

Promoting Greenhouse Gas Emissions Reductions in British Columbia's Small and Medium Sized Businesses

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Ethics Statement



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Abstract

Small and medium sized businesses make up over 98% of the businesses in British Columbia (BC) and are estimated to account for 28% of the Province's greenhouse gas (GHG) emissions. These businesses have the potential to reduce their emissions and achieve positive business benefits as a result, yet many face knowledge and resource barriers that prevent them from doing so. In order to reduce these barriers, three policy options were explored: an investment tax credit, a grant, and a consolidated information provision service. These options were developed, analyzed, and evaluated using information obtained from interviews with owners and managers of SMEs and technical experts and a review of existing research and policies. The analysis highlights the trade-offs, strengths, and weaknesses of each policy option and recommends that an information service be implemented followed by a wider survey of SMEs in order to determine the appropriate financial incentive.

Keywords: GHG emissions; abatement policy; climate change policy; small and medium sized businesses; abatement barriers

Dedication

I would like to dedicate this work to my family.

To my mom and dad, I would not be here without you (on this planet, or in this program). Thank you for ensuring that there were no barriers standing in the way of me pursuing my education.

And to my sister Kelly, while you may not be geographically close, your support and encouragement has never been far. Thank you for your unwavering faith in me.

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List of Acronyms

| | |
|-------------------|--|
| BC | British Columbia |
| CO ₂ | Carbon Dioxide |
| CO ₂ e | Carbon Dioxide Equivalent |
| CRA | Canadian Revenue Agency |
| GHG | Greenhouse Gas |
| HVAC | Heating, Ventilation, and Air Conditioning |
| IPCC | Intergovernmental Panel on Climate Change |
| ITC | Investment Tax Credit |
| PST | Provincial Sales Tax |
| SFU | Simon Fraser University |
| SMEs | Small and Medium Sized Enterprises |

Glossary

| | |
|---|--|
| Carbon Dioxide Equivalent (CO ₂ e) | A measure used to compare the emissions from various greenhouse gases based on their global warming potential. |
| Climate Change | A long-term change in global or regional climate patterns. |
| Climate Smart | A social enterprise based out of Vancouver British Columbia that provides training and support to assist businesses in measuring and managing greenhouse gas emissions. |
| Greenhouse Effect | Warming of the lower atmosphere of the earth that occurs when radiation from the sun is absorbed by the earth and then given off again and absorbed by gases and substances in the earth's atmosphere. |
| Greenhouse Gas (GHG) | A gas that contributes to the greenhouse effect by absorbing infrared radiation. |
| Opportunity Cost | The loss of potential gain from other alternatives when one alternative is chosen. |
| Rate of Return | The gain or loss on an investment over a given time period, expressed as a percentage increase over the initial investment cost. |

Executive Summary

There is overwhelming scientific evidence that climate change is occurring and that the primary cause is anthropogenic releases of greenhouse gases (GHGs) (IPCC, 2013). The Province of British Columbia (BC) has set ambitious targets to reduce provincial levels of GHG emissions, yet there is scepticism that it will be able to meet these targets under the current policy environment. Households and businesses from every sector of the BC economy will need to reduce emissions in order to reach these targets and mitigate the impacts of climate change.

This research focuses on small and medium sized enterprises (SMEs). SMEs account for over 98% of the businesses in BC and are responsible for an estimated 28% of the province's GHG emissions (Sheehan, 2015). The policy problem identified and explored in this research is that knowledge and resource barriers prevent SMEs from reducing their GHG emissions.

This research was informed by a literature review, interviews with experts on the subject matter, and owners and managers of SMEs. My literature review examined policies in other jurisdictions, existing policies in BC, and academic and think tank literature. I conducted interviews with academics and professionals with substantive knowledge about SMEs, energy efficiency, taxation, and climate change policy. I also interviewed managers and owners of SMEs in greater Vancouver, the Okanagan, and Vancouver Island.

The literature examined suggests that in addition to the societal benefit of mitigating climate change, there are a number of business benefits that result from GHG reducing activities. These include financial savings, increased access to contracts with sustainable purchasing requirements, improved competitiveness, and increased market share. Managing and reducing GHG emissions can also allow businesses to prepare for increased carbon regulation and protect against fluctuating energy prices. Additionally,

shifting to greener business practices can allow businesses to respond to both customer and employee demand.

SMEs have options to reduce their GHG emissions by lowering fossil fuel energy use, and more could do so if barriers to investment and process related activities were reduced. The primary barriers identified through my research fall into two categories: resource barriers and knowledge barriers. Resource barriers include time, staff, and financial barriers. SMEs are more likely than their larger counterparts to experience limited financial resources to engage in GHG reducing investments. This is further complicated by the fact that many investments require upfront costs, yet the benefits are delayed over a wider time frame. SMEs may also lack access to credit markets to borrow the funds necessary to engage in investment as well as the time, staff, and in-house expertise necessary for the analysis and implementation of GHG reduction strategies. Knowledge barriers include a lack of awareness and understanding of environmental issues, the business benefits associated with GHG reducing activities, the reduction options that are available to them (technology or behavioural initiatives), the GHG emissions that result from their business and the primary emitters, and available assistance and incentives to support them in their shift to greener business practices.

Policies exist in BC to promote corporate environmental sustainability. These include the BC Carbon Tax, a PST exemption for material used to conserve energy or produce energy from renewables, and FortisBC and BC Hydro incentives. However, these incentives do not target SMEs specifically, and while they do not explicitly exclude them they might do so through their eligibility requirements and sometimes relatively complicated application processes. The SMEs interviewed in this research indicated that they were either not aware of these incentives, or assumed that they would not qualify. These interviews also highlighted the importance of ensuring that eligibility criteria are clear, the application process is relatively simple and straightforward, and the payback is worth the time required to apply for the incentive.

Three policy options for British Columbia were developed based on information obtained from the interviews and the literature review. Option 1 is a refundable

investment tax credit of 30% of eligible project costs up to \$30,000. It would be administered through the tax system using an online tax form, would require the reporting of GHG emissions, and businesses would receive the incentive following their investment. Option 2 is a grant of 30% of eligible project costs up to \$30,000. This option would involve an application and approval process, would require the reporting of GHG emissions, and the funds would be provided prior to investment. Option 3 is a consolidated information service that would be designed to specifically target and assist SMEs. It would provide information regarding why and how to reduce GHG emissions, and would include an easy to navigate website as well as staff to provide over the phone and email support and advice.

These options were evaluated using the societal objective of effectiveness at reducing barriers and GHG emissions and the government objectives of cost-effectiveness and budgetary impacts. Effectiveness was evaluated using a qualitative analysis of the policies ability to impact knowledge barriers, a qualitative analysis of the policy's ability to reduce resource barriers (which looked at financial barriers and ease of compliance with the policy), and a quantitative estimate of the GHG emissions that would result from the policies. Cost effectiveness was calculated by looking at case studies of eleven Climate Smart businesses that engaged in GHG reducing projects and yielded an estimate of government cost (of the financial incentive) per tonne of CO₂e reduced. Budgetary impacts were evaluated using a quantitative estimate of the loss of government revenue or expenditures that would result from the incentives (based on estimated uptake) and a qualitative estimate of the degree of administrative and implementation ease.

This analysis highlights the trade-offs between the different policy options. Option 3 had the most significant impact on knowledge barriers, low costs of compliance with the policy, and a relatively low impact on budget due to its lack of financial incentives. However, it has little impact on financial barriers and would potentially result in the lowest GHG emissions reductions of the three policy options due to its assumed lower uptake (or GHG management resulting from the policy).

Option 1, the ITC, would have a relatively lower impact on financial barriers than the grant as the funds are provided following the investment. It would also have a potentially high impact on government budget as a result of lost revenue from the credit and could result in unanticipated budget impacts due to the lack of an application process. However, the ITC would potentially result in the most significant reduction of GHG emissions, as the relative simplicity and accessibility of the process could result in a relatively high level of uptake. Option 1 would also have relatively high administrative and implementation ease as it is administered through the existing tax system, which would require the addition of less staff and would reduce some of the overall administrative burden of the program.

Option 2 would have the greatest impact on financial resource barriers due to its provision of financial support prior to investment. It would also likely have a lower impact on budgetary costs to the BC government due to its relatively more complicated and less accessible application process (and the impact this would have on uptake), and because the application and approval process would make it relatively simple to restrict cost to government. However, option 2 would have the highest administrative and implementation costs of the three options due to the staff required to review applications and would also have the highest costs of compliance of the three options due to the requirement of SMEs to fill out an application form in order to apply.

Based on the uncertainty surrounding some the estimates used in this analysis the recommendation of this research is to begin by implementing option 3, administer a wider survey of SMEs through this website, and then implement either the ITC or the grant depending on the outcomes of this survey. Option 3 is necessary to target knowledge barriers and raise awareness of process related GHG reduction activities and is a relatively low cost and low budgetary risk option. As such this would be a necessary first step to begin tackling GHG emissions reductions amongst SMEs. A financial incentive in conjunction with an information provision service would have the most significant impact on the barriers faced by SMEs and would result in the highest potential GHG emissions reductions amongst these businesses.

It is hoped that this recommended 'package' of options would help SMEs to achieve their maximum GHG reduction potential, while limiting any unanticipated budgetary impacts to the province. This recommendation would help provide political support for a potential increase in the carbon tax and would ensure that SMEs are well positioned to be part of, and competitive within, a low carbon economy.

Chapter 1.

Introduction

There is overwhelming scientific evidence that climate change is occurring and that the primary cause is anthropogenic releases of greenhouse gases (GHGs) (IPCC, 2013). The Intergovernmental Panel on Climate Change (IPCC) states that “limiting climate change will require substantial and sustained reductions of greenhouse gas emissions” (IPCC, 2013b) and that these reductions in emissions will “require large changes in investment patterns and appropriate policies” (IPCC, 2014). The Province of British Columbia (BC) has set ambitious targets to reduce provincial levels of GHG emissions, yet there is scepticism that it will be able to meet these targets under the current policy environment. Households and businesses from every sector of the BC economy will need to reduce emissions in order to reach these targets and mitigate the impacts of climate change. This research focuses on small and medium sized enterprises (SMEs).

SMEs account for over 98% of the businesses in BC and are responsible for an estimated 28% of the province’s GHG emissions (Sheehan, 2015). Many SMEs are facing barriers that limit their ability to achieve their emissions reductions potential and gain the associated business benefits. The primary barriers identified through my research fall into two categories: resource barriers and knowledge barriers. SMEs are more likely than their larger counterparts to have limited financial, staff, and time resources. These resource limitations reduce their ability to develop the knowledge base required to explore, develop, and implement GHG reductions strategies. I analyze potential policy options that the province could use to limit these barriers and promote GHG emissions reductions in this vital sector of the BC economy.

Chapter 2.

GHGs and SMEs

Climate change poses real and significant threats to our planet. The impacts include changing precipitation levels with less snow, but more extreme rainfall and wind, higher mean temperatures and temperature extremes, rising sea levels, and storm surge. The climate stresses contribute to flooding events, the devastation of crops, and the potential extirpation or extinction of plants and animals (Gillis, 2014). Carbon dioxide is the most significant of the greenhouse gases in terms of total emissions and the increase in atmospheric concentrations of CO₂ are primarily the result of fossil fuel burning (IPCC, 2007). The IPCC Climate Change 2014 Synthesis Report warns that the continued emission of GHGs will cause further global warming and will increase the likelihood of “severe, pervasive and irreversible impacts for people and ecosystems” (IPCC, 2014b).

A massive reduction in the world’s emissions of greenhouse gases is required. Given the inability of markets to price carbon externalities, government policy is needed. In Canada, small and medium sized businesses are a sector with the potential to contribute significant reductions in emissions. While they can be small in terms of their individual emissions, the sheer number of SMEs means that the cumulative impact of GHG emissions reductions in this sector would be significant. This section provides a brief background to the current climate change policy context in BC and how SMEs are positioned within this context.

2.1. BC's GHG Emissions Reduction Targets

British Columbia has a legislated target to reduce its GHG emissions by 33 percent of 2007 levels by 2020 and to achieve an 80 percent reduction by 2050 (Government of British Columbia, 2015). The *Greenhouse Gas Reduction Targets Act* (passed in November 2007) also sets interim reductions targets of 6% by 2012 and 18% by 2016.

BC met its interim target of a 6% reduction in emissions by 2012 but there is widespread scepticism that it will be able to meet its 2020 targets. The 2014 Emissions Trend Report indicated that BC was on pace to *increase* emissions 11% by 2020 (from 2005 levels) (Kieltyka, 2015). It appears unlikely that BC will meet its 2020 targets under the current trajectory¹.

Innovative solutions are needed to help achieve GHG emissions reductions. Often overlooked by climate change policy, many small and medium sized enterprises have the potential to significantly reduce their GHG emissions yet are facing various barriers that prevent them from doing so. Under the right policy environment SMEs might be able to accelerate reductions in their GHG emissions and help BC in achieving its targets.

2.2. Small and Medium Sized Enterprises (SMEs)

Small and medium sized enterprises (also referred to as small and medium sized businesses) make up a significant proportion of businesses in most developed countries, and BC is no exception. This section describes how SMEs are classified, their role in the BC economy, and some of their key characteristics.

¹ The Climate Leadership Team's 2015 report states that BC cannot meet the 2020 GHG emissions reductions targets given the freeze in the carbon tax and the lack of new policy initiatives (Climate Leadership Team, 2015).

2.2.1. Classification of an SME

While there are a number of ways that the size of a business can be defined (annual sales or shipments, annual gross or net revenue, assets), the number of employees is a commonly used approach (Industry Canada, 2013). The categorization of SMEs based on number of employees varies, as illustrated in Table 2-1.

Table 2-1: Number of Employees in Varying Definitions of Small and Medium Sized Businesses

| Organization | Small Businesses | Medium Businesses | Large Businesses |
|--------------------------|------------------|-------------------|------------------|
| Industry Canada | 1-99 | 100-499 | 500 + |
| Government of BC | 1-49 | - | 50+ |
| Alternative Definitions* | 1-49 | 50-249 | 250 + |

* This definition is often used in European literature on SMEs such as Valdani Vicari & Associati SRL and the Centre for European Economic Research (2015) and Bradford and Fraser (2007).

Under Industry Canada’s definition, a business must have at least one paid employee, annual sales revenues of \$30,000, or be incorporated and have filed a federal corporate income tax return at least once in the previous 3 years (Industry Canada, 2013). This definition excludes the self-employed, “indeterminate” businesses, and public administration (including schools and hospitals, public utilities, and non-profit associations). The BC Government’s classification of small businesses includes those who are self-employed without paid help (BC Stats, 2015). In some instances ‘micro enterprises’ have been distinguished as those with fewer than 10 employees (VVA & ZEN, 2015).

