate TEEC ideas and frames of reference with authoritative and allocative resources but perhaps even more importantly to also prompt change vertically by building legitimacy and scaling up innovative arrangements of ideas and resources.

As stated in the conclusion of Chapter 9, if implemented, the propositions put forward by this thesis require nothing less than a gradual system-wide shift to a culture of reflexive governance. As such, this conclusion supports the hypothesis that was advanced by Dusyk et al (2009b, p. 388) that pursuing transformative levels of energy efficiency and conservation require not only transformational changes in the socio-technical systems within which energy services are fulfilled (e.g., buildings, communities, day-

to-day practices) but also in the governance approaches used to try to achieve these changes. It also provides an evidence-based answer the thesis's underlying research question:

> Do transformative levels of energy savings and intensity improvements also require more integrative and systemic approaches to energy governance?

Given the emergent and network-oriented properties of reflexive governance, I suggest that achieving transformative levels of energy savings will need to be coupled with a shift to a more integrated and systemic approaches to energy governance.

However, in the spirit of reflexive modernization, my answer is given with an important word of caution to the reader. Although my findings are evidence based, I nevertheless have only limited knowledge about how they will work and indeed not create the next set of problems. Mindful of this, in my final proposition I recommended that my answer to this research question be implemented in reflexive manner. By this I mean that in addition to reflecting critically upon the propositions themselves, any future application of them needs to be applied in an ongoing reflexive manner to develop their full potential for change.

10.2 Implications and Significance

The impetus for this dissertation was to address the non-academic problem of steering transformative energy efficiency and conservation in the built environment over the coming decades as a strategy for drastically reducing the energy and carbon intensity associated with fulfilling energy services. This societal "problem- and solution-oriented" research agenda is in keeping with an emerging view of interdisciplinary research (Klein, 2004; J. Robinson, 2008, p. 71). So while I list below a number of contributions to the literature that reflects what is perhaps a more conventional perspective of interdisciplinarity (i.e., the weaving together of ideas from different disciplines), its most significant contribution is the critical perspective that it brings to the decades old challenge of trying to improve the economic, social, and environmental consequences of fulfilling energy services. With this in mind, I now present some of the more specific academic and practical contributions made by this study.

Although ideas about technological, politics and institutional structures are acknowledged as being at the core of many socio-technical transitions studies, until recently, the institutional perspective taken was generally limited to technologies that were being applied (e.g., path dependence) or to cognitive limitations of the technologists that were applying them. This thesis adds an explicit organization-based new institutional lens to the study of socio-technical transitions which basically seeks to understand the influence that the institutional context of the organizations within which these technologies are being pursued or applied has on transitions. In Chapter 2, my understanding of how

socio-technical systems change is developed through a parallel review of literatures in new institutionalism, in organizational studies, science and technology studies, and technological change. Although some attention has started to be paid to the role of organizational institutions in transitions (e.g., Frank. W. Geels & Schot, 2007; Grin, 2010), to the best of my knowledge, this is the first time that these literatures were compared on par with one another. Moving forward, this should help to not only direct other scholars to this literature but to see how closely its institutional-perspective of change complements the technical-perspective of change provided by technology studies and the political-perspective of change provided by science and technology studies.

Another bridge between new institutional theory and the socio-technical transitions literature is the multi-level and multi-directional perspective of power that was developed and applied in Chapter 2. To a certain extent some of the elements of this perspective are already well represented in the socio-technical transition's multi-level perspective of change. However, missing from its explanation is a strong recognition that niches like regimes are institutionalized in terms of how they are organized and function. For example, in Grin's (2010) comparison of Arts & Tatenhove's (2004) three-level framework of power to the multi-level perspective of socio-technical transition studies, he maps the three levels of power (structural, dispositional, and relational) directly onto corresponding levels of the MLP (i.e., landscape, regime, niche). This misses the point, though, that both niches *and* regimes are subject to all three levels of power. This clarification matters because it reminds me that just as rules are set about how actors within regimes should function, so too are rules set about how actors within niches should function. As such, efforts to understand and possibly influence transitions need to ensure that they address all levels of structures shaping niches and regimes when looking at processes of socio-technical change.

