Canadian Subnational Climate Change Policy

By: Joseph Destito

Supervised By: Professor Mark Winfield

A Major Paper

submitted to the Faculty of Environmental Studies

in partial fulfilment of the requirements for the degree Master in Environmental Studies

York University, Toronto, Ontario, Canada

Date: Thursday, November 30, 201

Acknowledgements:

The author would like to acknowledge and thank Professor Mark Winfield's contribution in developing the analytical framework used in this report, as well as, the ongoing advisory support and guidance throughout the course of the MES program.

Disclaimer:

This report does not represent the views of any organization and are solely the views of the author.

Foreword:

I have always found the topic of climate change policy in Canada interesting and worth pursuing. In Canada, environmental or climate change policy is not a straightforward "save the environment" endeavour, rather, climate change or environmental policy is very much an effort that has political roots. Perhaps what further spurred my interest in climate change policy is the fact that Alberta, a province that should be last in implementing a carbon reduction policy, joined the club by implementing a carbon tax. With Ontario and Alberta joining Quebec and BC for provinces with carbon reduction policies, I thought an important question to ask is how impactful will these policies be at actually reducing carbon emissions, or will they simply be half-measures. To go about answering this, I evaluated all four policies using a set of criteria derived from via a literature review.

In many ways evaluating these four policies not only has allowed me to understand how each policy functions in great detail, but perhaps more importantly, it exposes not only the policies faults but the opportunities for improvement. In a sense, it has helped me understand what types of characteristics climate change policies that rely market mechanisms require to be successful. More broadly, this evaluation has taught me how to use an evaluative framework, but also how to effectively put one together. This major paper relates to my plan of study in many respects; it satisfies my learning objects 2.1, 2.2, 2.3, and 2.4, which are to gain an in-depth understanding of British Columbia's and Alberta's carbon tax, and Quebec's and Ontario's cap and trade system. This paper also bleeds into my first component learning objectives but to a lesser extent.

Abstract:

Using a framework, this paper evaluates British Columbia's and Alberta's carbon tax and Ontario's and Quebec's cap and trade system, to determine how effective these policies will be at reducing GHG emissions cumulatively. The framework has been primarily shaped via a literature review. The framework consists of the following evaluative criteria: A) policy effectiveness, B) allocation of public resources and C) policy design. Each criterion consists of multiple questions and sub-questions which are used to determine the effectiveness of the policy. The criterions take into account things such as the carbon scope, price of carbon, the extent of emission reductions, actual and anticipated reductions, allocation of generated revenues, political acceptability, gaming prevention, policy rigorousness, evaluation, and transparency. Since all policies besides BC's are in their infancy, to satisfy the criteria, this paper primarily utilizes government documents, working paper, and commentaries. Recommendations and findings are summarized in the appendix.

Current modeling and data suggest that all four policies will not result in enough emission reductions to allow the respective provinces to achieve their emissions reduction goals. Although, some are further off the mark than others. However, it is blatantly clear that the recommendations that are required with the timeframe allotted is steep to say the least. Ultimately, each policy can benefit from a price on carbon that is significantly greater than \$30/tCO_2e and a much leaner scope. Particularly, Alberta and Ontario damage their scope substantially to preserve their large emitters. Blanketed exemptions seem to be a popular theme between these two provinces. Better redistribution of revenues to achieve further reductions can also be had, particularly from British Columbia. Notably, Quebec sets the pace for good

transparency and something that the other three policies should aspire too. All provinces can also improve their reporting and evaluation processes.

Keywords: Canadian Subnational Climate Change Policy, Carbon Reduction Mechanisms, Cap and Trade, Carbon Tax, Policy Evaluation

Acronyms:

GHG: Green House Gas Emissions

CO_2e: Carbon Dioxide/ Carbon Dioxide Emissions

ETS: Emissions Trading System

C&T: Cap and Trade

tCO_2e: Tons of Carbon Dioxide Emissions

$MtCO_2e$ eq: Megatons of Carbon Dioxide Emissions Equivalent

SGER: Specified Gas Emitters Regulation

EITE: Emissions-Intensive and Trade-Exposed Industries

WCI: Western Climate Initiative

CITSS: Compliance Instrument Tracking System Service

Table of Contents:

Chapter 1: Introduction/Background

With the implementation of carbon taxes in Alberta and BC, and Cap and Trade Systems in Ontario and Quebec, there could be a shift in climate change policy in Canada. This paper seeks to evaluate these four policies using a comprehensive evaluative framework. The goal is to determine whether these policies cumulatively are sufficient enough to reduce Canada's carbon dioxide emissions in a significant manner. The first chapter of this paper is an introduction and background section that summarizes some of the influences of environmental policy in Canada, Canada's international commitments, as well as a breakdown of some of the types of environmental policy instruments typically used in Canada. Since this paper primarily is concerned with carbon taxes and cap-and-trade or emissions trading systems, I introduce both mechanisms, although a greater amount of detail is given to them in the case studies, which is in the third chapter. In the second section, I outline the methodology of this paper, as well as layout the evaluative framework and justify its use. The third section is where I evaluate each policy through the evaluative criteria put forward. In the fourth section I make recommendations as to how the policy can be altered or modified to increase carbon dioxide reductions. Lastly, in the conclusion I answer the question above by taking the evaluations and the corresponding recommendations into considerations.

1.1 The Economy vs The Environment

It is held that the environment can be considered as a "post-materialist value". In that, individuals view and value the environment as a function of their well-being (Anderson & Stephenson, 2016, p. 6). However, an individual's concern over the environment will only increase under two scenarios: i) when there is noticeable environmental degradation, and ii) when economic issues are not present (Ibid, pp.5-6). When translated to the politics and policy

sphere, when unemployment increases, the demand for government spending on the environment drops at a ratio of 6:1 (Ibid, p.11). That is, for every 1% drop in unemployment, demand for government spending on the environment drops by 6% (Ibid). While concern over the environment may still be high amongst voters, in times of economic hardship, voters are compelled to act in a way that would serve their economic interest (Ibid, p. 13). This is what Anderson and Stephenson explain was the reason for the Conservative Party victory in the 2008 and 2011 Canadian Federal elections: "despite their reputation as the least environment-friendly party [the Conservative Party won the 2008 and 2011 election] for two reasons: the environment was simply not the most salient issue for voters, and the Conservatives were seen as best on an issue that was salient – the economy (Ibid, p. 17)."

Canada can be defined as a "staples state," which is a state or economy that is reliant on the production and export of primary resources, such as fish, forestry, mining, and oil (Howlett & Kinney, 2016, p. 40). There are four stages to a staples economy, but for my purposes, Canada is considered an "advanced mature staples state." An advanced mature staples state is a spin-off from a post-staples state, where economies typically shift away from exporting resources (Ibid, p. 42). In an advanced mature staples state, instead of shifting, there is a push for further resource extraction combined with an increase in industry subsidies (Ibid, p. 43). In other words, the state's economy becomes further reliant on the extraction of a resource(s). The province of Alberta and its tar sands is a perfect example of this. There are two ways to extract tar sands oil: surface mining and in-situ mining. However, the only way for the province to exact the majority of the oil is to use the latter method, which is much more resource intensive than the former method (Nikiforuk, 2010, pp. 14-15). In the policy sphere, advanced mature staples states are problematic because "policy-makers often continue … to solve mature staples problems, rather

than promote a post-staples trajectory (Howlett & Kinney, 2016, p. 53).” This usually results in policies that try to promote environmental values and further entrenchment in the staples at the same time (Ibid).