2.2.2. SMEs in BC

With approximately 170,000 small and medium sized businesses in BC, SMEs make up a significant proportion of businesses in the province. Estimates put their cumulative GHG emissions at 17 million tonnes of carbon dioxide equivalent, about 28% of the province’s total greenhouse gas emissions (Sheehan, 2015).

Under Industry Canada's definition, in 2012 SMEs made up 99.9% of BC businesses (Industry Canada, 2013). Of these, 169,178 (98.6%) were small (fewer than 100 employees) and 2,218 (1.3%) were medium (100-499 employees)². BC statistics show that 79% of BC businesses have 0 to 4 employees: 51% of SMEs are self-employed without paid help and 28% have 1-4 employees (BC Stats, 2015). Industry Canada's 2012 statistics found that 93.7% of employment in BC was in SMEs (75.7% small businesses and 18% medium sized businesses) (Industry Canada, 2013).

2.2.3. Characteristics of SMEs

SMEs are a highly heterogeneous group. They operate in nearly every economic sector including retail, financial services, manufacturing, construction, food and beverage, and hospitality. There is also substantial heterogeneity across firms in terms of their level of energy utilization and the costs associated with energy investment, which will create variation in the value that firms derive from investment in energy efficiency (Allcott & Greenstone, 2012).

Climate Smart BC³ has found that in general, emissions rise with the size of the organization; however they appear to be influenced more by industry and associated energy, material and transport usage patterns (Climate Smart, 2012). Based on data from Climate Smart participating businesses, construction, trade and transport, and manufacturing SMEs reported the highest GHGs per employee and professional service and public administration/service organizations the lowest (Climate Smart, 2012).

² Using the B.C. definition, as of 2014, there were approximately 382,600 small businesses operating in B.C., representing 98% of all business in the Province. These businesses employed an estimated 1,010,800 people in BC, accounting for 54% of private-sector employment in the province (BC Stats, 2015).

³ Climate Smart BC is a Vancouver-based social enterprise that provides training and support to assist businesses in monitoring and managing their GHG emissions. Climate Smart has produced a number of reports regarding the experience of BC SMEs in reducing their emissions using data from participating businesses. I was introduced to these reports when I completed a report for Climate Smart on this topic during the summer of 2015.

Climate Smart identified the emissions by activity type among its participating businesses. Based on their findings, the primary emissions from SMEs include: Heat (24%); Fleet (22%); Paper (14%); Electricity (12%); Business Travel (10%); Waste (8%); Commuting (4%); Third Party Shipping (4%); and Other (2%) (Climate Smart, 2012). Paper use and heating are the main source of emissions for professional services, fleet vehicle activity is the main source of emissions from trade and transport SMEs, and manufacturers were found to have carbon impacts in multiple areas, with business travel being the highest source of emissions from the businesses surveyed (Climate Smart, 2012).

Chapter 3.

Methodology

This study examines the barriers that SMEs face in reducing their GHG emissions and investigates possible policy options to reduce these barriers and promote greater GHG emissions management amongst BC's SMEs.

The methodology for this study involves a literature review and semi-structured interviews with experts on the subject matter and individuals from SMEs who were responsible for energy efficiency investment.

The literature provides information about the barriers that SMEs face in engaging in green business practices, policies in similar jurisdictions that target SMEs specifically, and policies in similar jurisdictions that target pro-environmental business behaviour. This information was collected through a review of existing academic, think tank, and other literature on SMEs and the promotion of corporate environmental responsibility, as well as through an analysis of existing programs that promote corporate environmental sustainability.

Interviews were conducted with individuals who were experts on subjects pertinent to this capstone. This included academics and professionals who have substantive knowledge about SMEs, energy efficiency, taxation, and climate change policy. The insights and experiences of these individuals helped to strengthen my understanding of the barriers SMEs face, inform the policy options and their evaluation, and shine light on potential barriers to the implementation of specific policies.

The identification of potential expert interviewees was obtained from publicly available information and personal contacts of this capstone's supervisor and the researcher. These individuals were contacted via email with a description of my research to ask if they would be willing to be interviewed. Once they indicated a willingness to participate they were provided with a consent form and an interview guide (Appendix B). The interview guide allowed them to explore the types of questions that would be asked ahead of the interview. The interviews themselves when possible were conducted in person, however based on the availability of participants they were given the option to engage in an interview via telephone. Interview lengths were targeted at one hour.

A semi-structured interview format was used to allow for flexibility in responses and to encourage open dialogue with the participants. In general, participants were asked what their experience had taught them about the barriers that SMEs and businesses face in reducing their GHG emissions and engaging in energy efficiency investments, their opinions on the use of policy to promote corporate environmental sustainability, policies or programs that they think could best achieve this goal, and any risks or obstacles that might be associated with these policies or programs.

The second category of interviews was conducted with individuals from small and medium sized businesses in BC. Based on ease of accessibility, the majority of these interviews were conducted with individuals from SMEs within the greater Vancouver region; however, SMEs from the Okanagan and Vancouver Island were also interviewed. These interviews focused on SME owners and managers who were responsible for the business's investment decisions and/or energy-related expenditures. The purpose of these interviews was to gain a better understanding of the experience of SMEs in BC, the barriers that they perceive themselves to face, and their views on potential policy options

The identification of potential interviewees was obtained from publicly available information. The majority of the SMEs contacted were businesses that were listed as having undergone Climate Smart training, as these businesses were likely to have taken steps to reduce their emissions and thus have an understanding of the barriers that they

faced in doing this. A list of potential businesses to approach was compiled to ensure variation and diversity in size of the business (small or medium) and business sector (for example: food and hospitality, commercial, construction, manufacturing). Approximately forty businesses were contacted. Interviews were conducted with 8 SME owners or managers from a range of sizes and sectors.

These interview subjects were contacted via email that included a brief study description. The preliminary email specified that the researcher wished to interview the individual in the business that was responsible for making investment decisions for the business and/or energy-related expenditures. Once a representative of the SME indicated a willingness to be interviewed they were provided with a consent form that also contained additional information regarding the study purpose, as well as an outline of the interview questions that would be asked. Interview lengths were targeted at thirty minutes.

A semi-structured interview format was used to allow flexibility of responses, however there were general questions that were asked of all SME participants (which were provided to them ahead of the interview). SME participants were asked questions regarding the size of their business, their behaviours surrounding energy use monitoring, their behaviours surrounding environmental and energy efficiency investments, what (if any) were the major barriers they faced in engaging in energy efficiency investment, and their opinions on potential policy options. The semi-structured interview guide and questions that were provided to the SME interview participants are included in Appendix A.

Chapter 4.

Benefits, Methods, and Barriers to Reducing GHGs

There are a number of available methods to reduce GHG emissions and research shows that reductions result in business benefits. However, research also suggests that even with the benefits and available methods, SMEs are facing barriers that limit their GHG management and reduction. This section will review the benefits to reducing GHG emissions, some of the methods for doing so, and the barriers that stand in the way of SMEs realising these benefits.

4.1. Benefits of Reducing GHG Emissions

A common theme across studies is that large amounts of energy can be conserved at negative net costs, and that consumers and firms are failing to exploit profitable investment opportunities in energy efficiency (Allcott and Greenstone, 2012). A business focus on reducing GHG emissions can lead to financial savings, increased access to contracts with organizations that have sustainable purchasing requirements, and increased market share. GHG emissions management and reduction can also allow businesses to prepare for carbon regulation, respond to customer and employee demand, and retain employees.

The adoption of environmental improvements in SMEs can provide them with business benefits such as reduced operating costs and overhead. Streamlining supply chains, de-materializing packaging and redesigning products and services all benefit the bottom line by producing more value and less process and material waste (Climate

Smart, 2012). In addition, these investments can signal to external stakeholders a commitment to corporate social responsibility, which can improve the competitive advantage of firms (Bradford & Fraser, 2007). The Carbon Trust (2004, 2005) found that UK SMEs in most sectors could “easily reduce energy consumption by approximately 10-20%” and that for many SMEs this could provide the same business benefits as a 5% increase in sales (Bradford and Fraser, 2007, p.159).

A case study of 11 BC businesses conducted by the Pacific Institute for Climate Solutions explored BC SMEs (less than 500 employees) that had worked with Climate Smart BC to measure and manage their emissions between 2010 and 2013 (Sheehan et al., 2013). Of the almost \$1 million invested in emissions reductions (\$671,175 of the organization’s own savings plus outside incentives), they found annual cost savings of \$288,650 across the 11 businesses (Sheehan et al., 2013). Based on 2013 energy and waste-disposal costs, the estimated net savings over 10 years was found to be more than \$2.2 million dollars (Sheehan et al., 2013). With a projected payback period of 2.3 years, this implied a 43% rate of return along with annual carbon dioxide emissions reductions of 485.6 tonnes (Sheehan et al., 2013).

Climate Smart (2012) also points out that carbon management can create economic resiliency and protect SMEs against fluctuating energy prices. Businesses and individuals in BC have been facing, and will continue to face rising energy and waste costs, providing them with increased incentive to engage in environmentally conscious business behaviours regardless of their concern for the environment. In 2013 BC Hydro announced a 28% electricity hike that would occur over five years (CBC News, 2013). This is in addition to the BC Carbon Tax, which, although frozen since 2012, increases the cost of emitting GHGs.

4.2. Methods for Reducing Emissions

Policies aimed at improving environmental sustainability and reducing GHG emissions tend to target two types of investment behaviour: investment in renewable

energy, and investment in energy efficiency upgrades. Renewable energy investment includes investment in solar energy and wind energy, projects that produce “clean” energy for either the personal use of the firm or for sale and distribution. This research focuses on investment in energy efficiency upgrades, as renewable energy development is not feasible for many SMEs.

Investment in energy efficiency upgrades and energy conservation includes investment in lighting retrofitting, weatherization, heating, ventilation, and air conditioning (HVAC) and investments in appliances and vehicles with higher fuel efficiency (such as a fleet change or boiler replacement). There are also sector specific indirect investment methods of reducing business GHG emissions, such as investment in a cardboard bailer to reduce the number of required cardboard pick-ups, or investment in a larger fridge to reduce the number of deliveries of perishable food items.

In addition to capital investments, process related activities can also reduce business GHG emissions. These include (but are not limited to) activities such as changing staff behaviour (for example turning off lights and computers at the end of the day), using teleconference or videoconference instead of off-site in-person meetings, changing operating hours or staff scheduling, or re-routing business vehicle routes to maximize efficiency. Some examples of methods to reduce GHG emissions through both investment and process related activities are provided in Table 4-1.

Table 4-1: Investment and Process Related Methods to Reduce GHG Emissions

| Investment Methods | Process Related Methods |
|--|---|
| <ul style="list-style-type: none"> • Retrofitting lighting, windows, heating systems, and roofing materials • Insulation, weather-stripping, or caulking around doors and windows • Replacement of lighting with energy efficient bulbs • Replacement of boiler with energy efficient models • Installation of energy efficient appliances (e.g. hand dryers) • Installation of censored lighting fixtures • Installation of programmable thermostats • Investment in low emissions and/or fuel efficient vehicles and machinery | <ul style="list-style-type: none"> • Discouraging the use of plastic bags • Education of employees on electricity use • Paper and waste reduction strategies • Redistributing shifts and reducing work week • Use of web or teleconferencing in place of off-site meetings to reduce business travel • Encouragement of staff commuting through low carbon methods (e.g. public transit, carpool, cycling) • Corporate anti-idling policies • Turning off/reducing heat when possible |

4.3. Barriers SMEs Face in Adopting Energy Efficiency Investments and Operations

Research suggests that there are barriers that prevent SMEs from engaging in profitable GHG reducing investments and activities. Allcott and Greenstone (2012), Bradford and Fraser (2007), Lanoie and Rochon-Fabien (2012), and Climate Smart (2012) highlight the following barriers that businesses face in reducing their emissions and investing in energy efficiency:

Lack of Awareness of Business Benefits: While there are many business benefits associated with reducing GHG emissions (described in section 4.1), many businesses are not aware of these benefits, or believe that the benefits are not applicable to their particular business. Large businesses tend to be more aware of the broader business case (efficiency and competitiveness) for managing and reducing emissions than smaller businesses. Rather, many SMEs (regardless of economic sector) perceive that environmental improvements require substantial costs and effort. This prevents SMEs

from considering energy efficiency and GHG reducing investments as part of a sound and viable business plan.

Lack of Awareness of Business Emissions: SMEs are often not aware of the level of GHG emissions that result from their business activities and the primary sources of these emissions. In Bradford and Fraser's (2007) study of SMEs, companies reported that they did not take steps to reduce their energy consumption because they believed that the nature of their business did not offer the potential for emission reductions. A lack of awareness of business GHG emissions may lead SMEs to believe that their GHG emissions are not large enough to allow for meaningful reductions or business benefits resulting from these reductions.

Lack of Information: SMEs are often not aware of options to help them improve their environmental performance and how to implement these measures. Research suggests that businesses are often not aware of potential investments in energy efficiency, such as a new type of machine or technology that could reduce energy costs, as well as procedural initiatives that they could take to reduce energy consumption. Results from the "Enviroclub" initiative⁴ indicated that information and training for improving SMEs environmental performance was lacking. Furthermore, SMEs are often not aware of available services and incentives to assist them in reducing their GHG emissions and improving their environmental performance.

Lack of Staff for Analysis and Implementation: Lack of staff for analysis and implementation is a common barrier faced by SMEs. SMEs in Bradford and Fraser's (2007) study identified insufficient time or staff expertise or resources as the most significant barrier preventing them from improving their environmental performance. Building knowledge of environmental issues, business GHG emissions, the business benefits of reducing these emissions, the options available to reduce emissions, and how to implement these options takes time and staff resources that small businesses

⁴ The "Enviroclub" initiative was a Quebec program launched in 2001 that used educational workshops and technical assistance to support SMEs in improving their profitability and competitiveness through enhanced environmental performance.

may not have. This contributes to their lack of awareness of potential actions they could take to reduce emissions. Climate Smart reports that “SMEs are more likely to take on in-house carbon management if they have enough staff to allow time for employees to undertake and implement new business practices” (2012, p. 13).

Financial Barriers: SMEs may lack the financial resources necessary to invest in energy efficiency and GHG reducing investments. Research suggests that the size of the business may determine whether an organization has sufficient funds to take on in-house GHG management. Businesses without sufficient cash on hand to engage in investment may lack access to credit markets to borrow funds, or may be unable to justify or afford the interest costs associated with borrowing funds for this purpose. For those SMEs with enough cash on hand to engage in investment there may be a high opportunity cost associated with spending those funds on energy efficiency upgrades rather than other forms of investment. A ‘present-bias’ may also exist, as the cost of innovation is often immediate, but the benefits are often delayed. This is confounded by the common belief that ‘going green’ entails high costs, the lack of awareness of the financial benefits of going green, and the resulting low priority placed on environmental performance relative to other investment options.

