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Greenest City In Action: Setting Greenhouse Gas Targets for Mills Office Productivity

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Executive Summary

The following recommendations propose greenhouse gas reduction targets for Mills Office Productivity and were developed in accordance with “The Greenhouse Gas Protocol”. Sector specific carbon reduction strategies for the vehicle fleet at Mills were obtained primarily through expert interview and case study analysis. The central conclusions offered by this research study are as follows:

1.0 *The Greenhouse Gas Protocol* created by The World Forum on Sustainable Development in conjunction with The World Resource Institute has been assessed as the best framework available for setting greenhouse gas reduction targets.

Conclusions drawn from GHG protocol:

1.1: 2-Year target: 10 % below 2012 levels per million dollars of revenue

1.2: 5-Year target: 25 % below 2012 levels per million dollars of revenue

2.0 Because Mills Office Productivity is currently experiencing rapid growth, the target type most suitable to their operations is an *intensity target*.

2.1 The business metric most appropriate to an intensity target at Mills is *net revenue*, per million dollars earned.

3.0 A multivariate approach to reducing emissions generated by transporting goods is the most effective way to reduce the carbon footprint of the delivery fleet.

Classifications are as follows:

3.1 *Operational Efficiency & Behavioral Change*

Actions include: Smart Driver Training, Anti-idling & Speed Limit policy, Driver Incentive Program, Monthly Fuel Use Report and End of Lifecycle Efficiency Commitments

3.2 *Technological Change*

Actions Include: Installation of GPS and Diesel Oxidation Catalyst technology, fuel switching and vehicle conversions

3.3 *Partnerships and Financial Resources*

Actions Include: E3 fleet certification, buyer-group, eco-fee and fuel savings reinvestment and local pilot projects

Introduction

Mills Office Productivity (Mills) is a BC based business specializing in office supplies and educational materials. Mills recognizes the important role organizations have in the health and wellbeing of communities. As a certified B Corporation, the company has undergone rigorous assessment of their social and environmental performance and is recognized as an industry leader in corporate social responsibility. This report proposes strategic greenhouse gas reduction targets for Mills Office Productivity in consideration of the nature scale of their organization. Because emissions generated by transporting goods produces over 65 percent of aggregate greenhouse gas output, the delivery vehicle fleet at Mills is given special consideration in the following report. This research has been undertaken at the request of Mills Office Productivity and The Vancouver Economic Commission with both partners contributing expertise and mentorship.

Report Structure

This report begins with a description of the methods employed in this research study and is followed by a Literature Review regarding transportation emissions and target setting. The ten-step *Greenhouse Gas Protocol* framework is employed in order to recommend target levels reflective of the unique emissions profile at Mills. The latter portion of this report is focused on key recommendations for reducing ground fleet emissions as they relate to operational efficiency, technological change and financial resources & partnerships.

Methods

A literature review of academic articles as well as industry leading third party and consultancy reports was performed. Five expert interviews were then conducted in the fields of carbon counting, green logistics and engineering in accordance with TCPS2 Behavioral Research Ethics Board requirements. Based on the findings of the literature review and expert interviews, quantitative data for Mills emissions profile generated by Climate Smart was adapted to fit the “Greenhouse Gas Protocol” proposed by the World Resource Institute and World Forum on Sustainable Development (2004). Suggestions for reducing ground fleet emissions proposed during the expert interview process and subsequent desk study were synthesized into a concrete series of recommendations.

Literature Review

This literature review is designed to assess two central elements relevant to setting greenhouse gas reduction targets. The first is an evaluation of various target-setting frameworks available in order set out a methodical approach for making a recommendation. The second is an assessment of different target types to identify which category is best suited to Mills. The review concludes with an overview of the literature relevant to achieving emissions reductions in vehicle fleets to preface the expert interview process.