The demand-side focus of this dissertation is another aspect that is not commonly addressed by the socio-technical transitions literature, particularly with regards to energy. One explanation could be that the origins of the field are in technological change and as pointed out in the introduction, transitioning to transformative levels of energy efficiency and conservation is more a question of policy than it is of technology (International Energy Agency, 2012). In this regard, then, efforts to reduce the energy and carbon intensity of energy services may have more in common with studies related to the management of water resources where the emphasis tends to be on the creation of innovative policies via policy niches rather than innovative technologies (Knieper, Holtz, Kastens, & Pahl-Wostl, 2010; Pahl-Wostl, 2008; van der Brugge, 2009). Given the potential for demand-side aspects of energy use to mitigate carbon emissions, it is hoped that this study can be used as a platform for others to assess and understand how transformative energy efficiency and conservation should be steered.

In addition to bringing a demand-side energy focus to transition studies, this dissertation is also an introduction of transition studies to the field of energy demand planning. In many regards, energy

demand planning is a natural fit for ideas about steering intentional socio-technical change. It is essentially what the field has been trying to achieve since the late 1970s. What differs, though, is the scale and rate of change sought. As efforts in BC, Massachusetts and California show, it is only in the past few years that the mainstream focus of this field started to shift to rapidly scaling energy efficiency and conservation at the building, community, and societal scale. Prior to this, most efforts were on improving the energy intensity associated with individual behaviours or technologies through resource acquisition strategies. Although there has been a shift in practice from resource acquisition to market transformation over the past one-and-a-half decades in many jurisdictions, the markets targeted for "transformation" were generally isolated and discrete energy technologies (e.g., light bulbs, windows). As such, the level of impact was contained and the focus needed to achieve a desired market change was relatively narrow. The same cannot be said when the objective of a market transformation is the built environment. Although likely not politically palatable, such a scale of change suggests not "market transformation" but "societal transformation". This study, then, is an early indication of the shift in governance that is likely needed to accompany such an expanded agenda. Although I am careful not to extrapolate the findings of this single case study, the propositions advanced in this thesis provide some indication to the field of the hard-governance infrastructures needed to steer the next era of energy planning

Looking more into the specifics of my case study, one of the telltale differences between the effort undertaken by the Province to analyze and develop a strategy for pursuing transformative energy efficiency and conservation (TEEC) and the one undertaken by BC Hydro was their longevity. One reason that BC Hydro's EC&E Advisory Committee was able to gain as much traction as it did on its ideas was because it was around to not only recommend them but to help develop and monitor their progress as well. This finding adds support to the hypothesis advanced by Grin (2010, p. 231) "that transitions and system innovations will result when both types of activity [regime building actors & new experiments] reinforce each other over a prolonged period of time." It is also an important lesson to bear in mind for transdisciplinary exercises intending to influence more sustainable planning outcomes. Defining what sustainable outcomes are desired should be thought of as only the first step in the transdisciplinary process needed to achieve these outcomes. Considerably more action-oriented research needs to be done on what comes after local definitions of sustainability are established.

This dissertation is also one of the few examples of an effort to link descriptive transition studies, which represents the majority of the field, with (normative) assessment and evidence-based recommendations. To do this, I needed not only a double vision of the problem as suggested in Chapter 2 (i.e., of the socio-technical system in transition as well as the system of governance steering it) but also an additional lens that I could use to carry out my evaluation.

Moving from theoretical contributions to a methodological one, given the early phase of change in which most sustainability transitions are in, it is difficult to know what gains if any these efforts are contributing to. Without such a measure it is difficult to assess whether existing efforts to steer change are appropriate or not. Although my review of the literature pointed to a number of factors which have been found to positively influence socio-technical transitions, I could not find any framework that tried to link these factors to a method of analysis. Given this shortcoming, I developed a generic analytical framework that not only defined system conditions required for supporting transformative change but also defined the criteria with which the strength of each of these conditions could be assessed. This in turned allowed me to compare both efforts to steer transformative energy efficiency and conservation in BC according to a single set of criteria. Although the use of this framework was exploratory, it did show its potential as a generic analytical tool for comparing multiple case studies, something which has not yet been established in the socio-technical transitions literature.

At the local scale, the propositions developed in this thesis provide a starting point for those involved with or trying to influence how energy efficiency and conservation is steered in BC to consider and discuss not only what the objectives of these efforts should be but also about the institutional structures needed to support them. For each of the 15 propositions advanced in this dissertation, there is a myriad of details to be worked out. The very kinds of details that are well suited to the multi-scalar, participatory and transdisciplinary governance process outlined in Chapter 9.

