“The How-To Guide to a More Efficient Home”:
Project Report
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Abstract

The intention of the guide is to provide homeowners with a centralized resource that supports them in carrying out a sustainable home retrofit in Maple Ridge and other municipalities throughout British Columbia. Our work was motivated by the current lack of resources available to those wishing to improve the efficiency of their home, and our interactions with individuals from the building industry. The toolkit was compiled using information and data gathered from existing resources, and structured to be navigated by homeowners with limited knowledge of energy efficient home retrofits. Open access to this resource should serve to support those wishing to retrofit their home with helpful information and suggestions. In addition, we hope that the information will also serve as a call-to-action to homeowners not yet committed to completing a home efficiency retrofit.

Author Bios

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Virginia is a fourth year Environmental Science student at the University of British Columbia. Her area of focus is Ecology and Conservation. Virginia has some experience with home retrofit projects, and is very interested in sustainable building and the implementation of green technology. Her main introduction to green technology has been working on a carbon sequestration in algae research project at the University of Calgary.

Melinda Yogendran
Melinda is a fourth year student at UBC, studying Biology and Environmental Science, with a specialization in Conservation Biology. She has conducted research on renewable energy options for remote communities, and is interested in innovative energy solutions that increase efficiency, mitigate carbon footprints, and contribute to sustainable development.

Jennifer Yu
Jennifer is a fourth year Environmental Sciences student at the University of British Columbia. Her area of concentration is Land, Air, and Water. She is passionate about sustainability and air pollution issues, and hopes to make contributions in the green technology field.
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Introduction

Energy and water consumption in residential homes are significant contributors to regional resource use. Renewable technologies and upgrades should be applied, especially to older houses, in order to increase their efficiency and decrease their energy consumption. The objective of this project is to create an online toolkit for homeowners that provides comprehensive information on possible sustainable home retrofits. The toolkit is intended to be an easy-to-use resource for individuals wanting to increase the energy efficiency of their homes, and will include information on various energy saving upgrades, water saving upgrades, and building envelope upgrades, as well as information on energy audits, and City requirements such as permits and building inspections.

Currently, there is a lack of resources for homeowners looking for a centralized source of information on this topic. In order to address this issue, we aim to provide a comprehensive toolkit to aid the residents of Maple Ridge and beyond in completing home retrofits. In addition, the toolkit will educate homeowners on the actions required to carry out their projects and provide them with resources and services to support them in the retrofit process.

Methods

Research Methods

The toolkit was composed through research completed in a variety of contexts. The majority of information included was acquired from online resources. This type of information was validated from the following three means: from being obtained from a government website, from being validated by an expert\(^1\), or from the same facts being obtained on other unrelated online sources. These methods of validation were an attempt at ensuring that the information included in the toolkit was unbiased, and did not support motivations other than to provide homeowners with useful information.

Supplementing information was retrieved through interviews and site visits that were completed to fill gaps in information retrieved from online sources, and to supplement understanding of industry or specific processes.

\(^1\) Veronica Owens, Stephen Cote-Rolvink.
**Table 1:** Summary of interactions with industry members, and exposures to the field of construction and home retrofit.

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maple Ridge Home Site Visit</td>
<td>December 2015</td>
<td>Site visit of building envelope home retrofit project and discussion with homeowner - James Rowley - in regards to the struggles faced towards completing the project.</td>
</tr>
<tr>
<td>ARIA Site Visit</td>
<td>February 2016</td>
<td>Site visit to a commercial condo complex being built with a sustainable focus, according to LEED Gold standards, and discussion with Project Foreman about project schedule, materials and building practices.</td>
</tr>
<tr>
<td>Meeting with Stephen Cote-Rolvink</td>
<td>February 2016</td>
<td>Meeting with the Manager of Inspection Services for the City of Maple Ridge to discuss requirements for city permitting and building inspection during a home retrofit process.</td>
</tr>
<tr>
<td>Meetings and Consultations with Veronica Owens</td>
<td>October 2015 - April 2016</td>
<td>Meetings with and discussions with Veronica Owens, expert in the field of sustainable building, and building retrofit projects, in regards to the information included in our toolkit.</td>
</tr>
</tbody>
</table>