1.2 Federalism

It can be said that Federalism impedes the creation of overarching environmental policy in Canada. In the *Canadian Constitution Act of 1982*, Sections 91 (federal power) and 92 (provincial power) display an enumerated list that outlines which level of government has jurisdiction over what. Otherwise known as the *Division of Powers*, the list does not delegate either the federal or provincial government jurisdiction over the ‘environment.’ Instead, each level is given jurisdiction over a wide array of subjects that individually have implications for influencing how the environment is managed (Doelle & Tollefson, 2013, p. 166). This division has resulted in a patchwork of environmental management, whereby, there are jurisdictional areas that federal or provincial levels have exclusive jurisdiction over, while there are other areas where jurisdiction is shared by both levels (Ibid, p. 167). Legal scholars have suggested that because provinces have exclusive control over their natural resources, they have control of environmental management and policy (MacKay, 2013, p. 213). In fact, “provincial environmental policy [often reflects] … links between provincial governments and industry (Ibid, p. 214).”

Although the division has not limited the federal government’s power over environment management (Ibid, p. 213), it has made the federal government “reluctant to take up [environmental] issues out of fear of jurisdictional entanglement (Toner & Meadowcroft, 2009, p. 80).” As a result, the division has forced the federal level towards collaborative approaches with the provinces (MacKay, 2013, p. 215). Simmons supports this by suggesting that not only

has the federal government been hesitant on testing the limits of its environmental jurisdiction, but federal and provincial harmony concerning the environment is achieved through federal inaction (Simmons, 2016, p. 137). It is important to note that, "initiatives in fields like the environment beyond what is seen to be essential to economic development occur as they become politically… necessary… not as a result of the state seeking an expansive role in these areas (Winfield, 2012, p. 6)."

1.3 International Commitments

Internationally, Canada's environmental record has been checkered at best, with academics referring to Canada as once a "leader" to now a "laggard" in the international environmental law realm (Craik & Prior, 2016, p. 198). Perhaps Canada's largest international blunder is the Kyoto Protocol. The Kyoto protocol was an international agreement set out in 1997 that mandated countries to reduce their domestic GHG emissions (Macdonald, 2009, p. 152). Canada's GHG reduction target was to reduce their emissions 6% below 1990 levels by 2012 (Ibid). However, after ratifying Kyoto in 2002, it became apparent that not only was Canada going to fail to meet its Kyoto GHG reduction commitment, but there was no indication that Canada was going to make a serious effort to even try (Craik & Prior, 2016, p. 203). Of course, in 2012, Canada withdrew from Kyoto (Ibid, p. 198).

Recently in 2016, Canada has signed onto the new United Nations Climate Change Conference (UNCCC) agreement in Paris, which mandates signatories to reduce their emissions in such a way as to prevent the Earth's temperature from exceeding $2^{o}C$ (United Nations Climate Change Conference (COP 21), 2015). The agreement stipulates that every five years after 2020, signatories are required to review their contributions (Ibid). However, signatories cannot lower their targets, but they may increase them (Ibid). Canada's Intended Nationally Determined

Contribution (INDC) is to "achieve an economy-wide target to reduce our greenhouse gas emissions by 30% below 2005 levels by 2030 (Government of Canada, 2015, p. 1)." This translates to Canada's GHG emissions in 2030 to be approximately 523 $MtCO_2e$. In order for Canada to achieve their Paris target, it will require the implementation of stringent climate change policy sooner rather than later. Any delay will only exacerbate the problem, making it more difficult to solve (Bertram, et al., 2015, p. 235).

Historically, at the national level, no CO_2 reduction measures have meaningfully materialized in Canada. However, this is no longer the case. In October 2016, the Trudeau government announced its plan to implement a nation-wide price on carbon (part of the Pan-Canadian Strategy as explained below). A "floor price" on carbon will be set at \$10/ tCO_2e starting in 2018, which will increase by \$10 each year until it reaches \$50/ tCO_2e in 2022 (Campion-Smith, 2016). Should provinces fail to implement their own price on carbon via carbon tax or cap and trade system that does not meet the federal floor-price for that year, the federal floor price will be imposed on those province(s) (Ibid). Notably, the scope of the tax will be equivalent to the scope implemented in BC: "At a minimum, carbon pricing should apply to substantively the same sources as British Columbia's carbon tax (Government of Canada, 2016, p. 49)." What is also interesting is that the tax generated revenues by each province and territory is kept by the province and territory in question, and is spent at their own discretion (Ibid). Lastly, provinces and territories are recommended to provide transparent and regular progression reports for their carbon reductions (Ibid).

Additionally, in early December 2016, the federal government and all provinces and territories, with the exception of Saskatchewan, have adopted the *Pan-Canadian Framework on Clean Growth and Climate Change*. The Framework is a strategy implemented as a means to

achieve the Paris targets of reducing Canada's CO_2 emissions by 30% below 2005 (523 $MtCO_2e$) levels by 2030 (Ibid, p. 5). The Framework relies on subnational carbon reduction strategies with federal support. In terms of how reductions will occur, The Framework outlines four *Pillars*: 1) putting a price on carbon, 2) strengthening energy efficiency standards and codes for vehicles and buildings, 3) infrastructure that is resilient to the changing climate, and 4) investment in clean technology and innovation (Ibid, pp. 2-3). The federal government's commitment to The Framework is as follows: $62.5 million to support the development of infrastructure for alternative transportation (electric, natural gas, and hydrogen); $50 million over two years to invest in GHG reduction technologies for the oil and gas sector; $82.5 million over two years to support research and development for clean energy technologies; $100 million per year for the Regional Development Agencies to support clean technology; $50 million over four years to Sustainable Development Technology Canada (SDTC) for new clean technology projects; $40 million over five years to integrate climate resilience into building design and codes; $129.5 million to implement science programs to inform decision-makers; $10.7 million over two years to implement renewable energy projects in off-grid Indigenous and northern communities; $81 billion over 11 years for investments in public transit; $35 billion to be invested in large infrastructure projects that contribute to economic growth; $2 billion investment in the Low Carbon Economy Fund to support provincial and territorial actions to reduce emissions; and $1 billion invested over four years to support clean technologies in forestry, fishery, mining, energy and agriculture sectors (Ibid, pp. 47-8).

1.4 Other Types of Carbon Abatement Mechanisms Used in Canada

Domestically, environmental policy has typically been controlled using regulatory instruments. Regulatory instruments establish in law the prohibition of certain activities,

whereby permits may be used to control the manner in which the prohibited activity is engaged (Winfield, Policy Instruments in Canadian Environmental Policy, 2009, p. 47). The coercive power of regulatory instruments comes in the forms of fines. However, especially for larger firms, these fines are too low for firms to recognize them as any more than a cost of doing business (Ibid). In the event larger fines are available for non-compliance, maximum fines are seldom enforced (Ibid, p.48). Notably, regulatory instruments have proven effective should they be enforced vigorously (Ibid, p. 56).

Another popular environmental policy tool of choice are voluntary instruments. As the name suggests, governments set up programs where firms will voluntarily reduce their own emissions. Of course because there is no punishment for non-compliance, voluntary instruments are largely ineffective at achieving the policy's goal (Ibid, p. 50). However, the advantage to using voluntary instruments is that there are virtually no costs associated with them (Ibid). Another 'soft' instrument is educational. Instead of coercing behaviour change, the government sets up educational programs to encourage and educate sustainability (Ibid, p. 51).

Lastly, economic instruments used to reduce carbon dioxide emissions is a relatively new concept for Canadian policy. However, the use of economic instruments is not new to Canadian environmental policy. Economic instruments were previously used to control pollutants that caused acid rain and sulfur dioxide (Winfield, Implementing Environmental Policy, 2016, p. 77), but they were never used to reduce carbon dioxide, at least not in any substantial way. Canada saw its first example of a carbon tax implemented in Quebec in 2007, although this tax was a much less substantial and comprehensive tax compared to BC's, which was implemented the year after (Winfield, Policy Instruments in Canadian Environmental Policy, 2009, p. 57). In 2008, Alberta also implemented an ETS, however, its effectiveness as a carbon reduction policy

has been widely criticized (Ibid). The attractiveness of economic instruments (perhaps not a C&T system) is the fact they allow covered emitters to reduce their emissions the way they wish and at the lowest possible cost to them (Ibid, p. 53). Likewise, because governments typically prefer to achieve policy goals at the lowest possible cost, at least with respect to carbon taxes, economic instruments can be seen to be advantageous (Ibid).