10.3 Strengths and Limitations of the Research

The study could not have possible without the extensive and ongoing access that it had to energy efficiency and conservation deliberations within and between BC Hydro and the Province of British Columbia as well as with their stakeholders. As a result of this in-situ perspective, I was able to pull back the "black box" of energy planning to see the dynamic process from which new ideas emerged or in some cases were stifled. This perspective also gave me an opportunity to identify what the perceived barriers to advancing new ideas about energy efficiency and conservation were and the tactics used by different actors to enforce or overcome these barriers. For example, although many conversations tied back to the economic imperative of energy efficiency, by looking into the black box, you quickly realize that there are many ways from which this imperative can be approached and defined (e.g., strictly economic cost-effectiveness over supply, economic cost-effectiveness and reliability, or cost-effectiveness based on full-cost accounting that includes environmental services and public benefits/costs).

None of the observations over the course of the study's six-years of research would have been possible without the support and trust afforded to it by actors within the Province and BC Hydro, as well as the stakeholders with whom they worked. The capacity to build and maintain the trust and interest of these actors, then, was a key strength that is often undervalued in observation-based research.

In addition to collecting data through these in-situ observations, the research also used extensive interview and document analysis methods for collecting data. These additional methods not only helped to add clarity and context to what was observed but to also provide a more longitudinal perspective of EEC planning in British Columbia. Furthermore, as it was impossible for the dissertation's primary researcher to be in every setting where interactions regarding TEEC in the built environment were taking place, these sources of information were vital for providing a fuller picture of the planning and initiatives taking place.

Within BC the dissertation took a deep and long perspective of efforts to steer TEEC in the province. At its onset, the main focus of research was BC Hydro and its EC&E Advisory Committee. However, through my early observations of these deliberations, as well as the development of my theoretically-derived multi-level perspective of power (Chapter 2), it was realized that to reliably describe and assess TEEC governance in BC required an equally rigorous study of the Province's efforts to steer TEEC. For the BC Hydro example, this integrated approach highlighted the limitations of the utility's powers to achieve TEEC without strong provincial leadership and coordination. For the Province, having a procedural counter-example, demonstrated the knowledge and advocacy limitations of its existing modernist governance approach to steering TEEC.

Another scope related strength of my research is the longitudinal perspective that it provides to efforts to steer TEEC in BC. In 2009, the dissertation's author participated in a paper that described activities taken in the Province largely between 2007 and 2008 to advance TEEC (N. Dusyk, T. Berkhout, S. Burch, S. Coleman, & J. Robinson, 2009a, p. 397). In that paper, we concluded that "a substantive shift has occurred in British Columbia and that the goals being set by the province are starting to be backed by concrete action and political will". This conclusion is considerably rosier than the one arrived at only four years later by this dissertation. The point here is not to say that the conclusion derived in 2009 was wrong, it is more to appreciate how quickly the landscape dynamics of transformation can shift from one period of time to another. By taking a more longitudinal look I was able to not only understand how landscape-level events and actors can trigger such shifts (see Chapter 5) but also the counterforce that active and ongoing stakeholder engagement can bring to maintain a transition's momentum during periods of less supportive landscape or regime pressures (see Chapter 7). By taking a longitudinal perspective, then, I learned that just as important as creating momentum for transitions during periods of open policy windows, is the importance of building in procedural resistance to maintain this momentum when the window inevitably starts to close.

As noted above the organizational and temporal scopes selected for the dissertation are broad. While these bring with them the advantage of a more integrated look at efforts to steer TEEC, they inevitably mean that the granular data used to understand or assess any particular interaction or criterion

will be gritty rather than fine. What can get lost in the data as a result are the actions and influence of individuals that affect higher-order structures. Although I observed the actions of individuals as well as spoke directly with many of the people who I observed, what I have essentially presented in this dissertation is a system of governance that is created through vertical interconnections between subsystems (i.e., communities-of-learning and power within niches, regimes, and landscapes) rather than through more horizontal interconnections between actors and/or actants. In reality, governance is an outcome of both of these dynamics. And while I am deeply intrigued by the latter, in the end, my interest in the institutional components of transitions led me to the former approach.

Also along the lines of scope, one of the challenges persistently faced by the study was learning the language of the deep technocratic practices of energy planning and evaluation. The first two years of research were as much (if not more) about getting up to speed on the concepts underlying these practices as it was about assessing their effectiveness. After this time, although the learning never stopped, I had at least acquired enough of understanding to speak back (although likely with a strong accent). As a result, there were inevitably some details lost in translation along the way.