Priorities: Research suggests that environmental issues and improving environmental performance are not a top priority for many SMEs. For some “daily struggles for survival may push aside environmental issues” (Lanoie and Rochon-Fabien, 2012, p. 218). Businesses, particularly ones that are focused on survival, tend to apply a high rate of time preference (or discount rate) to investment decisions. Thus, the immediate costs and delayed benefits of investment in energy efficiency might result in these investments being low on their investment priority lists. Standards of energy efficiency may be less salient than other factors (such as costs of equipment) when making investment decisions. A lack of awareness of the business benefits associated with reducing GHG emissions contributes to this prioritization. The majority of small businesses that are already engaging in carbon management tend to be led by ‘visionary’ motives (personal interest in education, building upon existing initiatives, and industry/community leadership and engagement), which lead them to prioritise environmental performance in their business plan.

4.3.1. SMEs and Energy Efficiency Behaviour

Research suggests that certain types of SMEs are more likely than others to already be engaging in energy efficiency practices and GHG management despite the obstacles that they face. This section discusses the characteristics of SMEs that appear to influence whether they monitor their energy use and engage in GHG reduction strategies.

Bradford and Fraser (2007) found that certain categories of SMEs differ in terms of their energy use behaviours, internal constraints to improved environmental performance, and attitudes towards possible policy options to reduce energy use and carbon emissions.⁵ Firms were categorized by economic activity (manufacturing, construction, and commercial sectors) and by employee size (small or medium sized firms). Bradford and Fraser's findings include:

- Manufacturing firms were twice as likely as construction firms, and three times more likely than commercial firms to incorporate energy costs into their budgeting;
- Manufacturing firms were the most likely and commercial firms were the least likely to monitor their energy use;
- Manufacturing firms (with generally high energy usage), and medium sized firms were the most likely to have taken action to improve their environmental performance (69% of manufacturing firms surveyed and 67% of medium sized firms surveyed); and
- Firms in the commercial sector were the least likely to have adopted energy efficiency measures and most of these firms expressed the belief that their energy consumption was insignificant.

A survey of approximately 13,000 SMEs in Europe and the United States (TNS Political & Social, 2012) found that:

⁵ Bradford and Fraser's research is based on a 2005 survey of 55 SMEs in the UK.

- 93% of SMEs reported that they were taking at least one action to be more resource efficient. This included saving energy (56%), minimizing waste (53%), recycling (49%), saving materials (46%), selling scrap material to another company (23%), and using renewable energy (20%);
- In comparison with SMEs, large companies were more likely to save energy (82% versus 64%), minimize waste (72% versus 62%), recycle (76% versus 61%), save materials (74% versus 57%), and sell their scrap metal to another company (44% versus 24%); and
- While 80% of surveyed SMEs stated that they planned to implement additional resource efficiency actions, 79% of those SMEs that were currently not taking any measures did not intend to implement any action in the next two years.

Climate Smart (2012) identified the following themes in energy efficiency behaviour amongst participating Climate Smart businesses:

- The notion of GHG management is still a new one to many businesses, and uptake remains greatest amongst 'early adopters';
- The most oft-cited motivators for engagement in GHG management were: personal interest and building upon self-identified existing 'green initiatives' and taking a leadership position within their industry;
- The likelihood of capital investment increases with the size of the organization;
- Drivers for managing GHGs vary across the size of the organisation and revenue;
- The top five reductions strategies they identified (by percent of SMEs planning to implement) were: waste diversion, paper use, staff commuting, third-party shipping, and fleet behaviour;
- Few businesses anticipate future requirements as a top motivator.

These studies suggest that there is variation between sizes and sectors of SMEs in terms of their engagement in energy efficiency practices, their monitoring of energy use, and their motives for managing their GHG emissions. They also suggest that GHG awareness and management is not the norm for all SMEs and that certain types of SMEs are more likely to be engaging in GHG management and reduction. The

SMEs that are most likely to be already engaging in GHG management are manufacturing firms, medium sized firms, and those with a personal interest in limiting their environmental footprint. While some SMEs are taking steps to reduce their carbon footprint, larger businesses are more likely to be taking steps to be more resource efficient and are more likely to engage in capital investment to become more energy efficient. This research suggests that there are still many categories of SMEs that are not realising their potential for GHG emissions reductions and provides an indication of the types of SMEs that should be most targeted by policies.

4.3.2. Summary of Primary Barriers

The literature suggests that the two major categories of barriers that prevent SMEs from engaging in energy efficiency investment and GHG emissions management are knowledge constraints and resource constraints. These are depicted in Table 4-2.

Table 4-2: Barriers Preventing SME GHG Reductions

| Knowledge Constraints | Resource Constraints |
|---|---|
| <ul style="list-style-type: none"> • Lack of awareness of the options to help them improve their performance (equipment, technology, or behavioral) and how to implement these options • Lack of knowledge of business benefits of reducing energy consumption • Perception that environmental improvements require substantial cost and effort • Lack of awareness of environmental issues (i.e. the impact of GHG emissions) • Belief that nature of business does not offer the potential for emissions reductions • Lack of awareness of available assistance or incentives | <ul style="list-style-type: none"> • High immediate costs of investment (and delayed realization of benefits) • Lack of financial resources to engage in initial investment • Lack of access to credit markets • Lack of time for analysis and implementation • Lack of staff for analysis and implementation • Lack of in house expertise • Lack of time to improve knowledge |

These categories are closely related, as Climate Smart points out “for many SMEs, time and human resource constraints limit their ability to wade through the mass of information available on GHG management” (Climate Smart, 2012, p.4). Thus, resource constraints can prevent not only the investment and implementation of GHG management strategies, but also SMEs’ ability to gain the appropriate information required to incentivise, plan, and implement GHG reduction strategies.

Current policies and incentives available to businesses in British Columbia are not successfully reaching SMEs and are not sufficiently addressing the barriers that they face, or perceive themselves to face, in reducing their GHG emissions.

Chapter 5.

BC Policies and Incentives Promoting Energy Efficiency

Policies and programs exist in BC to support businesses in reducing their GHG emissions. However, these policies are not specifically designed with SMEs in mind. While many of these programs and policies do not explicitly exclude SMEs, they might inadvertently do so through the eligibility requirements and/or complicated application processes. This section provides a brief description of some of the existing policies and programs that target GHG emissions reductions and that potentially impact SMEs.

5.1. BC Government Initiatives

BC's Carbon Tax Act, implemented in July 2008, put a price on GHG emissions. The Act sets a tax rate that rose from \$5 in 2008 to \$30 per tonne of carbon dioxide equivalent emissions in 2012, working out to a tax of 6.67 cents/liter on gasoline, 7.67 cents/liter on diesel, 5.70 cents a cubic meter on natural gas, and 4.62 cents/liter on propane (Government of BC, 2015). This carbon tax has not increased since July 2012. While this policy does not reduce the barriers that prevent SMEs from limiting their GHG emissions, it should create an incentive to reduce emissions by increasing the price of any of the carbon-based fuels used by SMEs.

The BC Ministry of Finance provides a provincial sales tax (PST) exemption for material and equipment used to conserve energy or produce electricity from renewable sources (Government of BC, 2014b). This exempts individuals or businesses from

paying the 7% PST tax on qualifying equipment. Some examples of qualifying equipment include: materials and equipment that prevent heat loss from buildings (e.g. thermal insulation material); insulation that is designed to prevent heat transfer to or from hot water tanks, hot or cold water pipes, or ductwork (e.g. insulation blankets for hot water tanks); selected alternative energy sources (e.g. wind powered generating equipment); electricity, natural gas and propane conversion kits (e.g. natural gas and propane conversion kits for internal combustion engines); and devices designed to reduce wind resistance and improve fuel efficiency (e.g. aerodynamic bumpers).

5.2. FortisBC Natural Gas Incentives

FortisBC offers free energy assessments and various rebates for qualifying equipment upgrades and businesses.

Businesses that are a FortisBC commercial rate class natural gas customer and/or a FortisBC commercial electricity customer or customer of the municipality of Grand Forks, Summerland, Penticton or Nelson Hydro may be eligible to receive free support from a Business Energy Advisor (BEA). BEAs “help business owners and managers identify energy-efficiency opportunities to help eliminate energy waste and improve profitability, and how to take advantage of rebates and programs” (FortisBC, 2016a). Natural gas customers must consume less than 2,000 gigajoules a year to qualify for the no-cost consultation and can request a consultation online by providing general business information, the building area (in square feet), and weekly hours of operation.

The efficient boiler program offers financial incentives to encourage the installation of high-efficiency natural gas space heating systems in both new construction and existing buildings (FortisBC, 2016b). The rebate can be up to \$45,000, or \$9 per MBH. They also have an efficient commercial water heater program with up to \$15,000

of rebates. In order to apply for the rebate, businesses must be a FortisBC commercial rate class natural gas customer and must be a property owner or long-term leaseholder of an existing commercial building or a builder/developer or property owner of a new commercial construction project. Businesses that meet this criteria are able to apply for the rebate after the boiler or water heater is installed by a gas or mechanical contractor licenced with the BC Safety Authority by filling out a form that is available online.

Depending on the region where the business is located, Fortis BC also provides a foodservice equipment rebate for qualifying high-efficiency equipment of up to \$3,500 (for natural gas equipment) or \$1,000 (for electrical equipment), and various rebates for high-efficiency lighting retrofits, HVAC units, and refrigeration equipment. The rebate amount is based on the existing product, the upgraded product, and the number of units of the upgrade. Eligible businesses are able to apply for the rebate online after they have installed the eligible upgraded equipment.

5.3. Business Energy Saving Incentive

BC Hydro offers a Business Energy Saving Incentive program (formally Power Smart Express). This program is available to eligible commercial customers, small industrial sites, and residential stratas and provides them with financial incentives to help shorten the payback period for simple, one-to-one energy efficiency replacements (BC Hydro, 2015b). Business eligibility is not explicitly stated on the website, but there is an online tool that determines eligibility using the businesses account number. Energy efficiency replacements include lighting, HVAC, refrigeration or commercial kitchen energy-efficiency upgrades (the commercial kitchen energy-efficiency upgrade incentive expires February 29th, 2016).

Incentives are calculated based on operating hours, project costs, and energy savings. On average, incentives cover 35% of the cost of an energy-efficiency upgrade

(BC Hydro, 2015b). Pre-approval is required before equipment is purchased or installed, and the incentive is received following the purchase and installation of the equipment and the submission of a project declaration. The business starts by planning the upgrade with a Power Smart Alliance contractor, then submits the project details for pre-approval, purchases and installs equipment, submits the project declaration, and then receives the incentive. A full list of eligible products and a tool to determine program eligibility are available online (BC Hydro, 2015a).

5.4. Impacts of these Policies

These examples illustrate that there are initiatives, policies, and programs in place in BC to incentivize and/or support businesses in improving their environmental performance and reducing their GHG emissions. Table 5-1 summarizes these policies and their impact on the barriers SMEs face.

Table 5-1: Overview of Existing Policies and Programs and their Impact on SMEs

| Policy or Program | | Description | Impact on SMEs |
|--|---|---|--|
| BC's Carbon Tax Act | | \$30 per tonne of CO ₂ e | Provides incentive to reduce GHG emissions Has no impact on knowledge or resource barriers |
| BC Ministry of Finance Provincial Sales Tax (PST) Exemption | | Exemption from paying 7% PST on eligible material and equipment used to conserve energy or produce electricity from renewable sources | Minor impact on financial resource barriers |
| FortisBC Rebates | Energy assessment | Free energy assessment for businesses that consume less than 2,000 GJ a year, apply, and are approved | Impact on knowledge barriers for SMEs that consume less than 2,000 GJ a year, apply for the assessment, and are approved |
| | Efficient boiler and commercial water heater programs | Up to \$45,000 of rebates for upgrades to eligible efficiency boiler and \$15,000 for eligible efficient water heaters | Impacts financial barriers for SMEs that are property owners or long-term leaseholders of an existing commercial building OR are builders/developers or property owner of a new commercial construction project that are approved for the rebate |
| | Rebates for foodservice equipment, high-efficiency lighting retrofits, HVAC units, and refrigeration equipment. | Rebate for qualifying high-efficiency equipment Rebate amount is based on the existing product, the upgraded product, and the number of units of the upgrade Eligible businesses are able to apply for the rebate after they have installed the eligible upgraded equipment | Impacts financial barriers for eligible SMEs who apply for the rebate The degree of reduction depends on the scope of the project, the number of high-efficiency units that are purchased, and the rebate received |
| BC Hydro: Business Energy Savings Incentives | | Incentives for energy efficiency replacements (lighting, HVAC, refrigeration or commercial kitchen energy-efficiency upgrades) Incentives calculated based on operating hours, project costs, and energy savings Requires pre-approval | Reduces financial barriers associated with replacement of eligible equipment for businesses that are approved (average of 35% of costs covered) Could be complexity in the approval process that is a barrier to SMEs |

While programs and initiatives exist, they do not appear to be sufficiently targeting SMEs. The SMEs whom I interviewed were either not aware of any available incentives, assumed that they would not qualify, or were aware of past incentives but missed the deadlines before they expired.

Interviews with SMEs highlighted the importance of ensuring that businesses are aware of existing incentives and the business benefits resulting from the investments that these incentives promote. These interviews also highlighted the need for clear eligibility criteria so that it is easily determined whether or not the business might qualify for the incentive. SMEs might assume that they do not qualify for an incentive or program due to the size or nature of their business. Managers may also be reluctant to take the time and effort required to do the research and apply for an incentive when eligibility is unclear and there is a risk that they will ultimately not qualify. These interviews also emphasized the importance of ensuring that the process required to receive the incentive is perceived as being relatively straightforward and simple. SMEs with limited time and staff will be less likely to fill out long and complicated application forms or undertake processes that require a number of steps or complicated data collection.

Following from the previous points, it is important to ensure that the benefits of the incentive are clear and sufficient to offset the costs of applying. SMEs with limited staff and time need to be assured that the time spent applying for an incentive is worth their while. Energy efficiency investments (whether or not they include an incentive) will not be a high priority for businesses that are not aware of their current emissions, believe that there are no opportunities for reductions within their business, and/or are not aware of the business benefits associated with reducing emissions.

The existing research explored as well as the interviews that were conducted with BC SMEs and experts indicate that SMEs continue to face barriers that limit their ability (perceived or actual) to engage in GHG reducing investment and activities.

Chapter 6.

Policy Options to Reduce SME Barriers

I focus on policies that can reduce the 'knowledge' and 'resources' barriers that inhibit SMEs from managing and reducing their GHG emissions. Knowledge includes awareness of the business benefits of GHG emissions reductions, awareness of what business activities are the primary producers of GHGs, and awareness of steps that can be taken to reduce GHG emissions. Resources include financial, time, and staff resources.