1.5 Market Mechanisms for Carbon Abatement: Priced Based (Carbon Taxes)

Setting a price on carbon via a carbon tax is straightforward. Governments set a price on carbon, which is paid by individuals and industries that consume carbon through combustion, thereby allowing for the efficient reduction of emissions at the lowest possible cost (Stern, 2009, p. 99). As the price on carbon increases, it should send market signals to consumers incentivizing them to consume less carbon (Ibid, p. 100). Although there is disagreement over the exact price that carbon should be set at, it is generally accepted that the carbon price "should reflect the marginal social cost … of emitting one extra unit of [carbon dioxide] (Ibid)." By having the externalized cost of carbon incorporated in consumable goods that contain carbon input, the tax should ensure that "all opportunities for reducing emissions which cost less than the price [of carbon] will be exploited (Ibid)." This is shift is accelerated should a portion of tax revenues be allocated in the form of subsidies for sustainable energy programs (Winfield, 2009, p. 49).

Paul Ekins provides a comprehensive examination of the use of market mechanisms to reduce emissions. "[The] hallmark of [a] good [carbon] tax [is to] … bring the private cost of emitting CO_2 into line with social costs of global warming, [tax revenues are] expected to grow with income … [assuming little to no substitutability for] fossil fuel [use], it should be simple and cheap to administer through … existing tax structures, it [should] stimulate energy saving,

innovation, and investment in clean technology, [rendering] economic growth, [and lastly,] … regressive side effects [should be manageable] (Ekins & Terry, 2001, p. 327)."

Another positive is that market mechanisms for carbon abatement are not prescriptive, since market forces, and not the government, "[allow] polluters to choose how best to adjust to the environmental quality standard. [Those] facing high pollution abatement costs will prefer to pay the tax; [while] those with low costs will install equipment to avoid paying (Connelly, Smith, Benson, & Saunders, 2012, p. 185)." The effectiveness of pricing carbon is most evident when the price coercively forces behavioural change, whereby those who cannot pay the higher price for carbon will reduce their emissions (Ibid, p. 186).

There are also generally accepted disadvantages. For instance, should the price be set below the optimal level, the objectives of the tax may not be achieved (Ibid, p. 185). As well, a carbon tax, in particular, can result in disproportionality issues, whereby it typically has "a [greater] impact on low-income [individuals], whereas [high-income individuals] … can afford to pay the higher costs [since] fuel makes up a smaller proportion of their income [compared to low-income individuals] (Ibid, p. 187)." Should a portion of revenues not be used to minimize disproportional effects, the end result could be problematic.

1.6 Market Mechanisms for Carbon Abatement: Quantity Based (Cap and Trade)

Like a carbon tax, a C&T system operates in the same way in terms of coercing carbon reductions. For the upstream (covered) emitters, this coercion comes in the form of purchasing credits or allowances, while for downstream (not covered) emitters, this coercion comes from what is called *cost pass-through* (The Institute for Competitiveness & Prosperity, 2016, p. 17). Cost pass-through is when regulated emitters pass either some or all of the additional costs from

the C&T system onto the consumer, which forces consumers to then pay more for direct and indirect uses of carbon (Ibid). Should the cost-pass-through be high enough, it should force consumers to reduce their carbon consumption by investing in alternatives.

In a traditional ETS, the numbers of allowances made available for purchase are controlled, while demand and supply forces determine the cost of each allowance. In both Ontario's and Quebec's case, not only are the allowances set but so is the price put on carbon. As an economic assertion, the more allowances that are made available, the lower the cost of each allowance becomes. However, when fewer allowances are made available, the cost of each allowance should rise. While as an economic assertion, letting supply and demand forces determine the price sounds fine, in practice it has proven to be problematic. This is the primary reason behind controlling both the number of allowances made available, as well as, the price of allowances.

For example, a large issue with the European Union's ETS is due to market instability. Since too many allowance credits were made available, and a floor price of allowances was not set, the price per allowance fell (Brink, Vollebergh, & van der Werf, 2016, p. 604). While a small drop in price may not be detrimental, a significant drop in price, such as in the EU, can be. From an anticipated starting price per allowances of € 30, in 2013 the price per carbon credit dropped to € 2.75 (Ibid, p. 603). When the cost of carbon dips that low, the incentive for companies and individuals alike to alter their carbon consumption or invest in low carbon alternatives in nonexistent (Ibid, p. 604). In their modeling, Brink et al. find that through market stability, stronger price signals can be secured, and in turn, more incentive is created for carbon users to alter their carbon consumption or invest in low carbon technologies (Ibid, p. 613). The

simplest way to achieve this is to administer a tighter cap and establish a floor price for carbon credits (Ibid).

The power of a C&T system comes from the cap declining each year, where the fewer amount of allowances there are to purchase, the more expensive they become (Saxe, Cap and Trade, 2016, p. 66). Since the allowances rise in cost, the more advantageous it becomes for emitters to invest in energy efficient alternatives. This is easier said than done, as a cap that is set too low carries with it political, economic, and competitiveness ramifications, while a cap that is set too high results in few, if any, reductions (Ibid).

Chapter 2: Methodology

2.1 Research Question:

Are British Columbia's and Alberta's carbon tax, and Quebec's and Ontario's Cap and Trade System cumulatively sufficient to significantly reduce Canada's CO_2 emissions and why?

2.2 Research Design and Methodology:

The provinces of British Columbia, Alberta, Quebec, and Ontario have each put forward their mechanisms for reducing their carbon emissions. Separately and cumulatively, these provinces' respective policies are the most substantial climate change policies implemented in Canada. Now with the *Pan-Canadian Framework on Clean Growth and Climate Change*, the importance of these policies is raised.

I will be carrying out a policy evaluation for the four climate change policies using a framework that has been developed by adopting Bramley et al. evaluative framework as a foundation and supplementing it with a literature review of three peer-reviewed evaluations for BC's carbon tax (see section 2.3). In developing the framework, I use a multi-criteria approach, which as Guglyuvatyy argues, is how climate change policy should be evaluated (Guglyuvatyy, 2010, p. 357). Although such an approach forgoes an evaluation on a single plane, it does allow evaluation to occur in a matrix consisting of many criteria (Ibid, p. 358).

While there are other evaluations of BC's carbon tax, I chose these three evaluations because the authors' evaluate the policy as a whole and not just in terms of one aspect, such as Beck et al that evaluates BC's carbon tax in terms of its revenue neutrality or Rivers and Schaufele, who evaluate BC's carbon tax in terms of its influence on gasoline.

The original evaluative framework consisted of four individual criteria and two sub-questions for each criterion. However, for manageability purposes, the framework has been

condensed to three criteria with a list of sub-set questions for each criterion. It should be noted that this particular framework chosen can be expanded to ask more than 15 subsets of questions. The subsets for this paper were chosen and crafted because they have some degree of measurable metric, as presented by Bramley et al. While some criteria are easier to measure than others, each has some type of descriptive component; again some more than others. This is because besides BC's carbon tax, there is little to no information post-implementation.

The goal of this evaluation is to determine the effectiveness of each policy in their capacity to reduce CO_2 emissions. In evaluating each policy, I will be performing a literature review. The objective will be to locate and review assessments and commentaries for each policy, consisting of formal and informal sources of literature. Particularly for Alberta, Ontario, and Quebec, I will be relying on informal literature, such as working papers, assessments, and commentaries. I will also be using newspaper and journal articles, reports from non-governmental organizations, and relevant government documents.