Target Setting Framework

The literature showed limited scholarly deliberation over the strengths and weaknesses of the various target-setting frameworks. Having considered several different available methodologies (See: Carbon Neutral, n.d.; McKinnon & Piecyk, 2012), The Greenhouse Gas Protocol created by the World Resource Institute and World Forum on Sustainable Development appears to be best suited to setting reductions targets for small and medium enterprises (2004). The comprehensive phase-by-phase guide not only situates target setting in the broader scope of business operations, it also identifies key actions necessary at each phase of the process. The framework also provides relevant case studies and discusses in detail the best practices for carbon counting, reporting and monitoring results.

Target Types: Strengths and Weaknesses

One of the most important decisions involved in setting a target for Mills Office Productivity is the choice of which type of target to set. The literature established that greenhouse gas targets typically fall in one of two categories: absolute or intensity targets.

Absolute Targets

The literature presented comprehensive cost-benefit analysis of absolute targets with many arguing these targets are the most environmentally robust, especially at international and governmental levels. An absolute target “establishes a total amount of aggregate emissions over time” (Dudek & Golub, 2003). According to The World Resource Institute and The World Business Council for Sustainable Development, absolute targets have the benefit of being more easily comprehended in terms of their actual positive impact on the environment (2011, 2004).

The largest deterrent to choosing an absolute target, according to Ellerman and Sue Wing, is the perception of a hindrance on economic growth by restricting actions with high GHG output (2003). Others draw attention to the fact that if significant structural changes occur, absolute targets require the base year to be recalculated, complicating monitoring results in the long-term (Carbon Neutral, n.d.; The Carbon Trust, 2011; World Resource Institute, 2004). Another well-documented disadvantage is that in cases where emissions are linked to growth, it may be difficult to achieve deep reductions therefore lowering the likelihood of setting an absolute target at the company level (Ellerman & Sue Wing, 2003).

Intensity Targets

Similarly to absolute targets, the literature provided in-depth assessment of intensity targets. In contrast to absolute targets, intensity targets establish a goal based on the ratio of emissions relative to a business metric over unit of time (World Resource Institute, 2004). These targets require careful consideration of the most appropriate metric in order to accurately reflect emissions reductions (The Carbon Trust, 2011; World Resource Institute, 2004). One of the largest benefits to this type of target is the ability to reflect performance improvements independent of business growth or decline (World Resource Institute, 2004, Dudek & Golub, 2003). Therefore, intensity targets are also well suited to businesses experiencing rapid growth.

The largest drawback of intensity targets is that there is no guarantee aggregate emissions will be reduced if they are not adequately ambitious (Ellerman & Sue Wing, 2003, World Resource Institute, 2005). Dudek and Golub perform a valuable analysis of intensity targets and argue these targets can reduce the incentive to innovate, and advise intensity targets can undermine long-term goals of sustainability (2003).

Reducing Transport Emissions: A Literature Review

The literature review revealed a lack of available data indicating the magnitude of reductions achievable through implementing particular emissions reduction strategies in vehicle fleets. However there was general consensus that no “silver bullet” tactics exist (Deutsche Post AG, 2010).

The key to achieving deep reductions, according to McCollum and Yang, will be to use a variety of strategies to lower emissions (2009). The authors argue that travel demand management strategies, vehicle efficiency levels, fuels and behavioral change and technological change are

complementary approaches to reducing transportation emissions (McCollum & Yang, 2009). Others claim “driving style is the single greatest influencing factor on fuel efficiency” and furthermore increases in driver efficiency can lower fuel consumption by up to 20 percent (Deutsche Post AG, 2010).

Conclusions and Future Research

The central conclusions of the literature review are threefold: first, the Greenhouse Gas Protocol is the best available framework for target setting. Second, the choice of either an absolute or intensity target is dependent on the nature and preference of an individual business. Finally, the most effective way to lower the emissions of the vehicle fleet at Mills is by employing a diversity of strategies; behavioral change coupled with technological change will achieve the deepest reductions.