The policy options explored include: an investment tax credit (ITC), a grant, and a consolidated information provision service. The first two options contain a sub component of GHG emissions reporting requirements (described in section 6.2), which is not evaluated as a stand-alone component. These three options were chosen based on information obtained from the literature review and feedback from interviews. The ITC and grant options were chosen due to their ability to target the resource constraints faced by SMEs. While these options are financially based, they hold the potential to address knowledge barriers through the requirement of measuring and reporting business GHG emissions. The third option focuses almost exclusively on the knowledge barriers experienced by SMEs, a barrier that continuously surfaced throughout this research.

Section 6.1 sets the policy context and outlines some underlying assumptions and considerations that form the basis of the chosen options. Section 6.2 addresses the design of the policy options. Section 6.3 describes the GHG reporting requirement that is common to both option 1 and option 2. The characteristics of the ITC and grant options

that are common to both options are described in section 6.4, followed by individual descriptions of the three policy options.

6.1. Some Considerations

The policy options are directed towards the provincial government, as they require the resources, authority, and jurisdiction of this level of government. Furthermore, they are consistent with the provincial government's GHG emissions reduction targets set forth in the *Greenhouse Gas Reduction Targets Act*. While the ability to enact these policies lies within the jurisdiction and means of the provincial government, support and input from municipal governments, non-profits, and other local organizations would be critical in order to strengthen the design and implementation these policies.

These options are intended to target and address SMEs specifically.⁶ Current and past policy efforts have tended to focus primarily on large businesses, excluding SMEs and creating a need for targeted support and services to this sector. The sheer size of the SME community in BC points to the need for policies that target this sector. As noted above, one estimate suggests that the over 170,000 SMEs in BC are collectively responsible for 17 million tonnes of CO₂e, or about 28% of the Province's total emissions (Sheehan, 2015).

These options are focused exclusively on 'carrots' rather than 'sticks'. In this context, carrots refer to a 'welcome change' or reward for positive behaviour, and sticks refer to an 'unwelcome change' or a penalty for negative behaviour (Galle, 2012). This emphasis on carrots occurs for a number of reasons. First, the primary goal of this paper is to decrease the barriers that SMEs face in reducing their GHG emissions. While they might incentivise GHG reductions, regulations and disciplinary taxes do little in the way

⁶ It is beyond my scope to consider the complexity of having these policies apply to both SMEs and large businesses. The major impact of the ITC and grant, if extended to all businesses, would be on the provincial budget.

of reducing these barriers. Second, in BC there already exists a 'stick' in the form of the carbon tax. While evaluating the efficacy of the carbon tax lies outside of the scope of this project, its existence means that SMEs in the BC political context are already subject to disciplinary incentives or 'sticks'. Finally, SMEs are a difficult sector to regulate due to their sheer number and diversity of businesses compared to a few number of large corporations.

The policy options presented are complementary with the carbon tax or other stick-like measures. Limiting the barriers that SMEs face in reducing their GHG emissions ensures that SMEs are prepared and able to interact in an environment with potentially increasingly severe 'sticks', and are not left at a disadvantage relative to larger corporations as a result of their more limited resources. Furthermore, the research from this paper suggests that if SMEs are made aware of how to manage their emissions and the positive business benefits of doing so (in addition to the added benefit of mitigating climate change), there may be less need for policy intervention of any sort, carrot or stick, to incite GHG reducing behaviours.

6.2. Design Features of the ITC and Grant

Avoidance of any arbitrary design differences built into the financial incentive options governs my design of the policies. I want to ensure that the evaluation focuses on the key differentiating factors of these policy options, mainly, the administration of the financial incentives. A general design framework exists for each policy option. I assume that the more detailed design features would be determined by the province and would require additional research, consultation, and data collection. Features that require further research and development include: the eligible investments, the interaction of the incentives with existing policies, and the precise classification of qualifying businesses.

This analysis assumes at a high level that eligible investments under the ITC and grant options would be those that are proven to result in reductions of GHG emissions, as determined through government research. The degree of specificity of eligible

investments and the range of eligible investments would impact the cost-effectiveness of the policy, the uptake of the policy, and the potential for fraud and abuse of the policy. The possible eligible investments range from energy efficient lighting fixtures or machinery to web-cameras and environmental consultants. For the purposes of this analysis, eligible investments are assumed to be simply those investments that are proven to result in GHG emissions reductions.

This analysis examines both the grant and ITC options as stand alone incentives. However, as demonstrated in Chapter 5, there are other financial incentives available to assist businesses in reducing their GHG emissions. An important consideration for the issuing government is how the grant and ITC will interact with existing incentives, i.e. whether they will complement or supplement existing incentives. While this analysis assumes that the full incentive amount is available to any SME that engages in eligible investment, the issuing government may decide to implement these options as an 'either or' offering in conjunction with existing incentives to prevent 'double-dipping'.

This analysis also assumes that SMEs would be categorised using the Industry Canada definition as those businesses with fewer than 500 employees. However, the province would have discretion over the number of employees that would allow a business to qualify for these incentives. Due to the higher proportion of small relative to medium sized businesses (as described in section 2.2.2) the province might prefer to only allow small businesses to qualify for the incentives. Alternatively, due to the potential for more significant GHG emissions reductions from larger businesses, the province might choose to allow only medium sized businesses to qualify for the incentive.

Altering some of the design features would affect the trade-offs between the policy options, or the policy's performance on various evaluation criteria. This is demonstrated throughout the evaluation of the options in Chapter 8 and signifies that design is a critical component to be considered by the issuing government. The following sections further describe the general design framework of the policy options.

6.3. What Gets Measured Gets Managed: The Importance of Reporting GHGs

Option 1 and option 2, the ITC and grant financial incentives, will require as part of the policy package the reporting (and therefore measuring) of business GHG emissions. Businesses hoping to take advantage of the ITC or grant would be required to report their annual GHG emissions twice: once in order to qualify for the ITC or grant and a second time after receiving the incentive. The first annual reporting establishes a baseline and the second annual reporting allows for assessment of the effectiveness of the incentive. As this requirement is common to both option 1 and option 2, it will be described independently here.

The reporting of GHG emissions achieves a number of objectives. First, it increases the education and awareness of the businesses that complete these calculations through both the process of measuring emissions and the resulting information that is produced. Climate Smart has demonstrated the important adage that “what gets measured gets managed” (Climate Smart, 2012). As businesses measure their emissions, they are able to see precisely what their largest emitting business activities are, and are then better able to identify opportunities to reduce these emissions. Bradford and Fraser (2007) found that firms monitoring their energy use were significantly more likely to adopt energy savings strategies. Of the 65% of SMEs that monitored their energy use, 75% had taken steps to adopt efficiencies; of the 35% of respondents that did not monitor their energy use only 11% had adopted efficiency measures (Bradford and Fraser, 2007).

This reporting also provides a baseline so that the business is able to clearly evaluate the efficacy of any investments or behaviours that they subsequently engage in to impact their GHG emissions. In addition to providing data for the business itself, the reporting requirement provides valuable data to the Climate Action Secretariat in the

province, the agency that will be receiving this information. This data is necessary to evaluate the impact of the grant or the ITC pilot program on GHG emissions. This data can also be used to better understand and monitor provincial GHG emissions, identify key emitting industries, and inform future policy options.

To ensure standardized reporting, the software used to measure and report emissions would be administered by the province and available on-line. The province could either develop this software from scratch or ‘borrow’ or license existing software (such as that provided by Climate Smart or the David Suzuki foundation). Using one standard system to calculate GHG emissions would simplify the process and ensure that measurements are consistent across businesses. This system would also ensure that GHG data is being delivered directly to the province and prevent the risk of errors or fraud that result from simply self-reporting the number of annual GHG emissions on a grant application or tax form. The software would be designed to deliver the information directly to the provincial department that is administering the incentive⁷ and in the case of the ITC to the administering tax body (the CRA) to show the business is eligible for the credit.

Businesses would not be required to demonstrate a reduction in annual GHG emissions between the base-line year and their second reporting of GHG emissions. This is in order to prevent the incentive to ‘misreport’ annual GHG emissions, which would result in inaccurate data regarding the efficacy of the program being evaluated. Additionally, growing companies might be increasing their GHG emissions, even as they engage in practices to reduce them. As Climate Smart (2012) states, “small but forward-thinking, progressive organizations have high growth potential, which in turn leads to an increase in emissions, even as they actively work to reduce them” (p.38). One time or weather related events could also have a disproportionately large effect on a SME’s total emissions (Climate Smart, 2012). For these reasons, the ITC and grant options require the reporting of GHG emissions, and not the demonstration that these emissions are lowering.

⁷ This would ensure that the Climate Action Secretariat has the necessary information to monitor and assess the policy.

While a demonstrated reduction in GHG emissions will not be required from businesses, they would be required to provide data such as the number of employees, square footage, revenue, or some other variable in order to be able to view business GHG emissions as a factor of these variables and collect more accurate data regarding the impact of the incentives.

6.4. Common Features of the ITC and Grant Options

Option 1 (the ITC) and option 2 (the grant) contain a number of common design features in addition to the GHG reporting requirement. This was done in order to allow me to focus on the key design differences between an ITC and a grant, primarily, how they are delivered.

Each option provides financial support for SMEs to engage in investment that reduces their GHG emissions. This reduces the payback period on investment with the intention of making that investment both more attractive and feasible to the business. Both options would include the GHG reporting requirements described in the previous section. Both would cover 30% of eligible costs, up to a credit or grant of \$30,000. Based on an analysis of SME taxation, a report by the European Union for 20 member and 5 non-member countries recommends that tax credits for SMEs be granted as a percentage of specified investments, with a maximum absolute cap (VVA & ZEN, 2015). This report suggests that the setting of the percentage and the cap would determine not only how generous the incentive would be, but also which size enterprises would benefit most from the incentive (VVA & ZEN, 2015).

The 30% was determined based on the use of ITCs in other jurisdictions such as the Oregon Business Energy Tax Credit (35% of eligible project costs) and the United States Investment Tax Credit for Renewable Energy Projects (30% of eligible costs from 2006 to 2016). A 30% financial incentive is also believed to be a reasonable amount to impact the rate of return on investment enough to promote investment that would not

otherwise have occurred. Setting the incentive as a percentage of investment rather than a fixed rate ensures that ranges of investments (in terms of costs) are promoted.

The \$30,000 was chosen as a cap also to limit the impact on government revenue, while still providing incentives for larger scale projects. An analysis of the Oregon Business Energy Tax Credit suggests that the likelihood that a tax incentive will impact a firm's decision to engage in investment increases when the value of the tax credit is large relative to the costs of investment (Industrial Economics Inc., 2011). Based on this logic, a tax credit of 30% with a \$30,000 cap will have the greatest impact on the promotion of investment in projects up to \$100,000, at which point the value of the credit decreases relative to the total costs of the project. For SMEs that are financially constrained, it is realistic to assume that most projects will fall below \$100,000. The incentive should be capable of promoting capital-intensive investments that result in high GHG emissions reductions such as facility wide lamp retrofits, machinery replacement, boiler replacement, and fleet conversion. These more capital-intensive investments, conducted on a scale that is required by an SME, are likely to fall within the \$100,000 price range (for example, high efficiency commercial boilers cost up to \$50,000).⁸

Both the ITC and the grant would be available for 3 years as a pilot program, at which point their efficacy and impact could be evaluated. A single business would be eligible to receive the grant or ITC once over this three-year pilot period. The 3-year time frame provides a sunset period to limit the impact on government revenue and allows for information and data to be collected to examine the efficacy and impact of the incentives.

⁸ Case studies of Climate Smart businesses (Climate Smart, 2012; Sheehan et al. 2013) report some of the following investments under \$100,000: Freybe Gourmet Foods spent \$39,000 (excluding labor) on lighting retrofitting (metal halides to T5s); Otter co-op retrofitted their retail location with energy efficient lighting for a cost of \$7,000; Collingwood Neighborhood House engaged in a lighting retrofit for \$36,000; Aggressive tube bending underwent an air compressor retrofit for \$27,800; Shirtland Dry cleaners engaged in a boiler retrofit for \$37,000; Van Houtte Coffee Services converted their fleet vehicles from gas to a propane gas hybrid for \$5,000 per vehicle conversion.

A key component that will impact the efficacy of both the ITC and grant options is the marketing of these incentives and the awareness that SMEs would have about the existence of these incentives. As SMEs might have limited resources and expertise to track down and locate available incentives, government should engage in a marketing or awareness campaign to promote these incentives. It is beyond the scope of this paper to provide any prescriptions about how to develop these marketing campaigns. I assume they will exist and are successful in making SMEs aware of these incentives.

The ITC and grant options, while sharing many similarities, are differentiated by the process by which the incentive is administered. The impacts of these differences on uptake, administrative costs, and potentially efficacy at reducing GHG emissions, are analysed in Chapter 8.

6.5. Option 1: Investment Tax Credit

The proposed process for the ITC is as follows. Businesses hoping to take advantage of this credit would: 1) measure their annual GHG emissions using the online GHG emissions calculator (information would be sent to the CRA to confirm they had reported their emissions) 2) undertake eligible investment to reduce these emissions, 3) fill out an online tax form where they would specify the amount they had spent on eligible GHG emissions reducing investments, and calculate their subsequent tax credit, and 4) measure their annual GHG emissions using the online calculator prior to their filing of their next tax return. All businesses taking advantage of the credit would be subject to auditing and businesses that received the tax credit but did not report follow up emissions would be subject to a penalty.

In this option, the financial incentive would be provided *following* the measurement of GHG emissions and investment. Thus, businesses would not receive the incentive amount until after they had engaged in the measurement of GHG emissions, undertaken the investment, and filed their tax return. The tax credit would be

refundable, meaning that businesses with insufficient tax liability would still be able to take advantage of the full incentive amount.

6.6. Option 2: Grant

This option provides financial support for SMEs to engage in investment that reduces their GHG emissions through the form of a grant. Businesses hoping to take advantage of this credit would 1) measure and report their GHG emissions using the online calculator (this information would be sent to the department issuing the grant) 2) fill out an online application form to apply for the grant and 3) after receiving the grant and engaging in investment calculate and report their emissions using the online calculator, indicate what investment took place, and provide proof of investment (all online).

In this option, the financial incentive would be provided *prior* to the business's investment. This would provide financially constrained businesses with funds to invest prior to the cash outflow. Unlike the ITC option, businesses would be required to apply for the grant to determine their eligibility. The application would be available online in order to simplify the process and prevent the need for postage and delays in receiving feedback and decisions. In the application, businesses would be required to state the investments that they intend to make, a precise estimation of the costs of these investments, and the projected impact on their business's GHG emissions. Applications would then be reviewed and the size of the grant that the business is eligible to receive would be determined.

Ex-post reporting requirements occurring by a specified time period following receiving the grant would exist, requiring the business to communicate what investment took place, provide proof of investment, and their annual GHG emissions following the investment (via the online GHG calculator). This ex-post reporting would occur online.

This application process would require additional administrative resources for the issuing government (in this case the BC provincial government) in order to review and approve applications, administer funds, and review ex-post reports.