Findings will be summarized in the *Evaluative Criteria Matrix* (see Appendix I), and key similarities and differences between the policies will be highlighted and discussed.

2.3 Evaluative Criteria Matrix Framework and Justification:

Elgie and McClay evaluate BC's carbon tax using three criteria a) has the policy led to CO_2e reductions, b) how has the policy influenced fuel prices and usage, and c) was the policy 'revenue-neutral' (Elgie & McClay, 2013, p. 3). Elgie and McClay admit that disproportional impacts for low-income households are a criterion that should be included, but falls outside their scope of evaluation (Ibid, p. 2).

Murray and Rivers evaluate BC's carbon tax using three criteria a) scope, b) the price of carbon, and c) the allocation of tax generated revenues. Scope refers to the percentage of the

province's CO_2 emissions that are covered by the tax, and by extension, the percent of emissions that are not covered (Murray & Rivers, 2015, p. 676). The price of carbon refers to the price put on carbon, but also to the additional costs of fuels in relation to the carbon price (Ibid). Revenue allocation refers to whether the tax was revenue-neutral, but also whether revenues generated were allocated towards eliminating negative disproportional effects (Ibid, p. 677).

Rhodes and Jaccard evaluate BC's carbon tax using three criteria a) estimated GHG emission reductions, b) economic efficiency, c) administrative feasibility, and d) public acceptance. Estimated GHG reductions refer to the policies estimated reductions (Rhodes & Jaccard, 2013, p. 40). Economic efficiency refers to the cost put on carbon (Ibid). Administrative feasibility refers to the level of administrative complexity and cost of policy implementation (Ibid). Lastly, public acceptance refers to whether the policy provokes public resistance (Ibid, p. 41).

Bramley et al create an evaluative framework which is used to evaluate Alberta's GHG reduction policies. The criteria for their framework are: a) effectiveness, b) economic efficiency, c) use of public resources, d) policy design, and e) accountability and adaptiveness (Bramley, Huot, Dyer, & Horne, 2011, p. 11). The effectiveness criteria refer to the province's own carbon reduction targets (Ibid). The economic efficiency criterion refers to the extent of which the policy seeks to reduce CO_2 emissions in relation the price of carbon (Ibid). The allocation of public resources criterion refers to i) the allocation of policy generated revenue and ii) the policy's allocation of carbon coverage (Ibid). Regarding the latter, carbon coverage is considered as an allocation of public resources because it is assumed that the environment can be considered as a public good (Ibid, p. 14). The policy design criterion refers to the complexity of the policy, how rigorous the policy is regarding emission measurements, the amount of certainty the policy

can provide, and how well-informed stakeholders are about the policy (Ibid, p. 11). The accountability and adaptiveness criterion refers to transparency. That is, whether the policy is evaluated regularly and whether the policy can be adaptive should targets become jeopardized (Ibid).

The criteria that Bramley created will form the foundation of the criteria that I will be using, although it will be altered slightly. Such alterations are as follows: questions regarding efficiency will be combined with the effectiveness questions, so will questions related to scope. The effectiveness criteria will ultimately consist of, whether the policy is on-track to achieving its respective province's targets, what the price of carbon is, the extent to which reductions are being undertaken, how influential is the price on carbon on direct costs of carbon, and lastly, what is the scope of the policy.

2.3.1 Criteria A: Policy Effectiveness:

1A) What is the scope (coverage of carbon) of the policy? Are there any exemptions?

Starting with scope: "every tonne [of CO_2] uses up limited space in the atmosphere … and causes damage to our shared environment. [Any] … exemptions from payment of a carbon price [can be considered] as a subsidy, or allocation of a public resource to emitters (Bramley, Huot, Dyer, & Horne, 2011, p. 14)." "[Exemptions] from a carbon tax significantly increase the welfare cost of achieving a given emission reduction target (Rivers N. , 2010, p. 1099)."

Bramley et al suggests that the carbon coverage of 12% can be considered as "very poor (Bramley, Huot, Dyer, & Horne, 2011, p. 14)." According to the Pan-Canadian Framework, the federal government states, "[carbon pricing should be] applied to a common and broad set of sources to ensure effectiveness and minimize interprovincial competitiveness impacts. At a

minimum, carbon pricing should apply to substantively the same sources as British Columbia's carbon tax (Government of Canada, 2016, p. 49).” Considering that BC’s scope of carbon coverage is at least 75% of CO_2 emissions, this should be considered as “average,” while a scope of more than 12%, but less than 75% can be considered “poor,” and a scope of more than 75% can be considered “good.”

2A) How does the carbon price influence the cost of direct uses of carbon and to what extent are carbon reductions being undertaken?

Whether the price put on carbon results in carbon reductions can be explained as a function of marginal cost. The objective of pricing carbon is to reduce emissions by ensuring that the cost of products that contain carbon includes the cost of externalities caused by carbon emissions (Ekins & Terry, 2001, p. 333). This should result in an increased cost of carbon-intensive products, which in turn, should reduce the demand and emissions. Whether one is incentivized to reduce their emissions is dependent on their marginal cost of carbon abatement (Ibid, p. 329). If it costs an individual less to pollute and pay the tax rather than abating emissions, that individual will continue to pollute, and vice versa. Whether an individual pollutes or abates is a function of the price put on carbon.

The metric here is the dollar amount of carbon. Bramley et al classify \$15/tCO_2e as “at most good (Bramley, Huot, Dyer, & Horne, 2011, p. 14).” Considering that the bar has been set by BC at \$30/tCO_2e, this should be considered as “average,” while any dollar value below should be classified as “poor,” and any dollar between or above \$50/tCO_2e should be considered as “good” and “very good” respectively.

3A) Is the policy on-track to achieving its own carbon reduction target and is the policy on-track to achieving its respective province’s carbon reduction target?

While criteria 3A may be difficult to evaluate barring reported emissions post-implementation, particularly for Alberta, Ontario, and Quebec, this criteria can be achieved by comparing what the policy is expected to achieve and what the respective province wants to achieve (Bramley, Huot, Dyer, & Horne, 2011, p. 11). The government must show that it is taking clear steps that would be indicative of further carbon reductions (Ibid). For significant carbon reductions to be realized, "climate policy must apply either a rising carbon price or increasingly stringent regulations on technologies and forms of energy [; it] … is essential to have at least one of these … for policy effectiveness (Jaccard, Hein, & Vass, 2016, p. 3)." This is supported by Sadik, "complementary policies can … improve the effectiveness of a carbon tax, particularly [for addressing] … emission sources which do not readily lend themselves to the application of a carbon tax (Sadik, 2015, p. 7)."

For question 3A, it can be measured using the policy itself, as well as, the respective province's actions towards the policy, such as adjusting the scope or the price on carbon or even allocating funds towards different carbon reduction initiatives. Bramley et al, for example, focus on the price put on carbon, the way offset credits are used, how much of a reduction in carbon are government investments estimated to have, whether there is an indication that the respective provinces will be making any changes that will be indicative of future carbon reductions, and modeling data where applicable.

Although criterion 3A can be satisfied with actual carbon data post-implementation, since this data will be unavailable for three of the four provinces, this section will be largely descriptive in line with the metric provided in the paragraph above.

2.3.2 Criteria B: Allocation of Public Resources:

1B) Where are policy generated revenues being allocated to?

Revenue-neutral policies have the potential to be revenue-positive and in turn, can create a double dividend, which can be defined as "the economic benefit resulting from revenue-neutral imposition of a tax, [which] can arise if the revenue [allocated] improves economic distribution (Ekins & Terry, 2001, p. 334)." Should a portion of policy generated revenues be allocated back to tax-payers, such that the negative effects of the tax are cancelled out, it can result in increased economic output.