Looking back on the study's evaluation method, it could have benefited from a more participatory approach throughout the research process. Although research-related links were made with participants from within BC Hydro as well as the BC Ministry of Energy and Mines (i.e., through their involvement in a funding application process, participation on the research committee, opportunities to provide feedback on a preliminary case study draft, and presentations of findings scheduled after the study's completion), these links and the creation of knowledge could have been stronger if this participation had extended more into the design and analysis phase of the evaluation.

Similarly, although my research espoused and observed transdisciplinary participatory processes, its data was collected through less interventionist methods (i.e., observations, interviews, and document analysis). As a result, many of the benefits that I attribute to such processes (i.e., more critical and complex knowledge about the issue in question, a shared vision, and advocacy) have not emerged as a result of this study. Despite this limitation, it is hoped that this work will feed into future deliberations about how TEEC should be steered in BC. Continuing my look forward, in the final section of this chapter I make a number of recommendations for future research in this field of query.

10.4 Suggestions for Future Research

One area for future research is to take a more comparative look at efforts to steer TEEC as a way to test and generalize the propositions made in this dissertation. To minimize the number of potential explanatory variables, an obvious place to start is in jurisdictions with similar divisions of power between state and utilities as these are arguably two of the most powerful actors in the energy services regime. If I was continuing my particular study, Massachusetts and California would be strong candidates to include

as comparative case studies because, like BC, both States have major utility-delivered rate payer EE programs.

Another interesting focus of future research would be to look at how different actor and technological arrangements influence not only how TEEC is steered but the level of success that these efforts experience. As the focus of this dissertation was primarily on institutional arrangements, more actor and technology-oriented research would help to identify the type and level of influence of these other leading elements of socio-technical systems on transition processes. Looking across different types of systems (e.g., transportation, shelter, and water management), it may be that some elements are more influential in some systems than others or certain patterns of arrangements lead to an increased capacity to steer change. If so, such information could help to customize the hard-governance infrastructures used to steer change.

As discussed above, the language of energy planning and evaluation runs deep and with it the assumptions by which billions of dollars of energy-related resources are spent every year. It is my view that a detailed discourse analysis of these practices would be fruitful both from a theoretical and practical perspective. Indeed, if the propositions advanced by this dissertation are implemented, such an analysis would be invaluable not only for those from the "outside" who are trying to participate but also for those on the "inside" to reflect upon themselves and the assumptions that they take for fact.

The dissertation's evaluation framework for assessing the strength of system conditions supporting transformative change (Chapter 3) could benefit greatly from its application in other systems seeking transitions toward sustainability (e.g., universities, health care, transportation, agriculture) as well as across historical examples of transitions. Such studies are necessary to test the framework's flexibility and reliability. Given the early phase of transformational change that most efforts to steer sustainability are in, a major information gap facing these efforts is the level of success that they are having given that their aggregate physical impacts are likely to be minimal until later stages of change. The sooner feedback can be given to these efforts, the sooner adaptive measures to improve the strategies and institutions adopted to advance them can be made.

In terms of evaluation, as the initiatives in the dissertation's two case studies move forward, it would be helpful to blend an outcome-based assessment with the existing conditions-based one. This would serve to not only track the progress being made by BC Hydro and the Province but also to test and adapt the predictive strength of the evaluation framework used in this thesis.

Moving to the implementation of the dissertation's propositions, intervention research could help the organizations involved the study start to interpret and develop a strategy for transitioning to the kind of reflexive governance approach recommended by this dissertation. And as a way of enabling its self-

reflexive proposition, monitoring and evaluation could be undertaken to assess whether or not the proposition once applied are leading to the changes intended.

Finally, I think that there is much to be learned from a closer look at the relationship between cultural- and organizational-level structures during the planning for and application of procedural sustainability practices. In Chapter 2 I proposed that the five reflexive governance strategies developed by Voß and Kemp (2006) provide some signposts for practitioners as to where the potential organizational powers for procedural sustainability may lie and can start to be built. However, I cautioned that in order to be successful such organizational-level efforts needed to also be couched within the cultural-level notions of procedural sustainability. As way of example, I looked briefly at the challenges faced in the Netherlands when the transition management approach for steering socio-technical transitions was placed within a modernist governance culture. In this dissertation, I saw similar incongruences in the BC Hydro case study. In this case, many of the ideas being generated by the more reflexive-oriented Energy Efficiency and Conservation Advisory Committee were being stunted by the utility's overarching modernist governance culture. These two examples suggest that getting the culture of procedural sustainability right is just as important as the practice of procedural sustainability.