6.7. Option 3: Consolidated Information Provision Service

Option 3 is a consolidated information provision service to support SMEs in reducing the knowledge barriers that they face regarding GHG management and reductions strategies.

Research indicates that information and training to improve SMEs environmental performance is lacking. The success of the 2001 'enviroclub' initiative in Quebec, which provided educational workshops (in addition to technical assistance) to SMEs, indicates that information provision can be used to promote environmental initiatives amongst SMEs (Lanoie and Rochon-Fabien, 2012).

The province, or some form of private/public partnership, would administer this service. This option would be an exhaustive web-based information service, with an associated department staffed with personnel to provide over the phone or email assistance. The support staff would provide telephone and email support and advice to SMEs that have business specific information, and offer personal (rather than web-based) support. If the web-based service is designed effectively, many of the answers to questions that SMEs might have would be available on the website. However, having staff available to provide information provides a personal connection and also assists SMEs who might be confused or stuck in their GHG management and reduction process.

The types of information that this service would provide include (but are not limited to):

- Information regarding GHG emissions and their impact on climate change

- Information regarding the business benefits of reducing GHG emissions (including business 'success stories')
- Sector specific information regarding methods of reducing GHG emissions (including process methods)
- Information on resources, services, and suppliers to support business GHG reduction activities
- Step-by-step guides on how to develop and implement GHG reductions strategies
- A consolidated data base of available incentives and support⁹
- Direction towards GHG emissions monitoring calculators

While much of this information exists in various forms, it is currently dispersed over many resources and websites and is not easily and readably accessible. There is also no clear government department to contact for advice or support. The consolidation of this information in an easy to access, easy to navigate, user friendly format designed specifically for SMEs would ensure that businesses have access to the information that they need to make informed decisions on why and how to manage, monitor, and reduce their GHG emissions and would also reduce the time and staff costs associated with locating the appropriate information required to undertake green initiatives and GHG reducing activities.

This service would ensure that businesses are provided with consistent information and would reduce overlap between information provision from various municipal and provincial departments. Furthermore, a centralised service such as this could convey the business benefits of reducing GHG reductions to a wider array of businesses and hopefully serve to diminish the common belief that 'going green' necessarily entails high costs.

This service could also be used to bring together a network of businesses that are 'green' focused to share ideas and their experience. Additionally, this service could

⁹ This could be modelled after The Database of State Incentives for Renewables and Efficiency (DSIRE) in the United States, an easy to navigate service that provides various filters to allow for general or targeted searches of available incentives.

serve as a marketing tool for green businesses in BC that provide services to assist businesses in reducing their GHG emissions and environmental footprint.

The provision of information regarding potential activates that businesses could engage in to reduce their GHG emissions would provide information on process related activities in addition to capital investment opportunities. These process related activities such as turning off computers at the end of the day and re-directing shipping routes can often provide significant financial savings to businesses at very little or no capital cost, and many businesses do not appear to be aware of the impact that small and often easy changes can have both on their emissions and their bottom line.

6.8. Summary Table of Options

The main defining features of the three options are presented in table 6-1.

Table 6-1: Summary Table of Options

| | Option 1: ITC | Option 2: Grant | Option 3: Information provision |
|--|---|---|---------------------------------|
| Primary Category of Barrier Targeted | Limited financial and human capital resources | Limited financial and human capital resources | Knowledge gaps |
| Requires Reporting of GHG Emissions | Yes | Yes | No |
| Requires Application | No | Yes | No |
| Includes Ex Post Reporting Requirements | Yes | Yes | No |

The following chapter discuss the criteria used to evaluate these three policy options.

Chapter 7.

Criteria for the Evaluation of Policy Options

The primary goal of the policies is to decrease the barriers that inhibit SMEs from reducing their GHG emissions. The societal objective is to promote sustainability by reducing GHG emissions, as measured by the effectiveness of the policies. The government objectives are to achieve this goal in a cost-effective manner with reasonable and feasible impacts on government budget. Impacts on government budget include the impact of lost government revenue (ITC) or expenditures (grant), as well as the administrative resources required to implement the policies. Thus, these policy options will be evaluated using three primary criteria: effectiveness, cost-effectiveness for government, and government budget impacts.

7.1. Effectiveness

We want to assess the impact of the policies on GHG emissions as the ultimate measure. The means are through the lowering of the primary barriers they face – resource and knowledge. As noted above, resources include financial, time, and staff resources. Ability to reduce resource barriers contains two components: ability to reduce financial barriers and ease of compliance (the degree of time and staff resources required to utilize the policy). Knowledge includes awareness and understanding of the benefits of investment in actions that improve energy efficiency and reduce GHG emissions, and how to reduce business GHG emissions. The impact of the policy options on these barriers is evaluated using a qualitative scale of high, moderate, and low impact (defined in Table 7-1, Table 7-2, and Table 7-3).

Table 7-1: Definitions of Low, Moderate and High Rankings of Ability to Reduce Knowledge Barriers

| Impact on Knowledge Barriers: Attributes | Low | Moderate | High |
|--|-------------------------|-------------------------|-------------------------|
| <ul style="list-style-type: none"> • Improved awareness of business benefits • Improved awareness of primary GHG producing business activities • Improved awareness of methods to reduce emissions • Provides step by step instructions on how to reduce emissions • Information is available to all SMEs | Achieves 0-1 attributes | Achieves 2-3 attributes | Achieves all attributes |

Table 7-2: Definitions of Low, Moderate and High Rankings of Ability to Reduce Financial Barriers

| | Low | Moderate | High |
|--|----------------------------------|--|---|
| Qualitative assessment of the policy's ability to reduce financial barriers | No financial assistance provided | Provides SMEs financial assistance that may allow them to engage in desired investment | Provides SMEs financial assistance that allows them to engage in desired investment |

Table 7-3: Definitions of Low, Moderate and High Rankings of Ease of Compliance

| | Low | Moderate | High |
|--|--|---|---|
| Qualitative assessment of the degree of staff and time resources required to utilize the policy | <ul style="list-style-type: none"> • A low amount of staff or time is required to utilize the policy • No certainty that the business will benefit from the policy | <ul style="list-style-type: none"> • A moderate amount of staff or time is required to utilize the policy • Some degree of certainty that the business will benefit from the policy | <ul style="list-style-type: none"> • A high amount of staff or time is required to utilize the policy • Business is guaranteed to benefit from the policy |

This analysis also contains a quantitative estimate of the amount of GHG emissions resulting from the policy after the three year pilot program. A few estimates form the basis of the evaluation of GHG emissions reductions resulting from each policy. This evaluation begins with the estimate of the existing level of emissions -- 17 million tonnes of CO₂e, or about 28% of the Province's total emissions (Sheehan, 2015). The second estimate is that businesses that engage in GHG management achieve average annual GHG reductions of either five¹⁰ or ten percent¹¹.

Policy options are evaluated based on their predicted uptake. Predicted uptake, in this context, is defined as the percentage of businesses that engage in GHG management as a result of the policy. This results in an indication of the percentage of emissions that will be under management, and final GHG emissions reduction estimates are calculated assuming a 5% or 10% reduction of emissions amongst those businesses that manage their emissions. Tonnes of carbon dioxide equivalent (CO₂e) are a common

¹⁰ To provide a conservative low end estimate, 5% was rounded down from the 5.8% annualized emissions reductions achieved by Climate Smart businesses that completed 3rd year inventories (based on a report using 2011 Climate Smart data).

¹¹ Other discussions with Climate Smart suggest that average GHG emissions reductions from participating businesses are as high as 14%. Again, 10% was chosen as a conservative upper level estimate of GHG emissions reductions. Because there is no provincial accounting of GHGs from the SME sector, these estimates should be viewed as illustrative of potential impacts, rather than definitive. It is beyond the scope of my research to forecast GHG reductions.

measurement used for calculating businesses GHG emissions and are the measurement used in this evaluation.

7.2. Cost Effectiveness for Government

Government resources are limited and the societal goals that require government spending are numerous. As such, the efficient allocation of government resources is an important criterion when evaluating the policy options. Policy options should achieve a high level of 'bang for their buck'. The cost-effectiveness for government will be determined using a quantitative assessment that uses data from case studies of 12 investment activities undertaken by 11 SMEs to evaluate the estimated loss of government revenue (ITC) or increased expenditures (grant) per ton of CO₂e reduced. This quantitative assessment explores the cost per tonne of CO₂e reduced over time, because the cost to government of investing in a GHG reducing project is a one-time event, while the resulting GHG emissions reductions occur annually.

7.3. Government Budget Impacts

7.3.1. Impact of Foregone Revenue or Expenditures

The impact of foregone revenues (ITC) or expenditures (grant) will impact the feasibility and attractiveness of these policy options to the province. This impact is calculated quantitatively using the estimated uptake of the policy¹² and an estimate of the size of incentive received by each business. This research is unable to develop a precise estimate of the average incentive amount received, so a mid range estimate of \$15,000 is used. In order to demonstrate the maximum potential impact of the incentives

¹² Assuming that there are 170,000 SMEs in BC and that over the 3-year pilot period 15-25% will utilize the ITC and 10-20% will utilize the grant.

on government budget, another estimate is calculated assuming that each business would receive the full \$30,000 incentive. As no financial incentive is provided for option 3, this evaluation looks only at the grant and ITC options.

7.3.2. Implementation and Administrative Ease

In addition to the potential loss of government revenue associated with providing financial incentives, each policy option will have administrative costs associated with its implementation. Due to the difficulty of determining precise dollar values associated with administrative costs, the degree of implementation and administrative ease is evaluated using a qualitative assessment of high, low, or medium ease based on the characteristics of the program (depicted in Table 7-4). These qualitative measures are based on the number of steps involved in the implementation process and the expected number of staff required to administer the policy. This qualitative assessment of the ease of implementation and administration will look at each policy option relative to the others examined. A higher number of steps or staff required to implement and administer the policy results in a lower ease of implementation, and can be assumed to result in higher strains on government resources.

Table 7-4: Definitions of Low, Moderate and High Rankings of Ease of Implementation

| | Low | Medium | High |
|---|--|---|---|
| Qualitative assessment of the ease with which the policy is able to be implemented | A high number of staff (5+) required to implement the policy and/or a high number of steps involved in the policy implementation process | A moderate amount of staff (2-4) required to implement the policy and/or a moderate number of steps involved in the policy implementation process | A small amount of staff (0-1) required to implement the policy and/or few steps involved in the policy implementation process |

7.4. Criteria and Measures Matrix

The criteria and measures used to assess the policy options were developed based on the literature review and interviews with SMEs and experts and are summarised in Table 7-5.

Table 7-5: Criteria and Measures Matrix

| Criteria | Definition | Measure | Index |
|----------------------------------|---|--|--|
| Effectiveness | The extent to which the policy reduces knowledge and resource barriers and increases the ability of SMEs of a range of sizes and sectors to engage in practices that reduce their GHG emissions | Qualitative assessment of the policy's ability to reduce knowledge barriers | Low Moderate High |
| | | Qualitative assessment of the policy's ability to reduce financial barriers | Low Moderate High |
| | | Qualitative assessment of the ease of compliance with the policy | Low Moderate High |
| | | Quantitative assessment of the reduction in GHG emissions resulting from the policy based on the expected uptake of the program | Tonnes of CO ₂ e prevented from entering the atmosphere |
| Cost Effectiveness | Cost to government in terms of lost revenue/increased expenditures per unit of GHG reduced | Quantitative assessment | Canadian dollars per tonne of CO ₂ e reduced |
| Government Budget Impacts | The expected impact of the policy on government revenue and resources | Quantitative assessment of the expected expense to government of providing financial incentives | Government expenditure or loss of government revenue due to the provision of tax credits or grants |
| | | Qualitative assessment of the administration costs of the policy based on the ease with which the policy is able to be implemented | Low Moderate High |

Another criterion that is considered, but not included in the analysis, is the ability of the policy to result in useful data collection. The collection of data on SME's GHG emissions and investment behaviour can help to evaluate the impact of the program and also inform future policies. For the purpose of this analysis, data collection is considered

an additional benefit rather than a primary criterion to be used in the evaluation of the policy options.

Stakeholder acceptability is also considered yet excluded from the criteria due to the risk of double counting. The primary stakeholders associated with these policy options are SMEs and taxpayers. The political feasibility of implementing these policies depends in part on support for the policy from the community whose behaviour they tend to target (SMEs), and those who are ultimately funding them (tax payers). The acceptability of these policies to SMEs will likely be based on the policy's effectiveness at reducing these barriers, the simplicity and accessibility of these options, and the potential savings that they would experience due to these options. These considerations are incorporated within the three criteria. The acceptability of the policy to tax payers will likely be influenced by the impact on government revenue, the effectiveness of the program, the potential for fraud or abuse in each policy, and the potential for GHG emissions reductions. These components are also analysed within the other evaluation criteria.

Chapter 8.

Evaluation of Options

The options are analysed using the above criteria. Due to the similarities between the ITC and grant options, I examine the policies by criterion.

8.1. Effectiveness

8.1.1. Impact on Knowledge Barriers

Options 1 and 2 would have a low-moderate impact on knowledge barriers. The requirement of GHG reporting in order to qualify for the ITC and grant ensures that SMEs who apply for the incentive evaluate their primary sources of emissions. The identification of their primary GHG emissions sources provides them with a better understanding of the changes that they can make to reduce these emissions (including behavioural or process related changes). While these options do not directly state the business benefits of reducing emissions, those businesses that take advantage of the incentive to reduce their emissions will realise the business benefits first hand through their experience.

The limitation with option 1 and option 2 is that knowledge barriers are only impacted amongst those who are aware of the incentive, and manage and report their emissions in order to receive the incentive. Furthermore, on their own, these options do not provide businesses with step-by-step advice and information regarding how to go about making the necessary changes to reduce emissions. It will be up to businesses to

locate this information on their own. Option 1 and option 2 only indirectly impact knowledge barriers; they do not provide the information, they simply incentivize and compensate the measuring of emissions and the development of a GHG emissions reduction strategy.

Option 3 would have a high impact on knowledge barriers. This service would provide all SMEs with internet or telephone access information regarding the benefits of investment in efficiency, common sources of GHG emissions in businesses of different sectors, the available options to reduce GHG emissions, and how to go about making changes that will reduce business GHG emissions. The consolidation of this information in one easy to navigate website would make this information more accessible to SMEs. The support staff associated with this service would ensure that SMEs have someone to contact if they have any questions throughout the process.

Option 3 would also draw the most attention to process or behavioural methods of reducing barriers. Additionally, it could provide information on sector specific indirect methods of reducing emissions (such as a restaurant getting a larger fridge to cut down on deliveries). Option 3 is the only option that would provide step-by-step instructions on how to implement GHG reduction strategies. The provision of a consolidated database of available support and incentives would also increase knowledge of existing incentives.