The reallocation of policy generated revenues can also be instrumental in minimizing disproportional effects. Since a carbon price will negatively affect low-income households more than high-income households, by allocating a portion of policy generated revenues towards low-income households, it can help minimize regressive effects (Sadik, 2015, p. 6). The allocation of revenues towards minimizing regressive effects enables the policy to be more progressive (Beck, Rivers, Wigle, & Yonezawa, 2015, p. 57).

Disproportional effects are also felt by trade vulnerable industries. These types of industries are those which although are carbon intensive, are negatively affected by a carbon price since they compete with foreign industries that do not have a carbon price imposed upon them (Sadik, 2015, p. 6). Should a portion of policy generated revenues be allocated towards these industries, not only can it help minimize disproportional effects, but it can also aid these industries in transitioning to cleaner and less carbon-intensive means of production (Ibid).

Policy generated revenues can also be allocated towards energy efficiency programs to expedite carbon reductions. Since a carbon price will increase energy costs, it provides an opportunity for fossil fuel alternatives to develop. "[A] continuously increasing energy price … would result in substantial investments in energy efficiency and further innovation. [Private] efforts … could be complemented by government initiatives to encourage energy conservation

and efficiency. If energy efficiency could … be increased at no net cost at the same rate as the price of energy, then the negative effects of the rising price on … energy … would be cancelled out (Ekins & Terry, 2001, p. 347).” Additionally, should the government allocate policy generated revenues towards incentivizing individuals to invest in energy alternatives, this energy shift can become expedited and in turn lead to further carbon reductions (Sadik, 2015, p. 5).

For question 1B regarding the allocation of revenues, Bramley et al states, “[subsidies] for biofuels are generally thought to be very expensive on a cost per tonne basis. Subsidies for transit are very expensive for governments, but transit permits large cost savings for users and has other important benefits, such as reducing congestion (Bramley, Huot, Dyer, & Horne, 2011, p. 22).” The allocation of revenues can be considered “good,” if societal benefits are realized.

2.3.3 Criteria C: Policy Design:

1C) Is the policy simple and clear?

Policies that are ‘simple and clear’ usually cost less to implement, less likely to be ‘gamed,’ and more likely to be politically acceptable (Bramley, Huot, Dyer, & Horne, 2011, p. 11). The clearer the policy is in terms of objectives and requirements, the easier it is to determine whether the policy was effective (Pal, 2009, p. 301).

For question 1C, Bramley et al suggests that emissions-trading frameworks are most complex, hybrid frameworks such as Alberta’s SGER standard is less so, and a carbon tax would be the least complex (Bramley, Huot, Dyer, & Horne, 2011, p. 14).

2C) How rigorous is the policy; is the policy evaluated regularly, and is the policy transparent?

As for rigorousness, the more rigorous the policy is in terms of measurement, the more accurate are the policy's results and future predictions (Bramley, Huot, Dyer, & Horne, 2011, p. 11). Transparency is important as it ensures that the policy is constantly evaluated for effectiveness (Ibid). It also ensures that the public can access information about the policy, its results, its evaluations, and changes (Pal, 2009, p. 303). The more scrutiny the policy undergoes, the greater is the likelihood that the policy will reach its stated reduction objectives (Bramley, Huot, Dyer, & Horne, 2011, p. 11). Although scrutiny does not guarantee anything, it does allow for the possibility of progressiveness (Ibid). According to Pal, progressiveness should be the end goal for government policy, in that, policy should constantly be developing accordingly with the policy's results (Pal, 2009, p. 303). Policies that are successful should receive more funds towards adjacent and parallel programs, while policies that are unsuccessful, funds should be allocated elsewhere, but not in such a way as to jeopardize the aim of achieving greater societal benefits (Ibid, pp. 302-3).

For the rigorousness criteria for question 2C, the metric is emissions measurements themselves. That is, who must have their emissions measured, who does the measurement and are the measurements open to public scrutiny (Ibid). As for whether the policy is regularly evaluated and transparent, for Bramley et al, it comes down to the constant issuing of news releases, backgrounders, performance reviews, and annual reports (Ibid, p. 15). Although annual reports may be unlikely to be found, it is reasonable to expect that updates should be provided to the public after implementation. Second, it is also important to observe whether the content the government is providing is "misleading" (Ibid).

Chapter 3: Case Studies

3.1 British Columbia's Carbon Tax

3.1.1 Criteria A: Policy Effectiveness

1A) What is the scope of the policy? Are there any exemptions?

The scope of BC's carbon tax is between 75-77% of the province's emissions (Elgie & McClay, 2013, p. 2) (Rhodes & Jaccard, 2013, p. 39) (Murray & Rivers, 2015, p. 676).

The province has exempted fuel that is bought and sold on First Nations land by First Nations people (British Columbia Ministry of Finance, Sales to First Nations, and the Exempt Fuel Retailer Program, 2014, p. 3). Fuel that is used as a raw material in the following ways are also exempt from the carbon tax: for smelting aluminum, to produce or upgrade another fuel, to manufacture another substance, to separate coal, in pipeline pigging, as anti-freeze in a natural gas pipeline, to remove natural gas impurities, or as a refrigerant in the processing of natural gas (British Columbia Ministry of Finance, Registered Consumers, 2015, pp. 3-4). Lastly, fuels intended for export from BC, locomotive fuel for interjurisdictional use, aviation fuel for international use, marine fuel for interjurisdictional use, and coloured or dyed fuels that are purchased and used by farmers are exempted from BC's carbon tax (Government of British Columbia, Exemptions, 2016). Overall BC's carbon tax has a lean scope with few exemptions (Murray & Rivers, 2015, pp. 682-683).

2A) How does the carbon price influence the cost of direct uses of carbon and to what extent are carbon reductions being undertaken?

When first introduced in 2008, the price of British Columbia's carbon tax was set at \$10/ tCO_2e, increasing \$5 each year until it reached \$30/ tCO_2 in 2012 (Murray & Rivers, 2015, p. 676). At \$30/ tCO_2e BC's carbon tax will have a 4.4% impact on the cost of gasoline, resulting

in a cost increase of 6.67¢/L (Murray & Rivers, 2015, p. 676). Rivers and Schaufele found that for every 5¢ increase in the cost of gasoline, the demand for gasoline in BC reduces by 2.1% (Rivers & Schaufele, 2015, p. 29). Assuming a \$25/ tCO_2e, the demand for gasoline would decline by 8.4% (Ibid). Between 2008 and 2012, fuel use in BC declined by 17.4% (Elgie & McClay, 2013, p. 3). In fact, between 2010 and 2013 the sale of petroleum alone in BC dropped approximately 5% (Statistics Canada, 2015). This has contributed to a 10% reduction in BC's CO_2 emissions between 2008 and 2011 (Elgie & McClay, 2013, p. 6). In BC's *Provincial Greenhouse Gas Inventory* report, the provinces CO_2 emissions for 2008, 2010, and 2012 are as follows: 55.9 $MtCO_2e$ (Ministry of Environment, British Columbia Greenhouse Gas Inventory Report 2008, 2010, p. 9), 49.4 $MtCO_2e$ (Ministry of Environment, 2012, p. 13), 49.7 $MtCO_2e$ (Ministry of Environment, p. 14), 50.3 $MtCO_2e$ (Government of British Columbia, 2016). As can be seen, between 2008 and 2010 BC's CO_2 emissions fell by approximately 11.5%; between 2010 and 2012 emissions rose by approximately 0.5%, and between 2012 and 2014 emissions rose again by approximately 1.2%. Despite the increase, BC's emissions are still down by approximately 10%. The largest decrease in CO_2 emissions occurred when the tax first started and increased most when the tax hit its peak of \$30/ tCO_2e. In other words, emission cuts are most noticeable when the tax is still 'ramping,' but once the 'ramping' stops, regressive effects are evident.