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Appendices

Appendix A Membership of BC Hydro's Electricity Conservation and Efficiency Advisory Committee (2007)

Member	Affiliation
Brenda Binnie	President, UBCM; Councillor, City of Castlegar
Chelsea Burns	Student , UBC Arts & Science
John Cockburn	Chief Standards & Labelling, Natural Resources Canada
Lisa Coltart	BC Hydro, Director, Power Smart
David Craig	President, Consolidated Mgmt Consultants
Barbara Docherty	Independent Power Producers Association of BC (IPPBC)
Dennis Fitzgerald	Catalyst Paper
Fred Fortier	North Thompson Indian Band
Tom Hackney	Sierra Club of Canada - BC Chapter
Steve Hobson	BC Hydro, Manager, Power Smart
Matt Horne	Pembina Institute for Appropriate Development
Michelle Larstone	Independent
Daniel Johnston (Facilitator)	Hope Johnston and Associates
Art McDonald	School Plant Officials Association of BC
John Newcomb	Independent
Dan Potts	Joint Industry Electricity Steering Committee (JIESC)
John Robinson	University of British Columbia
Andrew Pape-Salmon	Min. of Energy, Mines and Petroleum Resources (MEMPR)
Nic Rivers	Simon Fraser University
Dan Smith	Hamatla Treaty Society
Sarah Smith	Manager, Marketing and Energy Efficiency, Terasen Gas
Douglas Spratt	Building Owners and Managers Assoc of BC (BOMA-BC)
Michelle Taschereau	Brite-Lite Vancouver Inc.
Bev Van Ruyven	BC Hydro, Senior VP, Customer Care and Conservation
Robert Wickson	BC Chamber of Commerce
Doug Wittal	Canadian Home Builders Association
Chandra Wong	Independent

Appendix B Methods and Document Sources Used to Locate Issues Raised or Submitted Directly to Provincial Decision Makers.

"Source of Issue"	Methods	Documentation Source
Province	Observations, Interviews, Documentation	(Ministry of Energy Mines and Petroleum Resources, 2007a, 2008)
Climate Action Team	Documentation	(Climate Action Team, 2008)
Union of British Columbia Municipalities (UBCM)	Documentation	(Union of British Columbia Municipalities, 2013)
Municipal Green Building Leaders (MGBL) Mayors	Documentation	(Campbell River et al., 2010)
BC Partnership for Energy Conservation and Efficiency (BCPECE)	Observations	
FortisBC (formerly Terasen Gas)	Documentation	(Terasen Gas Inc., 2010)
Environmental Non-Governmental Organizations (ENGOs)	Documentation	(BC Sustainable Energy Association, 2007, 2012a; BC Sustainable Energy Association et al., 2007; Dauncey, 2006; David Suzuki Foundation, 2001; Horne, 2008; Pembina Institute, 2009, 2011, 2012a, 2012b)

Appendix C Organizations Advocating for Some Aspect of Transformative Energy Efficiency and Conservation in British Columbia

Organization	Type of Organization	Established	BC Specific Activities
BC Sustainable Energy Association	Sustainable Energy NGO	2004	Report (2005): Sustainable Energy Policy Document Report (2006): Maximizing Energy Efficiency and Renewable Energy in BC Report (2007): Analysis of Key Policy Points in 2007 BC Energy Plan Report (2007): Climate action portfolio Submission (2007): Comments on the proposed green building code Report (2008): Climate Action Team Input[8] Report (2008): Climate Action Team Report[9] Report (2010): Ten Barriers to Small Scale Renewable Energy Report (2010): A Tax Revolt in Reverse: Greening BC's Economy through Smart Green Taxation Submission (2012): Pay As you Save BC Response Submission (2012): Budget 2013: Support the carbon tax!: No to tax or ratepayer subsidies to shale gas or LNG
BOMA BC	Building Industry Association	2005	Building certification, information and education
Built Green Canada	Green Building Certification	2003	Building certification, information and education
Campbell River	Local Government		Letter (2010): Letter from Green Building Leaders to BC provincial government
Canada Green Building Council	Green Building Industry Association	2002	Building certification, information and education
Caribou Regional District	Regional Government		Carbon offsets (balancing local government emissions through local reduction projects)
Cascadia Region Green Building Council	Green Building Industry Association	1999	Submission (2007): Comments on the proposed green building code
City of North Vancouver	Local Government		UBCM Resolution (2007): Local government action on energy efficiency for new buildings Letter (2010): Letter from Green Building Leaders to BC provincial government
Community Energy Association	Community Energy NGO	1993/ 2004	Integrated community energy consulting, information and education
Cowichan Valley Regional District	Regional Government		Letter (2010): Letter from Green Building Leaders to BC provincial government
David Suzuki Foundation	Environmental NGO	1990	Report (2001): BC at the Crossroads: Clean Energy or More Pollution Submission (2007): Comments on the proposed green