8.1.2. Impact on Resource Barriers

Impact on Financial Barriers

Option 1 has a moderate impact on financial barriers. This option reduces the out of pocket costs for business to engage in GHG reducing investment and should improve the rate of return on investment. As this proposed option is refundable, it is available to all SMEs, including those with no or limited tax liability.

The impact of the ITC on financial resource barriers is limited by the fact that SMEs taking advantage of the credit receive the financial assistance *following* their

investment. For financially constrained SMEs that require the financial incentive in order to proceed with the investment, receiving the incentive on their tax return will do little to reduce financial barriers in the form of upfront costs. These businesses would still have to borrow to finance the investment, and then wait until the end of the tax year when they receive the incentive in order to payback the borrowed funds plus the interest owing. Businesses that lack access to credit markets and are unable to borrow will not be able to proceed with investment. Those businesses that do not need to borrow money in order to proceed with the investment will be at a disadvantage as they will forgo the interest on that saved money (although this would be small considering our current interest rates) or face an opportunity cost of spending that money on the GHG reducing investment rather than on other potential investment. Not having the incentive provided upfront may also limit the ability of managers who would like to take advantage of the credit to convince their superiors to engage in the desired investment (due to the issues raised above).

The precise impact that not providing the incentive ahead of time will have on SMEs ability to engage in investment is unclear as it is uncertain how many SMEs have savings set aside to engage in investment, their degree of access to credit markets, the alternative investments that they would be engaging in, and the return on these alternative investments. While the ITC does provide a financial incentive, the fact that this incentive is provided following investments results in this option receiving a moderate score on its ability to reduce financial barriers.

Option 2 has a high impact on financial barriers. Like option 1, this option reduces the financial resources and out of pocket costs for SMEs to engage in GHG reducing investment and shortens the rate of return on investment. Like the refundable ITC option, the grant option affects financial resource barriers of all SMEs, including those with limited tax liability. Unlike the ITC option, the grant option provides SMEs with financial resources *prior* to their investment. With the grant option, businesses with insufficient cash in the bank to finance the investment would not be required to borrow as much money as they would in the case of the ITC as they receive the grant funding upfront. This would reduce the net cost of the investment to the business by reducing the amount of interest paid on borrowed funds or opportunity cost of using their savings.

This leads to greater reductions of financial barriers with the grant than the ITC. Based on this, option 2 is evaluated as having a high impact on financial barriers.

Option 3 would have a low impact on financial barriers, as it does not provide a financial incentive. However, it would likely not be a negligible impact as the provision of a consolidated list of existing incentives might lead to a higher uptake of these existing incentives, and a reduction of the financial barriers of those who utilize them.

Ease of Compliance

Both the ITC and the grant reduce the payback period on investment and provide an incentive to allocate often limited staff time to the management and reduction of GHG emissions. However, there are differences between the amount of time and staff resources required to utilize the incentives. As both option 1 and option 2 require the reporting and measuring of GHG emissions, this evaluation focuses on the time and staff resources required to apply for the incentive and ranks the options relative to each other.

Option 1 would have a high ease of compliance. As this option does not require an application form it does not require significant time or additional staff to utilize the incentive. All businesses that take the time to accurately and honestly fill out the tax form would be guaranteed to receive the incentive and their time would not be 'wasted'. Additionally, businesses that already utilize the services of an accountant could delegate the filling out of the tax form to their accountant.

Option 2 would have a low ease of compliance due to the relatively more complicated application process. This process would require additional staff resources to plan the investment, calculate the cost of investment and expected impact on GHG emissions, fill out this information on an application form, and report on how the grant was spent. Businesses would also not be guaranteed to be approved for the grant, so there would be a risk that the time spent planning a GHG reduction investment and reporting this information on an application form would be 'wasted'.

Option 3 receives a moderate-high score on ease of compliance as it would require staff time to utilize the incentive, however, overall it would decrease the time required to collect information regarding GHG emissions management and reductions. The provision of information in an easy to access consolidated service would make it easier for SMEs to inform themselves on how to reduce their emissions. By providing a step-by-step guide on how to enact certain GHG reducing practices as well as information on suppliers and service, this option would also reduce the time it takes to engage in GHG reducing behaviours or potentially investment. If the website is designed effectively, businesses could be fairly certain that the time spent navigating the website would result in useful information and business benefits.

8.1.3. Uptake and GHG Emissions Reductions

This analysis was unable to determine the precise level of uptake that could be expected of each policy. Due to a lack of available data on the uptake of comparable policies, an estimated range was chosen relative to the other two policy options. These estimated uptake ranges are meant to be illustrative. While they may be optimistic, I wanted to be sure to depict a range that included high-end uptake scenarios in order to ensure that the cost to government would not be underestimated. The estimated uptake ranges are depicted in Table 8-1. In this context, uptake refers to the percentage of businesses that engage in GHG management as a result of the policy over the course of the three-year pilot period.

Table 8-1: Uptake Estimate Used in Evaluation

| | Option 1: ITC | Option 2: Grant | Option 3: Consolidated Information Provision |
|-------------------------|---------------|-----------------|--|
| Estimated Uptake | 15-25% | 10-20% | 5-15% |

The highest uptake was expected for the ITC, followed by the grant, and finally the information provision service. This relative ranking was based on logic and information obtained from interviews (described in more detail in the following sections) that suggested that SMEs would be more interested in and more likely to apply for an ITC than a grant due to its relative simplicity and accessibility. The relative ranking of the uptake of each policy was supported by a poll taken in a January 2016 climate policy workshop hosted by Climate Smart and attended by various business representatives. Attendees of this workshop (approximately 40 people) were asked to indicate their support for various policy options, including the three options used in this research. The ITC achieved the highest level of support in this polling, followed by the grant, and finally the information provision service. While support does not necessarily result in uptake, it is assumed that higher support is indicative of higher interest, and thus likely higher uptake.

Ranges were also constructed to overlap based on the uncertainty of the driving factors motivating uptake and the possibility of similar uptake between the policy options. For example, if receiving the incentive ahead of time is of key importance to SMEs, then the uptake of the grant could be the same as the uptake for the ITC. Design features could also result in similar uptake between the options. For example, a very well designed and marketed information provision service may result in the same level of GHG management as a grant with a limited pool of available funds or a complicated application process.

While these estimates of relative uptake are based off of information obtained during my research, a more comprehensive survey would be required to definitively confirm the preferences of SMEs and the expected uptake of each policy.

Option 1: ITC

Annual uptake for this option was presumed to be potentially higher than that of the grant option as it lacks an application process, making it simpler, more accessible, and thus attractive to SMEs. Interviews with SMEs and experts highlighted the importance that simplicity and ease of application play in terms of SMEs interest in and

uptake of financial incentives. As both the ITC and grant options require GHG emissions measurement and reporting, the application and post reporting requirements of the grant are the main features that differentiate the two options in terms of simplicity and accessibility. Interviews emphasised that incentives would need to be easy to understand and easy to fill out for SMEs with limited time and resources, in order to ensure that the time and resource costs associated with applying for the incentive are sufficiently offset by the benefits that are received. It is assumed that SMEs would find it easier and simpler to fill out an extra tax form than to fill out an application process, await approval, and report on the impact of the grant once receiving it. Furthermore, as this incentive is administered through the tax system, businesses that already use the services of an accountant could task their accountant with completing this additional tax form.

Based on this analysis, Option 1 (the ITC) would have the highest level of effectiveness amongst the three policy options in terms of GHG emissions reductions resulting from the policy. Assuming a range of uptake (and associated GHG management) of 15-25% of BC SMEs, and assuming that all businesses were to apply for the tax credit in the first year¹³, this would result in GHG emissions reductions of 127,500 – 212,500 tonnes of CO₂e in the first year if businesses achieve a 5% reduction¹⁴. This would translate to 382,500 – 637,500 tonnes of CO₂e prevented from entering the atmosphere over the three-year pilot program. If businesses were to achieve a 10% reduction this would result in GHG emissions reductions of 255,000 – 425,000 tonnes of CO₂e in the first year, or 765,000 – 1,275,000 tonnes of CO₂e over the three-year pilot period.

¹³ For simplicity of calculation it is assumed that all businesses would apply for the credit (and achieve the associated reductions) in the first year of the pilot program. While this would not be the case, it provides a simple illustrative example of the impact of the policies over a given time frame. These total reductions would still ultimately be achieved if businesses apply in year 2 or year 3 of the pilot, the results would simply be staggered over a wider time frame.

¹⁴ Annual uptake by 15-25% of SMEs would result in 2.55-4.25 million tonnes, of the 17 million tonnes of CO₂e annually emitted by SMEs, being under management..

Option 2: Grant

This policy option was presumed to have a potentially lower uptake than the ITC option (15-25%) and a higher uptake than the knowledge option (5-15%). Annual uptake for this option was presumed to be lower than that of the ITC option as it involves an application and approval process, making it relatively more complicated and less accessible than the ITC. It is assumed that even with a relatively simple application and post reporting process, SMEs would find it easier and simpler to fill out an extra tax form than to fill out an application process, await approval, and report on the impact of the grant once receiving it. Additionally, as the grant involves an approval process, SMEs are not guaranteed that the effort they have undertaken to fill out the application form will result in a specific size of financial incentive. This lack of certainty over receiving the incentive may prevent SMEs from devoting resources to applying for the incentive.

Assuming a range of annual uptake (and associated GHG management) of 10-20% of BC SMEs, and assuming that all businesses would apply for the incentive in the first year, option 2 would result in GHG emissions reduction of 85,000 – 170,000 tonnes of CO₂e¹⁵ in the first year if businesses were to achieve a 5% reduction in emissions. This would translate to 255,000 – 510,000 tonnes of CO₂e prevented from entering the atmosphere over the three-year pilot program. If businesses were to achieve a 10% reduction in emissions, this would result in a GHG emissions reduction of 170,000 – 340,000 tonnes of CO₂e in the first year, or 510,000 – 1,020,000 over the three-year pilot program.

Option 3: Consolidated Information Provision Service

This policy option was presumed to have a lower uptake than the ITC and grant options. On its own, it does not incentivise businesses to invest in GHG management and reductions to the same degree as a financial incentive would. Instead it relies on personal motivations and interest amongst SMEs to seek out information and inform

¹⁵ Annual uptake by 10-20% of SMEs would result in 1.7-3.4 million tonnes, of the 17 million tonnes of CO₂e annually emitted by SMEs, being under management.

themselves as to the benefits and methods of reducing business GHG emissions. On its own, this option would primarily benefit businesses that were interested in reducing GHG emissions yet unsure how to do so, and that were motivated and able without financial assistance to pursue GHG emissions reductions. As the costs associated with GHG emissions rise, it is expected that the number of businesses in this category will increase.

Assuming that option 3 results in GHG emissions management amongst 5-15% of BC SMEs over the three year pilot program, and that this management occurs in the first year of the pilot program, this would result in GHG emissions reductions of 42,500 – 127,500 tonnes of CO₂e¹⁶ in the first year if businesses were to achieve a 5% reduction in emissions. This would translate to 127,500 – 382,500 tonnes of CO₂e being prevented from entering the atmosphere over the three-year pilot program. If businesses were to achieve a 10% reduction in emissions this would result in a GHG emissions reduction of 85,000 – 255,000 tonnes of CO₂e in the first year, and 255,000 – 765,000 tonnes of CO₂e being prevented from entering the atmosphere over the three-year pilot.

Table 8-2 illustrates the estimated GHG emissions reductions that would occur as a result of the policy in the first year (assuming that all businesses utilize the policy in the first year) and the tonnes of CO₂e that would be prevented from entering the atmosphere after 3 and 5 years if businesses were to achieve a 5% reduction in emissions.

¹⁶ A 5-15% uptake would result in 0.85-2.55 million tonnes, of the 17 million tonnes of CO₂e annually emitted by SMEs, being under management.

Table 8-2: Estimated GHG Emissions Reductions Based on Predicted Uptake and 5% GHG Emissions Reductions (1, 3 and 5 years)

| | Estimated Uptake* | GHG Emissions Reductions in First Year**(tonnes CO ₂ e) | GHG Emissions Prevented from Entering the Atmosphere After 3 Years: (tonnes CO ₂ e) | GHG Emissions Prevented from Entering the Atmosphere After 5 Years: (tonnes CO ₂ e) |
|---|-------------------|--|--|--|
| Option 1: ITC | 15-25% | 127,500 - 212,500 | 382,500 - 637,500 | 637,500 – 1,062,500 |
| Option2: Grant | 10-20% | 85,000 – 170,000 | 255,000 - 510,000 | 425,000 – 850,000 |
| Option 3: Consolidated Knowledge Provision | 5-15% | 42,500 - 127,500 | 127,500 - 382,500 | 212,500 – 637,500 |

* Percentage of GHG emissions under management of the 17 million tonnes of GHG emissions estimated to be produced by SMEs.

** Assuming that all businesses utilize the policy in the first year of the pilot.

Table 8-3 demonstrates the anticipated GHG reductions if businesses were to achieve a 10% reduction in GHG emissions (assuming that all businesses utilize the policy in the first year).

Table 8-3: Estimated GHG Emissions Reductions Based on Predicted Uptake and 10% GHG Emissions Reductions (1, 3 and 5 years)

| | Estimated Uptake* | GHG Emissions Reductions in First Year** (tonnes CO ₂ e) | GHG Emissions Prevented from Entering the Atmosphere After 3 Years: (tonnes CO ₂ e) | GHG Emissions Prevented from Entering the Atmosphere After 5 Years: (tonnes CO ₂ e) |
|---|-------------------|---|--|--|
| Option 1: ITC | 15-25% | 255,000 – 425,000 | 765,000 – 1,275,000 | 1,275,000 – 2,125,000 |
| Option2: Grant | 10-20% | 170,000 – 340,000 | 510,000 – 1,020,000 | 850,000 – 1,700,000 |
| Option 3: Consolidated Knowledge Provision | 5-15% | 85,000 - 255,000 | 255,000 - 765,000 | 425,000 – 1,275,000 |

* Percentage of GHG emissions under management of the 17 million tonnes of GHG emissions estimated to be produced by SMEs;

** Assuming that all businesses utilize the policy in the first year of the pilot.

8.2. Cost Effectiveness

This quantitative assessment sought to estimate the cost to government (in lost revenue or expenditures) of a one tonne reduction in CO₂e.

This estimate was developed using data from case studies of Climate Smart participating businesses published by the Pacific Institute for Climate Solutions (Sheehan et al., 2014). Among the information provided in these published case studies is the total cost of the initiative, the business benefits that resulted from the initiative (annual savings, projected payback period, and rate of return), and annual GHG emissions reductions (metric tonnes of CO₂e). These are case studies of 12 different environmental initiatives completed by 11 different BC SMEs. Projects are divided into four emission activity categories: electricity, heat, solid waste, and transportation. These cases represent the “top reduction strategy examples” amongst the projects considered from a pool over 500 Climate Smart participating SMEs (Sheehan et al, 2013). Total project costs and annual GHG emissions reductions (actual or projected) were used to calculate an estimate of government budget impacts (lost revenue or increased expenditures) per metric tonne of CO₂e reduced.