Regarding the capacity of BC's carbon tax to reduce emissions, \$30/ tCO_2e can be deceiving. In 2008, reductions and investments in alternatives would be made only if doing so was cheaper than paying \$10/ tCO_2e. While from 2009 to 2012, the incentive to reduce emissions or invest in alternatives would only be taken should doing so be cheaper than paying

$5/ tCO$_2$e. Since the 'ramping effect' ends after 2012, the only incentive consumers are given is whether alternatives are more cost effective to pursue than paying the 'new' cost of carbon.

3A) Is the policy on-track to achieving its own carbon reduction target, and is the policy on-track to achieving its respective province's carbon reduction target?

BC's emissions targets are to reduce the province's emissions by 33% and 80% from 2007 levels by 2020 and 2050, respectively (Government of British Columbia, 2008, p. 13). The carbon tax alone is estimated to reduce emissions by 3Mt/CO$_2$e by 2020 (Ibid, p. 20).

In 2007, BC's emissions were 66.33 Mt/CO$_2$e eq, meaning that BC's 2020 and 2050 emissions goals are to reach 44.44 Mt/ CO$_2$e eq and 13.27 Mt/ CO$_2$e eq, respectively (or reduce emissions by 21.89 Mt/ CO$_2$e eq and 53.06 Mt/ CO$_2$e, eq respectively) (British Columbia Climate Action Secretariat, 2016). In 2014, BC's emissions were reported at 64.46 Mt/ CO$_2$e eq, meaning that BC is short 20.02 Mt/ CO$_2$e of its 2020 target (Ibid). Although the province still has three years to reach its 2020 target, it is unlikely that the provinces emissions target will be met.

In making recommendations to the BC government, BC's Climate Leadership Team stated "new policies have not been added to the original policies, which plateaued in 2012. The 2020 target is extremely difficult to meet at this point. [The] Climate Leadership Team's recommendations will not enable the province to meet its 2020 targets. The 2050 target is within reach with ambitious actions (Climate Leadership Team, 2015, p. 8)." The Team has recommended the province to make the following changes to their carbon tax if they wish to achieve their 2050 targets: "[Modeling indicates that [the carbon tax should] increase … $10/tCO$_2$e per year … through to 2050. [The scope of the tax should be expanded] … to include non-combustion sources of carbon pollution that can be accurately measured (Ibid, p. 10)." Should this recommendation be undertaken, BC's carbon tax would have a price of carbon at

approximately \$100/tCO_2e. Other such recommendations from the Team include allocating a portion of policy generated revenue to protect carbon intensive trade-vulnerable industries, allocating a portion of policy generated revenue to reduce BC's PST, allocating a portion of policy generated revenues to establish a fund for technological development and innovation, and lastly, provide municipalities with funding for further emissions reductions using a portion of the policy generated revenues (Ibid, pp. 10-11).

Although BC's emission targets for 2020 may be unattainable, as the criteria states, consideration must also be given to the province's actions. For example, the Minister of Finance has made it clear that BC's carbon tax will remain as is: "The carbon tax base will not be expanded or broadened to include industrial process or other non-combustion emissions (British Columbia Ministry of Finance, Budget and Fiscal Plan – 2013/14 to 2015/16 (June Update), 2013, p. 64)." The Minister cited competitiveness as the reason to not alter the tax: "Increasing the carbon tax rates or expanding the base to include industrial process emissions would increase costs for BC businesses and increase competitiveness concerns. … Maintaining the current rates and base will help to ensure BC is not diverging in a substantial way from policies in competing jurisdictions. When other jurisdictions … introduce similar carbon taxes or carbon pricing, government may again review and consider changes to the carbon tax (Ibid)." The Minister goes on to state: "[economic] analysis conducted for the carbon tax review indicates that BC's carbon tax has had … a small negative impact on gross domestic product. … Increasing the carbon tax beyond the current \$30 per tonne would have a stronger negative effect on economic growth. … [As] expected, the economic impact of British Columbia's carbon tax … [on industries] … with high emissions intensities, such as cement production, petroleum refining, [and] oil and gas extraction … are most impacted (Ibid)." In the Ministry of Environment and the Environmental

Assessment Office 2013/14 Annual Service Plan Report, it is stated that as of 2013 "BC [has] placed a five year freeze on the carbon tax to allow other jurisdictions to catch up to BC's leadership position … and ensures BC industries are not placed at a competitive disadvantage for playing their part in addressing climate change (Ministry of Environment & the Environmental Assessment Office, 2014, p. 11)." Most recently in 2016, BC's new Liberal Premier Christy Clark has stated that any changes to the structure of their carbon tax are improbable (Bailey, 2016).

Although the BC government can alter its carbon tax, it is clear that there is no plan to do so. In BC's 2008 Climate Action Plan, the carbon tax rate has been given an adaptive function: "[after] being phased in, further tax rate changes will depend on … whether BC is meetings its emissions targets; the expected future impact on emissions of other policies; … the actions taken by other governments to reduce their GHG emissions; … and the advice of the Climate Action Team (Government of British Columbia, Climate Action Plan, 2008, p. 16)."

3.1.2 Criteria B: Allocation of Public Resources

1B) Where are policy generated revenues being allocated to?

BC's carbon tax is designed to be revenue-neutral with all generated revenues being allocated to income tax reduction (Murray & Rivers, 2015, p. 677). Economic models have shown that instead of producing an increase in household economic output (as is asserted by the double dividend hypothesis), the tax has produced a decrease in household economic output by 8% (Murray & Rivers, 2015, p. 679). Although Murray and Rivers suggest that there is "no statistically significant effect of the carbon tax on BC's economic growth (Ibid)." In fact, for the first four years of being active, BC's GDP growth has kept up with the national average (Harrison, 2013, p. 19). Statistics Canada reported that between 2010 and 2014, Canada's GDP

rose approximately 15%, while BC's grew 13% (Statistics Canada, 2015). The lack of revenues has been linked to the lack of gasoline sales: "[The] BC carbon tax has been revenue negative, [collecting] … less revenue than the government initially forecasted. [This is] … due to unexpectedly low gasoline sales (Rivers & Schaufele, 2015, p. 29)."

In BC, low-income households allocate 10% of their total income to carbon in which 7% is for gasoline, while high-income households allocate 4% of their income to carbon (Murray & Rivers, 2015, p. 680). To mitigate regressive effects of the carbon tax, the BC government created the *Low Income Climate Action Tax Credit*, whereby a portion of the carbon tax revenues are distributed back to low-income individuals and families. Eligibility for the rebate is dependent on family size and income. The yearly income cut-off for low-income families in 2015 was $32,737 for a single individual family and $38,193 for a married couple with children (Government of British Columbia, 2016). The maximum rebate amount is $115.50 per adult and $34.50 per child (Ibid).

Marisa Beck et al. examined the impact of BC's carbon tax on households and assessed whether revenue-neutrality and the redistribution of revenue were beneficial to household welfare in remedying any regressive effects. In their findings, Beck et al. states that should carbon tax generated revenue not go towards BC's deficit, "[no] revenue recycling worsens household welfare by 0.53%, whereas … revenue recycling worsens welfare by 0.01% (Beck, Rivers, Wigle, & Yonezawa, 2015, p. 54)." However, should carbon tax revenue go towards BC's deficit, "BC's welfare decreases by 0.13% without revenue recycling whereas it decreases by 0.08% with revenue recycling (Ibid)." Beck et al. find that revenue recycling is more beneficial for low-income households rather than high-income households since the former relies on wage income and not labour income like the latter (Ibid, p. 42). As such, BC's carbon tax

appears to be more progressive towards the welfare of low-income households (Ibid, p. 58). Other economic models have shown that the redistribution of tax revenues to low-income households results in a 0.3% reduction of economic output for low-income households (Murray & Rivers, 2015, p. 680). Although the regressive effects of BC's carbon tax are not eliminated entirely, they are minimized due to revenue recycling and redistribution.