Organization	Type of Organization	Established	BC Specific Activities
			building code Report (2008): Climate Action Team Input[20] Report (2008): Climate Action Team Report[21] Report (2012): Recommendations to improve BC's Carbon Neutral Requirements
Dawson Creek	Local Government		Submission (2007): Comments on the proposed green building code Letter (2010): Letter from Green Building Leaders to BC provincial government UBCM Resolution (2011): Renewable energy requirement
District of North Vancouver	Local Government		UBCM Resolution (2010): Expanding the scope of carbon offsets
District of Saanich	Local Government		Submission (2007): Comments on the proposed green building code
Federation of Canadian Municipalities	Local government association		Local government information and education Milestone based climate change planning framework for local governments Green Infrastructure program
Forest Ethics	Environmental NGO		Report (2012): Recommendations to improve BC's Carbon Neutral Requirements
Fort St. John	Local Government		Letter (2010): Letter from Green Building Leaders to BC provincial government
Fraser Basin Council's Smart Planning for Communities	Sustainable Communities NGO	2005	Sustainable community consulting, information and education
Globe Foundation	Sustainable Business NGO	1993	Report (2007): The Endless Energy Project Report (2012): British Columbia's green building and energy efficiency sector
Lighthouse Sustainable Building Centre	Green Building Service Provider	2005	Submission (2007): Comments on the proposed green building code Report (2008): Green building in British Columbia Report (2008): Climate Action Team Report[9] Report (2012): Towards Carbon Neutral Buildings in BC
Metro Vancouver	Regional Government		UBCM Resolution (2010): Local government share of provincial carbon tax revenues (to use for carbon reduction initiatives) UBCM Resolution (2010): Maximizing reductions in greenhouse gas emissions (accelerate BC Building Code Changes)
Mountain Equipment Co-Op	Retail Business		Submission (2007): Comments on the proposed green building code
Net-Zero Energy Home Coalition	Net-Zero/Solar Industry Association	2004	Net-zero homes advocacy, information and education
North American	Insulation Industry		Submission (2007): Comments on the proposed green

[20] This report was co-authored by 21 ENGOs. Most authors focused on issues other than the built environment.
[21] The report was co-authored by 11 ENGOs. Most authors focused on issues other than the built environment.

Organization	Type of Organization	Established	BC Specific Activities
Insulation Manufacturers Association Canada	Association		building code
Pembina Institute	Sustainable Energy NGO	1985	Report (2006): Maximizing Energy Efficiency and Renewable Energy in BC Report (2007): British Columbians want a sustainable energy future Report (2007): Mind the Gap: A blueprint for Climate Action in BC Submission (2007): Comments on the proposed green building code Report (2008): Climate Action Team Input[8] Press Release (2008): Environmental "Reality Check" Aims to Clear Air on BC Carbon Tax Report (2008): Climate Action Team Report[9] Report (2009): Climate, Energy and the BC Election 2009: A Review of Three Party Platform Commitments Submission (2009): Recommendations for a Low Carbon Economy in BC Report (2010): Report: Assessment of the BC Clean Energy Act Report (2010): Putting a price on climate pollution Letter (2010): Letter from Green Building Leaders to BC provincial government Report (2010): Encouraging On-Site Renewable Energy Submission (2011): Input to 2012 BC Building Code Changes and Policy Discussion Report (2012): Recommendations to improve BC's Carbon Neutral Requirements Submission (2012): Response to request for public feedback on PAYS-BC utility financing program for energy efficiency Report (2012): Pembina Institute recommendations for BC's carbon tax review Fact Sheet (2012): Hone energy labeling Letter (2012): Letter to BC MEM: Renewal of funding for LiveSmart BC Efficiency Incentive Program
Pollution Probe	Environmental NGO		Report (2006): Maximizing Energy Efficiency and Renewable Energy in BC
QUEST Canada	District Energy Industry Association	2007	Advocacy, information and education
QUEST BC	District Energy Industry Association		Information and education
Regional District of Nanaimo	Regional Government		Letter (2010): Letter from Green Building Leaders to BC provincial government
Smart Growth BC	Sustainable Communities NGO	1999	Report (2008): Climate Action Team Input[8] Report (2008): Climate Action Team Report[9]
Smithers	Local Government		UBCM Resolution (2011): Retention of carbon offsets by local governments (to use for carbon reduction