Given that both policy option 1 and policy option 2 have the same credit allowance (30% of the total project costs, up to \$30,000), the resulting estimate of cost per tonne of CO₂e reduced is the same for both options. Additionally, as ‘cost’ in this calculation is interpreted as impact on the budget due to lost tax revenue or higher expenditures for the grant, option 3 is not considered for this criterion. Budgetary impacts due to implementation and administration costs are covered in the third criterion.

Estimated government cost (in lost revenue or expenditure) per metric tonne of CO₂e reduced is calculated for each emissions activity category. It is also calculated for the average of all categories as well as all categories excluding electricity. The government cost is a one-time loss of revenue or increase in expenditure per project, yet GHGs will be prevented from entering the atmosphere annually. Thus, the cost per tonne of CO₂e reduced (\$/tonne CO₂e) depends on the time frame explored. This

analysis looks at cost per tonne of CO₂e for one-year, two-year, three-year, five-year, and ten-year emissions reduction scenarios (note that these values are not discounted because I assume all the costs to the government occur in year one). The findings of this analysis are presented in Table 8-4 and Table 8-5.

Table 8-4: Cost to Government Per Metric Tonne of CO₂e Reduced by Emissions Activity Category

| Emissions Activity Type | 1 year \$/tonne CO ₂ e | 2 year \$/tonne CO ₂ e | 3 year \$/tonne CO ₂ e | 5 year \$/tonne CO ₂ e | 10 year \$/tonne CO ₂ e |
|-------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|------------------------------------|
| Solid Waste | 8 | 4 | 3 | 2 | 1 |
| Heat | 273 | 137 | 91 | 55 | 27 |
| Transportation | 273 | 137 | 91 | 55 | 27 |
| Electricity | 3758 | 1879 | 1253 | 752 | 376 |

Table 8-5: Cost to Government Per Metric Tonne of CO₂e Reduced by Averages of Emissions Categories

| Emissions Activity Type | 1 year \$/tonne CO ₂ e | 2 year \$/tonne CO ₂ e | 3 year \$/tonne CO ₂ e | 5 year \$/tonne CO ₂ e | 10 year \$/tonne CO ₂ e |
|--|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|------------------------------------|
| Average of all categories excluding Electricity | 185 | 92 | 62 | 37 | 18 |
| Average of Heat and Transportation | 273 | 137 | 91 | 55 | 27 |
| Average of all categories | 1078 | 539 | 359 | 216 | 108 |

As these tables illustrate, there are large discrepancies between the government cost per metric tonne of CO₂e between the different emissions activity types. While the average cost per metric tonne of heating and transportation projects were identical (once rounded to a whole number), the average cost of electricity related projects was substantially higher than all other categories, and the average costs of solid waste related projects was substantially lower than all other categories.

Table 8-4 and Table 8-5 illustrate that efficiency is largely dependent on 1) whether it is calculated based on one year of emissions reductions or more, and 2) whether electricity projects and, to a lesser degree, solid waste projects are included amongst the list of 'eligible investments'.

The rationale for looking at a number of years in the estimation is quite simple: the more years included in the analysis the more tonnes of CO₂e that are prevented from entering the atmosphere and the greater perceived impact of a dollar of lost government revenue. According to Industry Canada (2013), 71.7% of SMEs that entered the marketplace in 2007 survived into 2009, this number increases to 86% when just looking at SMEs with 5-99 employees (small businesses, excluding micro enterprises). This suggests that the majority of SMEs (nationwide) live past their second year. However, with just under 30% of SMEs not making it to their 2nd year, the 2 year cost estimate might be the most appropriate to use when evaluating the cost to government per tonne of CO₂e reduced.

The explanation of the impact of electricity and solid waste on efficiency can be better understood by looking at the average project costs and GHG reductions of the different emissions activities projects (Table 8-6).

Table 8-6: Average Project Costs, Annual GHG Reductions, and Business Benefits of Electricity, Heat, Solid Waste, and Transportation Projects

| | Average Project Cost | Average Annual GHG Emissions Reductions (metric tonnes of CO ₂ e) | Average Annual Business Savings |
|-----------------------|----------------------|--|---------------------------------|
| Transportation | \$111,252 | 59 | \$60,800 |
| Electricity | \$94,367 | 5 | \$13,700 |
| Heat | \$90,200 | 62 | \$26,325 |
| Solid Waste | \$663 | 23 | \$1,925 |

Amongst the case studies reviewed, the average costs of electricity projects are relatively high, yet the annual GHG emissions reductions resulting from the project are lower than all other project types. This is due to the large proportion of hydroelectricity in

BC, which produces virtually no GHG emissions relative to other forms of electricity generation. These findings suggest that in terms of promoting GHG emissions reductions, government incentives for investment in electricity-focused projects are relatively inefficient. While these projects may be an inefficient target for government financial support, they do provide business benefits that should compel businesses to invest in electrical efficiency in the absence of financial incentives.

Alternatively, solid waste projects (although only 2 case studies were examined) appear to have low budget costs relative to the GHG emissions reductions that result from them. While this appears to be a promising form of government supported investment, these projects tend to be largely behaviourally based initiatives rather than investment in particular machinery or equipment, potentially limiting their suitability to government grants or tax credits.

These findings suggest that cost-effectiveness can be improved based on the eligibility requirements set forth in the policy, or the ability of the policy to target specific types of investment behaviour.

8.3. Government Budget Impacts

8.3.1. Impact of Foregone Revenue or Expenditures

The impacts of the financial incentives (in terms of foregone revenue or expenditures) on government budget were estimated using the uptake assumptions (outlined in section 8.1.3) of 15-25% uptake for the ITC and 10-20% uptake for the grant. While the range of project costs receiving financial incentives and thus the size of the government financial incentive would likely be wide, for the purpose of this analyses it is assumed that there is an average government financial incentive of \$15,000, which would result from an average total project cost of \$50,000. This evaluation also calculated the total cost to government of financial incentives if all applicants of the

incentive were to receive the maximum incentive amount of \$30,000. While this is highly unlikely to occur, it demonstrates the maximum possible impact to the government budget of the financial incentives based on the assumed uptake. The impacts of this analysis are portrayed in Table 8-7.

Table 8-7: Impact of Financial Incentives on Government Revenue Over the Three-Year Pilot

| | Estimated Uptake | Estimated Number of SMEs utilizing the policy | Estimated total cost to government assuming all receive \$15,000 incentive | Estimated total cost to government assuming all receive maximum \$30,000 incentive |
|------------------------|------------------|---|--|--|
| Option 1: ITC | 15-25% | 25,500-42,500 | \$382.5 to \$637.5 million | \$765 million to \$1.275 billion |
| Option 2: Grant | 10-20% | 17,000-34,000 | \$255 to \$510 million | \$510 million to \$1.02 billion |

These calculations provide a very rough estimate of the degree of financial burden to the government that could result from a three-year ITC or grant pilot program. These estimates are based off of (potentially) generous assumptions of uptake and average project costs, and thus might be overstating the total costs. However I did not want to drastically underestimate the potential costs to government.

At the high end, with all taking the \$30,000 maximum, the costs are high and present challenges to the province given the current government’s commitment to balanced budgets. Thus, in the roll out of a program, the government would likely want to set limits on the funding available. This would be far easier in the case of a grant with a fixed maximum set per year. Once the maximum is reached, no additional grant applications would be accepted (but those ‘late’ could be carried forward to the

subsequent year). Setting a maximum under an ITC would require the use of an application or pre-approval process before businesses could claim the tax credit. Including this process in the ITC would likely remove the benefits of simplicity, higher uptake, and lower administrative costs that are associated with the ITC in this analysis. This would bring the ITC in line with the grant on these measures, yet without the benefit of having the incentive provided prior to the investment.

The budgetary impact of both the ITC and the grant could also be lowered by reducing the maximum incentive available (for example from \$30,000 to \$15,000), restricting the eligible businesses (only small or medium sized businesses), or through designing the eligibility criteria so that only relatively lower cost investments are eligible.

8.3.2. Implementation and Administrative Ease

There would be administrative costs associated with the creation and implementation of the government run GHG emissions calculator that are common to both option 1 and option 2. These costs would exist if the software was developed from scratch, and (presumably) to a lesser degree if GHG calculating software was obtained from an existing source. The software would need to be designed so that information could be sent directly to the government department responsible for administering the incentive, and the CRA (in the case of the ITC).

While the initial costs of designing this system might be high, if designed properly it would result in a system with relatively low administrative complexity, as the process would be done entirely online. Mechanisms could be built into the design of the online system to prevent or catch fraud or misreporting of emissions. This could include requiring specific business information in order to ensure the data is attached to a real business and to allow flagging of reported emissions that are well above or below industry standards. However, as businesses are not rewarded or penalized for reporting high, low, or decreasing emissions, it is expected that there would be little incentive to misreport information. The costs of designing and implementing this system would be identical for both the ITC and grant options.

Option 1: ITC

The implementation of this option would require the upfront costs associated with the design and creation of an additional online tax form and slight modifications to the tax system. This tax form would only be available online to ensure simplicity for the businesses applying and because this would be a temporary pilot program with an optional opt-in. This additional tax form would require an addition to the mainframe programs at the Canadian Revenue Agency (CRA), and potentially the modification of the tax filing software of various vendors. Thus, the design of this option would require action from not only the province, but also from the CRA and potentially tax software companies. Additionally, this option would require the creation of a government web page with basic information regarding how to apply for the tax credit and eligibility requirements.

Option 1, which requires that businesses fill out an additional tax form and report annual GHG emissions using the online calculator, requires a low degree of steps in order to administer the policy. As this option is incorporated into an already existing tax system and structure it would not be expected to require the addition of a large amount of staff in order to administer it. The monitoring for potential fraud and abuse of the credit would be primarily undertaken by the CRA, which would be able to monitor whether those applying for the credit were legitimate businesses by using its existing database of business tax returns and past instances of fraud. Some provincial administrative staff would be required to answer over the phone questions about the tax credit as well as the GHG emissions calculator. While the GHG calculator software would be designed to deliver information to the CRA to confirm that specific businesses have reported their GHG emissions and are thus eligible for the credit, provincial staff would be required to maintain a GHG emissions database in order to evaluate the efficacy of the program. The ITC receives a moderate to high score on implementation and administrative ease. While there are few steps required to administer the program, some personnel would be required to answer over the phone questions and the designing and updating of the tax systems (and the involvement of the CRA) adds a slight degree of implementation complexity to this option.

Option 2: Grant

The implementation of this policy would require the development of an online grant application process, and would result in the costs associated with the design and creation of webpage and this online application form. It would also require the development of a department or unit to review grant applications, and the training of these staff. The grant option requires a number of steps to administer the policy relative to the ITC. A staff department would be required to review applications, approve or reject applications, notifying applicants of their status, determine the incentive amount that will be received and initiate the administering of funds. This department would also provide over the phone answers to questions regarding the grant and the GHG calculator (which would be required of personnel in the ITC option as well).

The application review and approval process would be simplified if clear eligibility requirements are set, however, even with clear eligibility requirements applications would still require staff review to monitor for fraud and abuse. A database would need to be developed and maintained to keep track of businesses applying for the grant and ensure that the same business or individual is not receiving multiple grants over the course of the pilot. Additionally, oversight would be required in order to ensure that the business applying is a legitimate business, and that the cost estimate stated for the planned investment (and thus the size of the grant received) is accurate. The online application could allow for software with certain safeguards to be built into the process to flag suspicious data (such as a business number that doesn't exist), however staff would still be required to review applications to ensure legitimacy and prevent against fraud and abuse. Like the ITC, a database would have to be maintained that incorporates information regarding the investment that was undertaken, baseline emissions, and emissions following this investment. This application and approval process can be expected to require a relatively high level of staff resources, which in this assessment is quantified as five or more staff, in order to effectively and efficiently administer the grant.

The relative complexity of this implementation process can be assumed to result in higher levels of government expenditures and a higher impact on government budget.

These factors result in option 2 receiving a low score on administration and implementation ease.

Option 3: Consolidated Information Provision Service

The majority of the implementation costs of this option would occur in the design and development of the website component of this option. The design of this service would require research, consultation, and technical design. The information that would be available on the website would need to be located from existing sources, and in some cases would require additional research and consultation to develop 'new' information. The website would need to be well designed as the success of this option depends on the website being easy to navigate and user friendly. Certain components of the website would need to be updated semi-regularly (such as information regarding existing incentives, suppliers, and services), however the bulk of the information would be created in the initial development of the website.

Option 3 requires no concrete 'steps' in its implementation. Once the website is active, SMEs would be able to utilize it and access it at their own accord and pace. Trained staff would be required to provide support and assistance to enquiring SMEs. If the website is designed effectively, it will presumably provide the answers to most questions that SMEs might have, and will limit the need for a high number of staff to provide over the phone or email assistance and direction. It is assumed that the implantation of this service will require 2-4 additional staff.

Due to the resources required to develop a successful website, the low number of administrative steps involved in the process, and the moderate number of additional staff required, option 3 is evaluated as moderate implementation and administrative ease.

8.4. Summary of Evaluation of Options

The evaluation of the three policy options based on the three criteria is summarized in Table 8-8.

Table 8-8: Synthesis of Policy Evaluation

| | | | Option 1: ITC | Option 2: Grant | Option 3: Consolidated Information Provision |
|----------------------------------|--|---|---|---|--|
| Effectiveness | Ability to Reduce Knowledge Barriers | | Low-Moderate | Low-Moderate | High |
| | Ability to Reduce Resource Barriers | Ability to Reduce Financial Barriers | Moderate | High | Low |
| | | Ease of Compliance | High | Low | Moderate-High |
| | GHG Emissions Reductions (over the 3-year pilot)* | | 765,000-1,275,000 tonnes of CO ₂ e | 510,000-1,020,000 tonnes of CO ₂ e | 255,000-765,000 tonnes of CO ₂ e |
| Cost-effectiveness** | | | \$539/tonne of CO ₂ e*** | \$539/tonne of CO ₂ e*** | — |
| Government Budget Impacts | Impact of Foregone Revenue or Expenditures**** | | \$382.5 to \$637.5 million | \$255 to \$510 million | — |
| | Implementation and Administrative Ease | | Moderate - High | Low | Moderate |

* Calculations based on the assumption of a 10% reduction in emissions;

** Calculations are based on a two-year time frame;


















*** These values are derived from the average of all project types (electricity, heat, solid waste, and transport projects). If electricity is excluded than the cost per tonne of CO₂e is reduced to \$92/tonne of CO₂e. If solid waste and electricity projects are excluded than the cost per tonne of CO₂e is \$137;

**** Calculated using an estimated average project cost of \$15,000.

A visual 'stoplight' summary of the evaluation of the options is presented in Table 8-9. Cost-effectiveness is not included in this table as option 1 and option 2 received the

same cost-effectiveness score and option 3 was not included in the quantitative cost-effectiveness evaluation.