Tax generated revenues were also allocated towards: reducing the first two personal income tax brackets by 5%, reducing corporate income taxes from 12% to 10% and reducing small business corporate income tax rate from 4.5% to 2.5% (British Columbia Ministry of Finance, Budget and Fiscal Plan – 2013/14 to 2015/16 (June Update), 2013, p. 66). The remaining tax generated revenue was allocated to social programs such as the Northern and Rural Homeowner Benefit Fund, the BC's Senior Home Renovation Tax Credit, the Children's Fitness Credit and Children's Arts Credit, and a Training Tax Credit. For 2011/12, BC's carbon tax collected $959 million, but $1.141 billion was reallocated, meaning that the BC government allocated $182 million more than what the carbon tax generated (Ibid, p. 67).

Despite the reduction in income taxes, both personal and corporate, the remainder of the revenues allocated do not generate societal benefits as the criteria requires. Only those that are eligible for the credits and are receiving them are ultimately benefiting from them. More importantly, these revenues are being allocated in such a way that would complement the tax and further reduce GHG emissions, such as a home energy retrofit fund for instance.

Considering that the economic output of low-income individuals has suffered slightly from the introduction of the carbon tax, it is not unreasonable to think that disproportional effects could have been eliminated. Furthermore, it is not unreasonable to think that should the BC

government allocate tax generated revenues differently, that further emission reductions could have also been achieved.

3.1.3 Criteria C: Policy Design

1C) Is the policy simple and clear?

Although the implementation costs of BC's carbon tax are not explicitly stated in the 2008 budget, there are some figures that could suggest how much money was allocated towards implementing the carbon tax. As part of the implementation of BC's carbon tax, the government created the *Climate Action Dividend*, whereby a one-time $100 subsidy was provided to BC residents (British Columbia Ministry of Finance, Budget and Fiscal Plan: 2008/09 – 2010/11, 2008, p. 153). The total cost of this subsidy was $450 million (Ibid). It is already established by not being an ETS, the carbon tax is simple and administratively cost-effective: "The carbon tax scores high on administrative feasibility because it only requires changing the tax rates of an existing tax. Thus, administrative costs to the government, companies, and final consumers are minimal (Rhodes & Jaccard, 2013, p. 42)."

In a 2008 survey completed by Ipsos Reid, it was found that 59% of British Columbians did not support the implementation of a carbon tax; while only 31% did support it (Ipsos Reid, 2008, p. 1). In a follow-up survey conducted post-implementation, support for the carbon tax increased to 46% and non-supporters fell to 52% (Ibid, p. 2). Also, both Rhodes and Jaccard, and Murray and Rivers would agree that as time progresses, the public acceptance of the tax has increased (Rhodes & Jaccard, 2013, p. 43) (Murray & Rivers, 2015, p. 681).

The Pembina Institute has also been following the public opinion of British Columbians regarding the provinces carbon tax. In their 2011 polling data, they found that when it came to

the carbon tax, 41% of British Columbians believe that the carbon tax has had a negligible effect, 33% believed it had a positive effect, and 27% believed it had negative effects (Horne, Measuring the Appetite for Climate Action in BC: British Columbians' perspectives on climate change and carbon taxes, 2011, p. 3). When asked if the carbon rate should increase past $\$30/tCO_2e$, 29% of British Columbians supported the idea, 51% opposed the idea, and 21% were unsure (Ibid, p. 4). In a follow-up survey by the Pembina Institute, approximately half of British Columbians replied that they have either purchased a more efficient vehicle or drove less frequently in order to avoid paying a higher tax (Horne, Sauvé, & Pedersen, British Columbians' perspectives on global warming and the carbon tax, 2012, p. 4). This poll is particularly important because whether the carbon tax is popular or not, there is at least some indication that it is coercing behavioural change. Additionally, there also seem to be regressive effects on public opinion. In this survey, only 21% of British Columbians agree that the carbon tax has had positive benefits, while 40% agree that the carbon tax has had negative benefits (Ibid, p. 6).

The public opinion of British Columbians has also been followed by The Environics Institute. Their results support the narrative that public opinion has fluctuated over time, but popularity for the tax overall is now increasing: "Public support for the BC carbon tax has strengthened over the past year, with … 61% [of British Columbians] … saying they … support it (up from 58% in 2014). This matches the highest level of public support for the BC carbon tax since it was first introduced in early 2008. No more than 32% [of British Columbians] … now … oppose the provincial carbon tax (down 6 points since 2014) (The Environics Institute, 2015, p. 6)." In fact, in a 2015 Angus Reid poll, when asked about a provincial carbon tax, 54% of British Columbians supported their carbon tax, while only 46% opposed it (The Angus Reid Institute,

Most Canadians support carbon pricing; but less consensus on effectiveness of such measures, 2015, p. 16)."

2C) How rigorous is the policy; is the policy evaluated regularly, and is the policy transparent?

Regarding transparency, BC's carbon tax has an interesting characteristic. Since revenue recycling and revenue neutrality is a large component of BC's carbon tax, each year the Minister of Finance is tasked with providing a schematic in BC's yearly budget which shows how much revenue the carbon tax generated in the previous year and where that money has been allocated to (British Columbia Ministry of Finance, Budget and Fiscal Plan: 2008/09 – 2010/11, 2008, p. 14). Should the Minister fail in the task to produce a revenue-neutral carbon tax, 10% of their salary is withheld (Ibid). Additionally, if in any year the amount of money allocated is less than the amount generated by the carbon tax, the Minister will need to provide a plan to show how that money will be allocated back to taxpayers (Ibid).

In 2013, The Minister of Finance undertook a review of the carbon tax. The review was to determine the impact the carbon tax had and whether to alter its structure in any way (British Columbia Ministry of Finance, Budget and Fiscal Plan 2013/14 – 2015/16, 2013, p. 58). The scope of this review was "revenue neutrality, and consider the impact of the carbon tax on the competitiveness of BC businesses, particularly those in the agricultural sector (Ibid)." As mentioned previously, the rate and scope of the tax were left unchanged, with competitiveness cited as the main deterrent. The revenue recycling structure also remained unchanged, with the Minister of Finance citing no reason other than "one of the key principles was that the tax would be revenue neutral – that all carbon tax revenue would be returned to individuals and businesses through reductions in other taxes and not used to fund government programs (Ibid, p. 59)." Lastly, farmers were given a pseudo-exemption of an 80% break from the carbon tax (they only

pay 20% of the carbon tax) (Ibid, p. 60). Notably, the Minister suggests that doing so will result in a benefit of $11 million annually; although there is no explanation as to who exactly benefits from this $11 million exemption (Ibid).

Each year starting from 2009, the Ministry of the Environment has been tracking the carbon tax indirectly through tracking the provinces GHG reductions as part of their *Annual Service Plan Report*. In 2012 and 2014 the Minister of the Environment released Progress to Targets Reports, outlining the province's progress towards its reduction targets. In the 2012 report, the Minister of the Environment stated: "the current carbon price is not a strong enough incentive (British Columbia Minister of the Environment, 2012, p. 22)." In fact, a wider scope and a greater carbon price were recommended when emissions reports were only available up to 2010 (Ibid). Even in the 2014 Progress Report, the Minister of the Environment stated, "some policies lose effectiveness over time if they are not updated. For example, the carbon tax impact effectively diminishes if the rate remains unchanged, as inflation dampens the price signal (British Columbia Minister of The Environment, 2014, p. 7)."

Lastly, every year the BC government adds to its GHG Inventory, which shows the reported emissions within the province broken down by 'sector' and 'activity.' Environment and Climate Change Canada collects the GHG data and gives it to the BC government to approve (British Columbia Ministry of the Environment, 2016, p. 6). Notably, as part of the Greenhouse Gas Emission Reporting Regulation, industrial emitters that emit more than 10,000tCO_2e per year must report their GHG emissions (Government of British Columbia, Climate Action Legislation, 2017). While industries that emit 25,000tCO_2e per year or more must have their emissions independently verified (Ibid).