Applying the Greenhouse Gas Protocol

Climate Smart is a Vancouver based social enterprise specializing in creating emissions profiles for small and medium sized businesses in order to help reduce their environmental impact (Climate Smart, 2015). Climate Smart has worked closely with Mills to produce an annual emissions profile and was included in the expert interview process.

The ten-step Greenhouse Gas Protocol as well as the 2015 Climate Smart emissions profile for Mills will be utilized in the following:

Step 1: Senior Management Commitment

Obtaining senior management commitment is an essential first step for any company wide objective. Given this study is a result of a senior management commitment to The Climate Pledge it is presumed senior management commitment has been obtained.

Step 2: Decide On Target Type

Based on the literature review, expert interview process and in consultation with Mills, an *intensity target* with a metric of *per million dollars in revenue* has been selected. Because Mills is in rapid growth stage and there are currently inadequate mechanisms for financing capital-intensive transitional technologies, an intensity target will allow Mills to set a meaningful reduction target without compromising the financial wellbeing of their business.

Step 3: Decide on the Target Boundary

The target boundary stipulates which GHGs, geographic operations, sources and activities will be included in the target (World Resource Institute, 2004). Climate Smart employed an “operational control” approach to stipulate the geographic boundaries of the emissions profile; this study will adhere to this model. Emissions sources covered by the target include: electricity (purchased, unmetered/unbilled), heat (generated, unmetered/unbilled from fuel), transporting people (road, staff commuting), transporting goods (road), other (garbage, paper consumption) and purchased reductions (offsets, REC’s (= 0)).

Step 4: Choosing Target Base Year

Because reliable baseline information is provided by the Climate Smart emissions profile, a *fixed target base year* is most suitable to Mills. The 2012 emissions profile has been selected as the target base year on the basis that this data is reliable and at a time scale which makes reductions ambitious.

Step 5: Define Target Completion Date

Assuming the target is implemented in the 2016 fiscal year, *the completion date is 2021 with an interim target in 2018*. The short-term scope of a five-year target is beneficial as it decreases uncertainty levels and future actions reliant on advances in technology (World Resource Institute, 2004).

Step 6: Define the Length of Commitment Period

The length of the commitment period is the period of time in which emissions performance is actually measured against the target. A *single year commitment period* is best suited to the relatively short term 2 and 5-year goals. It will therefore be essential that Mills continue generating annual emissions profiles to assess progress.

Step 7: Decide of the Use of Offsets and Carbon Credits

Mills does not currently purchase offsets or carbon credits however should this change they should be included in subsequent emissions profiles. It is best practice to include offsets and carbon credits separately from internal emissions when reporting as well as to specify the origin and nature of the offsets.

Step 8: Establish a Target Double Counting Policy

Should Mills decide to purchase offsets or carbon credits the organization will need to establish a double-counting policy. In this case, Mills should refer to the GHG protocol for best practice examples, as different scenarios require specific strategies.

Step 9: Decide on the Target Level

Based on thorough review of the Climate Smart emissions profile, expert interview process, and in consideration of the solutions proposed in this report specific to the transportation sector at Mills, the following target levels have been selected:

- 2 year target: 10% below 2012 levels per million dollars of revenue
- 5 year target: 25% below 2012 levels per million dollars of revenue

Step 10: Track and Report Progress

Once Mills has adopted a target it is critical to track progress against the 2012 base year. When reporting emissions it is important to include a description of the target (type, base year, completion date length of commitment period) as well as information on emissions performance in relation to the target (World Resource Institute, 2004). If using an intensity target, an absolute emissions calculation should also be included. It is assumed this information will be reported directly to The Vancouver Economic Commission.