Organization	Type of Organization	Established	BC Specific Activities
			initiatives)
Terrace	Local Government		UBCM Resolution (2012): Energy efficiency improvements for homeowners
Tides Canada	Environmental NGO		Report (2012): Recommendations to improve BC's Carbon Neutral Requirements
Tofino	Local Government		Letter (2010): Letter from Green Building Leaders to BC provincial government
Union of BC Municipalities	Local government association		Local government information and education Green Infrastructure program
West Coast Environmental Law	Environmental NGO	1974	Report (2012): Recommendations to improve BC's Carbon Neutral Requirements
Whistler	Local Government		Submission (2007): Comments on the proposed green building code Letter (2010): Letter from Green Building Leaders to BC provincial government
World Wildlife Fund	Environmental NGO		Report (2012): Recommendations to improve BC's Carbon Neutral Requirements

Appendix D Semi-Structured Interview Schedule for Local Government Interviews

Introduction:

- Thanks!
- Point of interview
- Recording and consent
- Questions?

Questions:

Begin: clarify what department they work for

1. What actions has your municipality taken (or is planning to take) to reduce energy intensity and/or GHG emissions in your community?

2. Are there other activities that have been talked about but are not yet part of municipal planning?
    a. In what stage/form are these activities? E.g. scan of other activities, pilots, etc.

3. What were the steps that led to the development of these actions?
    a. i.e. what is the process from issue on the table to implementation?

4. What were the motivating factors for pursuing these actions?
    a. Broader pressures: policy, legislation, public pressure, culture, growth/meeting needs?
    b. Individual: political interest/agendas, branding?

5. Let's look at the survey. What are the roles that each of the key actors you indicated have played?
    a. E.g., funding, programs, planning resources, public awareness, information sharing, technical assistance, innovative policy or project development, advocate
    b. Other departments/units in the municipality?
    c. Other organisations? Political, non-governmental, etc?
    d. How do they connect together, if at all?

    e. How have you engaged with these different individuals or organizations?
        i. e.g. public consultation, driving agency, etc.
        ii. Formal or informal?
    f. Is there a role not being filled?

6. Has your engagement with a particular group enabled you to move more on this issue?
    a. Resources? Information? Knowledge?
    b. Who is pushing municipal energy efficiency and climate agenda forward in the province?
        i. leadership/vision

7. Has the process of planning, developing and implementing these actions followed a typical pattern as for other issues in the municipality?
    a. How has it differed, if at all?

8. Are you aware of other municipalities that are doing similar work?
    a. Have you taken examples/inspiration from other municipalities
    b. Are you connected to these other municipalities?

9. Have there been any challenges/barriers/resistances to these actions?
    a. What have you been able to do to circumnavigate these challenges?
    b. What kinds of resources were necessary?

10. Are you on track to meet your community's and/or the province's climate change goals?

11. What would need to happen, under ideal circumstances, in order for such activities to be extended or accelerated?
    a. E.g. policies, stakeholder involvement, visioning exercise, funding

<u>Concluding Script:</u>

- Thank you
- Additional questions?
- Okay to follow-up if needed?
- Contact us/email summary

Appendix E Semi-Structured Interview Schedule for Organizations Working with Local Governments

Introduction:

Thank you for agreeing to be interviewed. As indicated in your consent form, this interview is conducted in order to investigate policy innovation networks in climate change mitigation and/or energy efficiency in British Columbia. The purpose of the research is to explore the role of different actors and their interactions with one another to try to change urban energy systems, drawing on examples from across the province.

The interview will not exceed 90 minutes. The interview will also be recorded using a digital audio recorder. If you wish to stop the interview at any time, please let me know and the interview and the audio recording will cease immediately.