Table 8-9: 'Stoplight' Summary of Evaluation of Policy Options

| | | Option 1: ITC | Option 2: Grant | Option 3: Consolidated Information Provision |
|---|--|---|--|---|
| Effectiveness | Ability to Reduce Knowledge Barriers |  |  |  |
| | Ability to Reduce Resource Barriers |  | Ability to Reduce Financial Barriers |  |
| | | | Ease of Compliance |  |
| | | |  |  |
| | GHG Emissions Reductions (over the 3-year pilot) |  |  |  |
| Impact of Foregone Revenues or Expenditures | |  |  |  |
| Administrative Ease | |  |  |  |

Chapter 9.

Discussion of Analysis

This analysis highlights the trade-offs among the policy options. Each option has its strengths and weaknesses and there is no clear 'winner'. This section will discuss the major trade-offs between the policy options.

Option 3 is the most successful at reducing knowledge barriers, has a relatively low impact on government budget due to its lack of financial incentives, and low to moderate administrative and implementation ease. It also has the lowest expected impact on financial barriers, predicted uptake, and therefore potentially GHG management and emissions reductions. However, it is the only option that provides virtually all SMEs with information about how and why to reduce their GHG emissions. It would also increase the awareness of process related activities (rather than investment activities) to a higher degree than option 1 and option 2. Through its provision of a database of existing incentives it may attract awareness to existing incentives and potentially lower the need for additional financial incentives. Option three is thus a necessary policy option to reduce knowledge barriers, yet is potentially not sufficient on its own to reduce financial barriers.

The clearest trade-offs from this analysis are between option 1 (the ITC) and option 2 (the grant). As these options both provide financial incentives of the same amount these trade-offs are centered on differences between how the incentives are administered.

An advantage of the ITC is its relative simplicity and accessibility compared to the grant. This leads to the ability of the ITC to reach potentially more SMEs, and thus

potentially result in greater GHG emissions reductions. The administering of this incentive through the tax system also results in relatively low administrative costs. This could result in fewer strains on government budget and a more cost-effective method of reducing GHG emissions amongst SMEs.

A potential downside of the ITC is that without an approval process, the government has less control on the uptake of the ITC and thus its budget impacts. Given the potential cost in the billions of dollars, there will be reluctance to undertake this policy without some additional restrictions limiting uptake. An approval process could be added to the design of the ITC option in order to monitor the amount of ITCs being claimed, however this would remove its relative simplicity (and associated uptake) and increase its administrative costs to those in line with the grant.

Another disadvantage of the ITC is that it delivers financial support *following* investment. As discussed in section 8.1.2, businesses with insufficient cash in the bank to proceed with investment might not have access to loans, and those that do will have to borrow more cash to proceed with investment than in the case of the grant (and pay more interest on this borrowed cash). Those businesses that have sufficient cash to proceed with the investment without a loan will still be facing an opportunity cost of lost interest or benefits from investment that would have otherwise occurred. Thus, the net costs of investment in GHG emissions reducing projects are higher in the case of the ITC than in the grant. Whether this relative disadvantage offsets the benefit of the simplicity of the ITC, and the impact that this will have on uptake, is unknown.

The grant's relatively complicated application and approval process ensures that the government is able to more closely monitor the impact of the incentive on government budget, and a certain total threshold can be determined for the amount of grants that are provided a year. This reduces the risk of the policy ending up causing unsuspected or unanticipated impacts to government budget. The fact that the grant provides financial support *prior* to the investment also has a greater impact on the financial barriers faced by SMEs relative to the ITC (for reasons described above).

However, the grant's application and approval process has some downsides. First, it potentially limits the uptake of the policy by complicating the application process. Second, it requires high administrative costs. If grants are to be processed in a timely and thorough manner and fraud and abuse is to be prevented a dedicated team of trained staff is required to review and approve the applications. This creates an additional strain on government budget that could negatively impact the cost-effectiveness of this option.

While the precise budget that the provincial government would be willing to allocate to an initiative such as this is unknown, the impact of the program on government budget is likely a top priority for the provincial government. While this analysis used estimated uptake ranges based on information obtained through this research, the precise level of uptake (and thus the expected cost of the incentives to government) is unknown. This is particularly relevant for the ITC where it is challenging to place limits on the impact of the incentive to government budget. The government could limit the budgetary impacts of both the grant and the ITC by either lowering the eligible amounts (e.g. up to \$15,000 rather than \$30,000), restricting the eligible investments, restricting the eligible businesses (e.g. to only medium sized businesses), and/or announcing a fixed time period for the ITC and budget for the grants. However, any actions to limit the impact on government budget would likely also limit the uptake and GHG emissions reductions that result from the policy. These uncertainties require additional data collection in order to definitively determine the budgetary impacts of either policy.

Chapter 10.

Recommendation

More needs to be done to promote GHG emissions reductions amongst SMEs. A knowledge provision service is a relatively low cost option to raise awareness of GHG reduction opportunities, reduce the time and staff resources required to develop a GHG reduction strategy, and reduce the knowledge barriers that might be preventing businesses from reducing their emissions. This option could also serve to raise awareness of existing incentives, and potentially reduce the need for additional financial incentives. Option three is necessary to ensure that information and knowledge barriers are not preventing SMEs from unlocking their GHG reductions potential. As such, I recommend the implementation of option three as a necessary ‘first step’.

The limitation with option three is that it does not impact financial barriers. Thus, following the implementation of option 3, I recommend that the province also consider implementing either option 1 or option 2. A financial incentive with a GHG emissions reporting requirement provides the opportunity to unlock the maximum potential for GHG reductions amongst this sector and would also collect valuable data. Additionally, in the event that the carbon tax is increased, a financial incentive for SMEs would help to gain political support from this sector.

This analysis highlights the trade-offs between the ITC and grant, yet there is no clear winner. Either option could be successful at reducing barriers and promoting GHG reductions amongst SMEs. Due to the high number of SMEs in BC, uncertainty over the expected uptake of either policy creates budgetary risks if either option were to be implemented without additional data collection. Based on these uncertainties, my recommendation is to begin my implementing the information provision service (option

3), administer a survey to SMEs through this website, and implement either the ITC or the grant depending on the information gathered through this survey.

The survey could collect the information required to provide greater certainty over the expected 'demand' for the policy (and thus uptake), the types of investments that SMEs would like to make, and thus the expected budgetary impact of the incentive. Additionally, the survey could be designed to provide information to inform the list of eligible investments, the size of businesses that should qualify, and how the incentive should interact with existing programs and policies. The existence of the information service and the dissemination of a survey would inform and engage SMEs prior to the announcement of a financial incentive. This would help to raise awareness and 'buy in' for either the ITC or the grant (whichever was ultimately chosen). Increased certainty as a result of the survey findings would increase the credibility of either incentive and make it a more attractive policy option to the provincial government. Additionally, by beginning with option 3, the basic systems would be in place to market and provide information regarding the financial incentive that is ultimately administered.

This recommended process (beginning with the implementation of option 3, followed by a survey, and then a financial incentive) would ensure that both knowledge and resource barriers are being impacted. Collecting additional data through a wider survey of SMEs prior to the implementation of a financial incentive would reduce the budgetary risks associated with the incentive, and ensure that once implemented, the incentive would be a success. This process would result in the greatest potential GHG emissions reductions from BC SMEs, at a reduced cost and risk to the provincial government.

Chapter 11.

Study Limitations, Future Research and Conclusion

This study suggests that small and medium sized businesses can play an important role in ensuring that BC is able to meet its GHG reductions targets. Developing policies that explicitly target this vital sector of the BC economy will improve both the environmental and economic sustainability of the province. Tackling the barriers that SMEs currently face in reducing their GHG emissions is necessary to ensure that these businesses are able to achieve their potential GHG emissions reductions. At the same time this will help to strengthen the bottom line of a sector that includes over 98% of the province's businesses.

A knowledge provision service is a relatively low cost way to ensure that knowledge and information barriers are not standing in the way of SME GHG emissions reductions. An investment tax credit and a grant have the potential to reduce additional barriers and further promote GHG emissions reductions amongst SMEs. While both financial incentive options are viable, I recommend collecting more data through a broad survey of SMEs prior to implementing either the credit or the grant in order to reduce risks, create greater certainty, and ensure the success of the incentive.

The major limitation of this research is that it relied on a number of general assumptions regarding SME behaviour and preferences and the cost of the policies. This was due to a lack of available data on the uptake of similar programs, the financial situation of SMEs, and the precise costs associated with administering the policies. A wider survey of SMEs would help to clear up some of these uncertainties.

An additional limitation of this research is that it does not address some of the institutional and structural barriers that SMEs might face in their effort to reduce their GHG emissions. This includes ensuring the appropriate facilities and services exist to allow them to pursue active GHG reduction strategies, and acknowledging that a number of SMEs rent rather than own their space. The current structure of many rental spaces creates a situation where many SMEs have little control over the energy inputs into their business space. While policies exist that target the developers of new buildings as well as the owners of existing buildings, it is necessary to ensure these policies are successful at ensuring the buildings SMEs rent are operating efficiently and sustainably. In order for SMEs across BC to fully realise their GHG reductions potential, facilities such as recycling and composting also must be available and accessible to them. SMEs outside of the larger cities in BC may have more difficulty and higher costs associated with accessing “green” services and suppliers, such as biodegradable materials and environmentally conscious suppliers. While the policy solutions put forward do not directly address these issues, it is hoped that they will help to promote the burgeoning green economy throughout BC.

Future research should focus on the municipal level to ensure that businesses have the necessary facilities and services required to achieve their maximum possible levels of GHG emissions reductions. Strategies to reduce GHG emissions can be simple, but many may require the services and input of a variety of levels of government as well as private suppliers. Continuing research should be conducted to ensure that the appropriate services and support exist in all levels of government and the community to facilitate a broader transition to a sustainable, low carbon economy.

It is hoped that the current momentum of climate change consciousness that has been propelled by the change in federal government will lead to some concrete policy solutions over the next few years. When these policy changes do come about they will draw both an increased awareness to the importance of GHG emissions reductions, and increased incentive for businesses to engage in GHG emissions reducing activities. This is the right time to implement policies that reduce the barriers that SMEs face to ensure that they are well positioned to be part of, and competitive within, a low carbon economy.

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Appendix A.

Interview Information and Interview Guide: SMEs

SEMI-STRUCTURED INTERVIEW SCHEDULE: SME INTERVIEWS

Simon Fraser University Masters of Public Policy Graduate Research Interview Schedule

Title of Study: Promoting Greenhouse Gas Emissions Reductions in British Columbia's Small and Medium Sized Businesses

Principal Investigator: Caitlin Williamson

Supervisor: Dr. Nancy Olewiler

Research Problem

Climate change, BC legislated GHG emission targets, planned pipeline and LNG development, and rising energy and waste costs have made sustainable energy practices an issue of importance to BC governments, individuals, and businesses. Small and medium sized businesses (SMEs) represent 98 percent of all businesses in BC and in addition to being contributors to GHG emissions, they are also being negatively affected by these rising energy and waste costs.

Studies have shown that energy efficiency investments can result in positive businesses benefits to the SME in addition to the societal benefits associated with reducing GHG emissions. However, research suggests that SMEs face a number of barriers to investing in profitable low-carbon and energy efficient technologies and practices. The objective of my research is to develop and assess a set of policy options and recommendations that could assist SMEs in reducing their GHG emissions and improving their environmental sustainability.

Purpose of the Interview

The purpose of the interview is to gain information from SMEs about any investment they have made to improve the energy efficiency of their business and any barriers they may face in doing so. This interview also hopes to elicit their views about potential policy options to see which ones would help them most to reduce their GHG emissions. The objective of these interviews is to gain information that will help me to develop and assess a set of policy options to help SMEs in reducing their GHG emissions.

Topic Areas of Discussion

- How many employees are in your business? (Less than 10, between 10 and 49, between 50 and 250, between 251 and 499)
- Are you aware of or do you monitor your energy consumption?

- What steps (if any) has your business taken to improve its environmental footprint (for example, reduce waste or reduce energy consumption)?
- Are there any investments or activities that you would like to engage in to improve your environmental sustainability and energy efficiency but are unable to?
- What, if anything, do you think prevents you from investing in energy efficiency technologies or “green” practices?
- Are you aware of any programs or assistance (government or otherwise) to help you to improve your businesses environmental footprint?
- If yes, have you ever accessed any of these programs or assistance?
- What, if anything, do you think the BC government could do that would help you to make your business more “green” and/or energy efficient?
- What are your opinions on these possible policy options:
 - An investment tax credit (\$2000 a year over 3 years)
 - A grant (\$2000 a year over 3 years)
 - The provision of free energy audits
 - A free educational workshop (An online workshop, a 4 hour workshop, 1 day workshop, or 3 day workshop)

Appendix B.

Interview Information and Interview Guide: Experts

SEMI-STRUCTURED INTERVIEW SCHEDULE: EXPERT INTERVIEWS

Simon Fraser University Masters of Public Policy Graduate Research Interview Schedule

Title of Study: Promoting Greenhouse Gas Emissions Reductions in British Columbia's Small and Medium Sized Businesses

Principal Investigator: Caitlin Williamson

Supervisor: Dr. Nancy Olewiler

Research Problem

Climate change, BC legislated GHG emission targets, planned pipeline and LNG development, and rising energy and waste costs have made sustainable energy practices an issue of importance to BC governments, individuals, and businesses. Small and medium sized businesses (SMEs) represent 98 percent of all businesses in BC and in addition to being contributors to GHG emissions, they are also being negatively affected by these rising energy and waste costs.

Studies have shown that energy efficiency investments can result in positive businesses benefits to the SME in addition to the societal benefits associated with reducing GHG emissions. However, research suggests that SMEs face a number of barriers to investing in profitable low-carbon and energy efficient technologies and practices (including financial, time, and knowledge barriers). Research also suggests that policies aimed at improving corporate environmental sustainability tend to target large businesses and corporations, and that SMEs have often been ignored by government intervention to promote GHG reductions and environmental sustainability. The objective of my research is to develop and assess a set of policy options and recommendations to assist SMEs in reducing their GHG emissions and improving their environmental sustainability.

Purpose of the Interview

The purpose of the interview is to gain information from experts on the subject matter related to this topic. This includes academics and professionals who have substantive knowledge regarding SMEs, environmental efficiency, taxation, and environmental policy. These opinions and perspectives will be used to inform the policy options that are proposed as well as the evaluation of these policy options.

Topic Areas of Discussion

- What has your research and experience taught you about the barriers that businesses face in reducing their GHG emissions and engaging in energy efficiency investments?
- What types of policy initiatives have been effective in helping businesses improve their environmental sustainability?
- What additional policies would you recommend to help improve energy efficiency of SMEs and help achieve environmental sustainability? What are some of the risks or obstacles associated with these policies or programs?