Results Summary

Through following the GHG protocol, utilizing the Climate Smart emissions profile as well as through the expert interview process, key recommendations are as follows:

Factor	Recommendation
Target Type	Intensity Target: Metric of Per Million Dollars in Revenue
Boundary	Operational Control
Base Year	Fixed base year of 2012
Completion date	2018 & 2021
Length of Commitment Period	Annual
Target Level 2 year goal	10% below 2012 levels per million dollars of revenue
Target Level 5 year goal	25% below 2012 levels per million dollars of revenue

Recommendations for Reducing Fleet Emissions

By sector, transporting goods generates the largest share of emissions at Mills. Reducing the carbon emissions of the delivery fleet is the largest sustainability challenge faced by the business due to the high capital expenditure required to replace vehicles. Mills owns each of the 16 vehicles in their fleet, providing the advantage of operational control over the vehicles and the ability to test new technologies as they become available. Although Mills has taken steps to address the impact of this sector, a strategic plan to reduce the emissions of the fleet is essential in order for Mills to achieve their reduction targets. (See Appendix B for breakdown of delivery fleet)

Key Findings

The solutions proposed below are the result of expert interviews. Interviews were performed with representatives from Climate Smart, Van Houtte Coffee, Eco-Options, Green Step Consulting and The Fraser Basin Council. Recommendations have been allocated into three distinct categories: operational efficiency, technological change and partnerships & financial resources. (See Appendix A for complete summary of recommendations).

Operational Efficiency:

Each of the interviews cited operational efficiency as the starting point for reducing fleet emissions. These initiatives include vehicle handling and fleet management policies. Typically these do not require substantial upfront cost and in combination can achieve relatively deep reductions. Several operational efficiency initiatives were proposed during the expert interviews:

- 1) *SmartDriver Training*: This training ensures each vehicle is utilized in the most efficient manor possible therefore conserving fuel and lowering emissions. According to Van Houtte Coffee, combining efficiency training with in-vehicle telematics has helped them receive the most out of the program. It is estimated that SmartDriver training can lower emissions between 15 and 25 percent on annum.
- 2) *Driver Incentive Program*: Van Houtte Coffee, The Fraser Basin Council and Climate Smart suggested efficiency outcomes be linked to an incentive program for the vehicle operators. The creation of an incentive program can help achieve buy-in of drivers and therefore ensure optimal success of efficiency training.

- 3) *Anti-idling and Speed Limit Policies:* There was consensus among many interviewees that in house anti-idling and speed limit cap will enhance the success of SmartDriver training. In house policies should have clear, consistent signage and be incorporated into employee communication as often as possible.
- 4) *Downsizing and Right- Sizing:* The Fraser Basin Council highlighted the impact reallocating vehicles can have as an effective way to minimize emissions. This strategy entails the correct size vehicle is being utilized for a particular load, and vehicles are not carrying empty loads as they return to base.
- 5) *Monthly Fuel Use Report:* Generating a monthly fuel use report will help Mills collect information on vehicle usage, support tracking annual emissions progress and help in downsizing and right-sizing vehicles.
- 6) *Preventative Maintenance Program:* Preventative maintenance will ensure all vehicles are operating at peak mechanical performance therefore decreasing fuel wastage.
- 7) *End of Lifecycle Purchasing Policy:* The creation of an end of lifecycle purchasing policy, which stipulates Mills will invest in the most fuel-efficient replacement possible, confirms the long-term commitment to reducing fleet emissions well beyond the end of the target date.

Technological Change:

Although emissions reductions can be attained through efficiency strategies, deeper reductions are achievable through technological change. These solutions are typically more cost intensive than behavioral change and must be considered for their financial feasibility on a case-by-case basis. The following suggestions are presented in order of priority:

- 1) *GPS Telematics:* there was consensus among interviewees that GPS technology will enhance efficiency initiatives at Mills while having the added benefits of tracking emissions data and providing coaching opportunities.
- 2) *Diesel Oxidation Catalysts (DOCs):* DOC's are recommended as an interim technology. These mechanisms break down particulate matter in the exhaust stream of diesel engines and are relatively inexpensive to install in comparison to replacement.
- 3) *Hydrogen Conversions:* Both the Fraser Basin Council and Climate Smart cited hydrogen fuel as a promising alternative fuel. Hydrogen is a zero carbon emission

alternative with a conversion process requiring minimal adjustments to existing vehicles. Mills should assess the viability of partnerships with local hydrogen fuel providers, as the possibility of substantially reducing fleet emissions is significant.