Before we begin, do you have any questions about the study or clarification about any of the information that we have provided you with?

Questions to be asked:

1. What role has your organization played in assisting local government X reduce its energy intensity and/or GHG emissions ?

2. What specific actions have you been involved in?

3. Are there other activities that have been talked about but are not as developed yet as the ones you have already mentioned?
    a. In what stage/form are these activities? E.g. scan of other activities, pilots, etc.
    b. Constraints?

4. What were the motivating factors for pursuing these actions?
    a. Broader pressures: policy, legislation, public pressure, culture, growth/meeting needs?
    b. Individual: political interest/agendas, branding?

5. Are there challenges/barriers/resistances to these actions?
    a. What have you been able to do to circumnavigate these challenges?
    b. What kinds of resources were necessary?

6. Who have you engaged with in these actions?
    a. What other departments/units are involved in these issues?
    b. Any other organisations? Political, non-governmental, etc?
    c. How do they connect together, if at all?

7. On a scale of 1 to 5 with 1 being not very important and 5 being very important, how would you rank the importance of the different individuals or organizations that you have engaged with?

8. How have you engaged with them?
    a. e.g. public consultation, driving agency, etc.
    b. Formal or informal?

9. Has your engagement with a particular group enabled you to move more on this issue?
    a. Resources? Information?

10. Is the planning, development and implementation processes followed for these issues/actions typical?
    a. How has it differed?

11. Have actions similar to the ones you've taken or thought about taking been taken on by any other municipalities that you know of?
    a. Are they connected to you or other actors?

12. What is the potential for the actions taken or planned by local government and the learning that has accompanied these actions to move forward either within local government X or in other BC communities? Why/not?
    a. Within the municipality?
    b. Within the province?

13. What things could be done to increase both the ability of BC communities and organizations such as your own to reduce energy intensity and/or GHG emissions in BC communities? (E.g. policies, stakeholder involvement, visioning exercise, funding)
    a. What would need to happen to make these things become a reality?

14. Concluding Comments:

    Thank you very much for your time today. Before I leave, do you have any additional questions about the study or the interview that you would like to ask?

    Should you think of any questions after the interview, please do not hesitate to contact me either by email or phone. Here is a business card with my contact details.

    Finally, if you like, we can email a summary of the study's findings to you in the early fall.

Appendix F Semi-Structured Interview Schedule for Provincial Government Officials

Questions to be asked:

1. Can you explain briefly what your role is within the Ministry of _____?

2. From your perspective, what are the province's energy efficiency and conservation/GHG reduction objectives for BC's built environment for 2020? 2050?

3. What measures has your department taken and/or is planning to take to achieve these objectives? And/or to reduce energy intensity and/or GHG emissions in BC's built environment?

4. Of the measures led by your department, can you describe the processes you followed to pursue them?
    a. What was the genesis for these particular measures?
    b. What other government departments/units are involved in developing/implementing these measures?
    c. Who, outside of the provincial government, have you engaged with to pursue them? E.g., utilities, ENGOs, local communities, private sector etc.?
    d. How do these different entities connect together, if at all?

5. Why were these measures pursued and not others (e.g., rational analysis, Broader pressures/support: policy, legislation, public pressure, culture; Individual: political interest, stakeholder interest).

6. What were the challenges/barriers/resistances to implementing these measures?
    a. How were the challenges addressed?
    b. What kinds of resources were needed to see the measure through? (e.g., financial, human, knowledge, political)

7. Are there other energy efficiency or GHG reduction measures being pursued by other branches of the provincial government that your department was/is involved with?
    a. What is your department's role in supporting these activities?

8. Are there other measures that have been talked about but are not as developed yet as the ones you have already mentioned?
    a. What is done (and by whom) to ensure that ideas such as these continue to move forward? E.g., white papers, scan of other jurisdictions, research projects, pilots, etc.
    b. How are these efforts coordinated (and by whom)?
    c. What are the constraints to scaling up existing ideas or moving new ideas forward?

9. How would you rank the importance of the different individuals or organizations that you have engaged with to pursue your energy use and GHG emissions objectives in the built environment?

10. From your perspective, what things could be done to increase the BC government's capacity to accelerate a reduction in energy intensity and/or GHG emissions in BC's built environment (E.g. policies, stakeholder involvement, visioning exercise, funding)
    a. What would need to happen to make these things become a reality?