**Toolkit Sections**

After gathering information and gaining more of an understanding of the home retrofit process in the first semester, criteria was set to determine which topics to include information on in our toolkit. Priority sections were identified based on the accessibility of resources and the robustness of existing information. If a topic was considered difficult to be accessed by homeowners, we considered it a priority topic to be included in the toolkit. We also considered our interactions with a homeowner carrying out a retrofit project - James Rowley - who we met with in December of 2015. Through James, we were able to understand some of the struggles and challenges that homeowners encounter during a retrofit process. What would he have wanted access to before he had began his project? What type of information was inaccessible to him? What types of suggestions could have made his project easier to execute? Additionally, we also considered where there are knowledge gaps in easily-accessible resources of this type, as well as what we would benefit from if we were homeowners trying to understand the process.
From the above criteria, a list of options for toolkit sections were compiled. The final decision was made based on the ways in which the sections could support homeowners, and in relation to if particular sections already existed in other resources or not. We made assessments about the accessibility of information about these topics and if it was feasible for us to write particular sections.

Results

Our toolkit is composed of five sections: Retrofit Options, Energy Audits, City Permits and Inspection, Contractors, and Finances. Under the Retrofit Options we have included options for home insulation, home heating systems, water reuse systems, efficient appliances and solar PV installation. This section details the process of each option and discusses how they work to improve home efficiency. The toolkit also explains the energy audit process in detail and provides information on how to prepare for an energy audit. Similarly, the City requirements section describes what kind of permits homeowners will need for renovating their homes, what the building code is, how homeowners can build to code, and the inspection process that is required by the City. Additionally, we think it is important to list all the stakeholders that a home retrofit project could potentially involve to ensure that all aspects are considered. Moreover, the toolkit discusses how to hire a good contractor, which is essential to a successful home retrofit project. Lastly, our toolkit includes a list of incentives and rebates that are offered on provincial and municipal levels to encourage homeowners to perform sustainable home retrofits.

For the layout of the toolkit, we have decided to make it visually appealing, which is why most of the sections are more focused on images and videos, along with simple and limited text. The citation format is done in footnote style to allow better reading flow and easier access to resources.

See Appendix A for the toolkit draft, which includes all images, tables, and videos for each section. Below is a roadmap that is included in the toolkit to help guide users through the sections.
Discussion

Although our toolkit aims to provide readers with the most comprehensive information available, there are some challenges involved with synthesizing such a large amount of information, leading to limitations in our toolkit.

The first challenge we encountered was finding reliable information from sources that were up-to-date and relevant to our region of focus. Also, some of the information we found in our research was time-specific. For example, when looking into financial incentives that are available to homeowners, it became clear that these incentives are changing often and many of them are no longer available. There was also a large amount of information on some of our topics, which made it difficult to decide exactly what should be included in our toolkit.

These factors have resulted in a few limitations. For the sake of clarity we decided to keep a lot of the information simple and straightforward, but this also means that readers do not get as much detailed information as they may want. Another component of our toolkit that we decided not to include is information on pricing and specific contractors to work with for each retrofit option, as this information is very specific to where readers are located and which suppliers they are working with. However, with these things considered, the toolkit still provides a very good overview of many of the home systems and energy efficient upgrades that readers will be interested in.
Conclusion

Through this toolkit, homeowners will now have access to a resource that will inform them on their current home systems, and guide them in selecting appropriate sustainable retrofits for these systems. Homeowners will also understand legal requirements and steps that need to be taken with the municipal government in order to carry out their projects, and will be provided with advice and support for finding suitable contractors and financial incentives. Lastly, the toolkit will be clearly navigable and the information will be presented in a user-friendly manner that allows readers to easily find what they are looking for.

Acknowledgements

First and foremost we would like to acknowledge the consistent support, encouragement, and time invested by Veronica Owens from Light House Sustainable Building Centre. We also greatly benefited from discussions and support from Tara Ivanochko, and helpful information and suggestions from Stephen Cote-Rolvink from the City of Maple Ridge and James Rowley.


See attached document.