- 4) *Propane Conversions:* Eco-options have developed technology for converting vehicles to propane dual fuel engines, which run at a ratio of up to 5 percent gasoline and 95 percent propane. Should Mills decide the lifecycle of the diesel engines is longer than the target commitment period, it is recommended that the diesel vehicles be converted to propane. Propane dual fuel results in an emissions reduction of 24 percent on annum.
- 5) *Nitrogen Tire Inflation:* By switching tire inflation to nitrogen the pressure of the tires will remain more constant. This lowers emissions by reducing fuel wastage resulting from improper inflation.

Partnerships & Financial Resources

Partnerships are essential for Mills as they begin to alter the nature of their fleet. Partnerships will ensure Mills has the best available resources for reducing fleet emissions and the opportunity to be recognized for their efforts. Two organizations were deemed as beneficial to Mills:

- 1) *E3 Fleets:* E3 fleets is a program developed by the Fraser Basin Council designed to help public and private sector fleets reduce their emissions. This program offers resources for fleet management as well as a certification program specific to behavioral change and efficiency initiatives.
- 2) *West Coast Electric Fleets:* West Coast Electric Fleets offers wide range of online resources, peer network and technical assistance to fleet managers looking to incorporate zero emissions vehicles into their operations.

Expert interviews were also focused on addressing the financial barriers associated with replacing fleet vehicles with more efficient models. Electric Vehicles (EV's) are generally regarded as the most fuel-efficient vehicles available in terms of their carbon footprint. However, the financial barrier preventing small and medium businesses from converting their fleet to electric is significant. Three strategies for addressing this issue were identified in the interviews:

- 1) *Formation of a Buyer Group*: A buyer group would require Mills to reach out into the community and recruit other parties looking to purchase an EV. By purchasing vehicles “in bulk” there is potential to achieve a cost savings on their purchase.
- 2) *Fuel Savings Reinvestment and Eco-Fee*: An “eco-fee” is a tax applied to goods sold at Mills. Ideally, the capital generated from the eco-fee, along with the capital savings achieved through efficiency strategies, would be subsequently reinvested in fuel-efficient vehicles.
- 3) *Credit Union Financing Rate*: Interviews also highlighted the potential to obtain reduced financing rates through local credit unions for green projects. In particular VanCity has programs designed to help small businesses invest in green development initiatives.

Concluding Remarks and Future Research

This report has sought to develop greenhouse gas reduction targets for Mills Office Productivity and made key recommendations for reducing the emissions of their vehicle fleet. The results of this study indicate it is feasible for Mills to lower their emissions significantly in the delivery sector of their business. Meeting the reductions goal of 25 percent below 2012 levels per Million Dollars in Revenue is reliant on the application of initiatives proposed in this report. These recommendations should not be taken in disregard of other business sectors, as there are many opportunities to reduce the carbon footprint outside of the delivery fleet.

Additionally, as science based targets become adapted to fit small and medium businesses, Mills should explore the feasibility of a long-term science based emissions target. Science based targets provide goals that are aligned with global climate models in keeping atmospheric temperatures below 2°C compared to pre-industrial levels and are currently the most ambitious form of target setting (Krabbe et. al., 2015). Should Mills wish to continue their sustainability mandate beyond the 5-year target completion date, I recommend this manner of target be adopted.

The results of this study are not exclusive to Mills and are applicable to all commercial and private fleets. Mills has a unique opportunity to contribute to the growing field of sustainable logistics through measuring the success of reduction strategies. This report revealed that data surrounding the level of reductions achievable through particular initiatives is limited. I urge Mills to share the results of the proposed reductions strategies with the community at large.

Community Partners & Expert Interviews

This study was undertaken with the generous contribution of several industry professionals. The following participants contributed expertise and guidance to this research:

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Appendix A:

Priority Actions for Emissions Reduction: Operational Efficiency & Behavioral Change, Technological Change, Partnerships and Resources

Operational Efficiency & Behavioral Change	Fleet Outcome
Develop Anti-idling and Company Speed Limit policy	Reduces fuel usage and GHG emissions
Enroll all vehicle operators in Smart Driver Training	Reduces fuel usage and GHG emissions
Monthly fuel use report	Supports efficient management of fleet vehicles and route optimization
Establish driver incentive program for efficient vehicle use	Supports the success of Smart Driver Training and anti-idling/ speed limit policy
Conduct ROI on 2011 electric vehicle	Develops business case for viability of electrifying fleet vehicles
Commit to procurement of lowest emissions option for all new vehicle purchases	Lowers increases in transportation emissions due to business growth
Preventative Maintenance Program	Maximizes vehicle efficiency, increases employee engagement with greening fleet
Downsizing and Right-sizing vehicles	Maximize fuel cost savings and reduces emissions
Monitor and report annually on kilometers travelled	Supports right-sizing and downsizing and aids in reporting GHG reduction progress annually
Monitor and report annually on advancements in fleet technology	Supports company vision for carbon neutral fleet options, ensures best technology available is considered

Technological Change	Fleet Outcome
Install GPS technology in all fleet vehicles	Supports anti-idling policy, Smart Driver Training & monthly fuel use reports. Provides coaching tool for employee incentive program
Install Diesel Oxidation Catalyst (DOC)	Removes up to 90 percent of hydrocarbons & carbon monoxide and up to 30 percent of particulate matter
Hydrogen Fueling	Potential to convert fleet vehicles to carbon neutral fuel
Switch from oxygen to nitrogen tire inflation	Decreases emissions, increases fuel mileage, improves vehicle handling
Convert all diesel engines to propane	Reduces emissions by ~24 percent. Decreases diesel specific particulate emissions
Purchase electric vehicles at the end of life-cycle for oldest vehicles	Lowers increases in transportation emissions due to business growth

Partnerships and Resources	Fleet Outcome
Gain E3 fleet certification	Enhances resources available for fleet management (only requires behavioral change initiatives)
Assess viability of “buyer group” to drive down the price of electric vehicles	Reduces cost barrier to acquiring most efficient option
Fuel Savings reinvestment and “eco-fee” program to fund green fleet initiatives	Reduces cost barrier to acquiring most efficient option
Join West Coast Electric Fleets	Opportunity to be recognized for green fleet management and electric vehicles
Assess viability of partnerships with local hydrogen fuel providers (Hydra Energy)	Potential to significantly reduce fleet emissions in the long run

Appendix B:

Delivery Fleet Breakdown

Make	Model	Year	Fuel
Ford	E450	2008	Gasoline
GMC	W4500 - 3 Tonne	2006	Diesel
FORD	E450	2008	Gasoline
Estar	Electric 3 Tonne	2011	Electric
Ford	E450 Super Duty	2012	Gasoline
Mercedes	Sprinter	2012	Diesel
FORD	E350	2009	Diesel
GMC	Savana - 1 Tonne	2008	Gasoline
GMC	Savana - 1 Tonne	2008	Propane
GMC	W4500 - 3 Tonne	2006	Gasoline
Chevrolet	Express Van 2500	2009	Gasoline
GMC	Savana Van	2014	Gasoline
Chevrolet	Express Van 2500	2008	Gasoline
Chevrolet	Express Van 2500	2008	Gasoline
Chevrolet	Express Van 2500	2009	Gasoline
Chevrolet	Express Van 2500	2013	Gasoline