3.2 Alberta's Carbon Tax:

3.2.1 Criteria A: Policy Effectiveness

1A) What is the scope of the policy? Are there any exemptions?

Alberta's carbon levy, perhaps unsurprisingly, has many exemptions, which are as follows: natural gas that is produced and consumed on-site by conventional oil and gas producers until January 2023, the use of fuel by farmers for farming operations are exempt, inter-jurisdictional flights, on-reserve fuels for Indigenous peoples, and fuels sold for export (Alberta Treasury Board and Minister of Finance, 2016, p. 95). The most important exemption is for facilities that currently fall under the SGER (Specified Gas Emitters Regulation) performance standard (Ibid, p. 94). SGER facilities are those facilities that emit 100,000 tCO_2e and over per year and make up approximately half of Alberta's yearly carbon emissions (Leach, Adams, Cairns, Coady, & Lambert, 2015, p. 31). Although this is not an exemption in the strictest sense, the exemption from the tax is to ensure that facilities are not being taxed twice for the same emissions (Alberta Treasury Board and Minister of Finance, 2016, p. 95). That is, should SGER facilities be covered under the levy, not only would SGER facilities be taxed under the SGER standard, but they would also be taxed under the levy as well. The SGER exemption is not permanent; it is only active until 2018/19, at which point, the SGER program is slated to be replaced by an 'output-based' approach called the *Carbon Competitiveness Regulation* (CCR). According to the *Climate Leadership Report to the Minister*, the CCR will apply to former SGER facilities that emit 100,000 tCO_2e or more per year (Leach, Adams, Cairns, Coady, & Lambert, 2015, p. 31). These facilities will be subject to the \$30/tCO_2e that the rest of Alberta is subject to; however, these facilities will be allocated emission rights or credits in proportion to their output (Ibid). The reason for these emission credits is to mitigate the disproportional

impacts that trade-vulnerable sectors, such as those under the SGER standard, will face with the implementation of a carbon levy (Ibid). Although it is uncertain what percentage of these emissions are covered by the credits, the credit amount will reduce 1-2% each year and firms will be able to buy, sell, and trade these credits (Ibid). However, it can be speculated that the allocation percentage will be significant: "The emissions pricing regime we propose for large emitters recognizes the fact that much of Alberta's industrial sector faces significant trade-exposure, and emissions policies which impose high average costs of production here could shift activity and prosperity to other locations with no real impact on emissions (Ibid, p. 34)." Finally, analogous facilities that do not pass the 100,000 tCO_2e per year threshold have the option to opt-in and be treated as a large emitter (Ibid, p. 31). It must be stated that the CCR is a proposed replacement for the SGER standard presented by the Climate Leadership Team. As of now, all that is officially known is that the SGER standard will be replaced by an 'output-based' system. All other details are uncertain. Regardless, until the SGER exemption is lifted, and notwithstanding the other exemptions, Alberta's carbon levy scope can be no more than 50% of the province's emissions.

The government of Alberta estimates that the levy's scope is 70-90% of Alberta's emissions (Government of Alberta, Carbon levy and rebates, 2016), while the Alberta Ministry of Environment and Parks estimates 78-90% (Alberta Ministry of Environment and Parks, 2015-2016 Environment and Parks Annual Report, 2016, p. 30). However, as will be shown, given the exemptions, a scope of 70% is unlikely.

According to Environment Canada's 2013 National Inventory Report, Alberta's agricultural sector is responsible for 19,209,000 tCO_2e (19.21 $MtCO_2e$ or approximately 7.2% of Alberta's total emissions) (Environment Canada, 2015, p. 60). Alberta's aviation emissions are

responsible for 1,500,000 tCO_2e (1.5 $MtCO_2e$ or approximately 0.6% of Alberta's total emissions) (Ibid). According to Alberta's 2013 Greenhouse Gas Reporting Program, Alberta's conventional oil and gas sector is responsible for 8,005,223 tCO_2e (8.01 $MtCO_2e$ or approximately 3% of Alberta's total emissions (Government of Alberta, Alberta Greenhouse Gas Reporting Program 2013 Facility Emissions, 2016, p. 12). The assumption here is that all emissions from conventional oil and gas are exempt. What are excluded are biofuels and fuels used on-reserve. Lastly, for large emitters, a clue is given for their scope once the SGER standard is replaced. In Alberta's 2016-2019 Fiscal Report, it is estimated that the Climate Change and Emissions Management Fund is expected to generate $917,000,000 in the year 2018/19 (Alberta Treasury Board and Minister of Finance, 2016, p. 113). This is significant because at present, for SGER facilities to comply with the SGER standard, they must pay into the CCEMF. If it assumed that the regulation replacing the SGER standard only consists of a price on carbon of $30/ tCO_2e, then in 2018/19, large emitters will be paying a carbon price on 30.57 $MtCO_2e$. By using the 2013 SGER emissions report (the most recent published report) as a reference, it can be said that large emitters could be responsible for only 23% of their emissions, indicating an exemption of 77%. On a provincial scale, this means that approximately 38% of Alberta's emissions could be exempt once SGER regulation is replaced. This leaves Alberta with a carbon levy scope of 51%.

Although some of these figures require assumptions that may or may not be correct, the main take away should be that exemptions for large emitters have ramifications. Notwithstanding the other exemptions, for Alberta's scope estimate of 70-90% to be correct, it would mean that the maximum exemption for large emitters would be 60%. Should this be the case, it would mean that the CCEMF`s revenues for 2018/19 are short by $508,780,000.

2A) How does the carbon price influence the cost of direct uses of carbon and to what extent are carbon reductions being undertaken?

Alberta's carbon tax took effect January 1, 2017 starting at \$20/ tCO_2e and will increase to \$30 in 2018 (Government of Alberta, Carbon levy and rebates, 2016). For a consumer to pay the tax and pollute would mean that doing so would be cheaper than investing in alternatives, should alternatives cost more than \$20/ tCO_2e in 2017 and \$10/ tCO_2e in 2018. Since there is no ramping effect after 2018, further incentives to reduce carbon consumption will depend on whether alternatives are more cost effective to pursue than paying the 'new' carbon cost.

The impact Alberta's carbon levy has on direct uses of carbon, such as the cost of gasoline, for example, will be 4.49¢/L in 2017 and 6.73¢/L in 2018 (Alberta Treasury Board and Minister of Finance, 2016, p. 106). Assuming households use 135 GJ of natural gas and 4500 L of gasoline per year, the carbon levy will raise household fuel costs by an additional \$338 in 2017 and \$508 in 2018 (Government of Alberta, Carbon levy and rebates, 2016). It is estimated that indirect costs of carbon (products that, although do not contain carbon, are influenced by the carbon price) caused by the carbon levy will range from an additional \$50 - \$70 per year per household in 2017, and \$70 - \$105 per year per household in 2018 (Ibid). The carbon levy is then estimated to impact households a total of \$388 - \$408 in 2017 and \$578 - \$613 in 2018.

As with BC's case, we should expect the largest amount of carbon reductions to occur the year of implementation. While reductions in the second year of implementation, or the "ramping-up" year, should still occur although may not be as significant as the first wave of reductions.

In the *Climate Leadership Report to the Minister*, which was created to provide the Minister of Environment and Parks advice regarding the development of a comprehensive climate change strategy, stated "the carbon prices contemplated in this report will not drive radical changes in prices, behaviour, or emissions in short order, simply because we are not

proposing radical policies, but a managed transition (Leach, Adams, Cairns, Coady, & Lambert, 2015, p. 33).” The report goes on to state that a $30/tCO$_2$e price on carbon “will change people’s behaviour at the margin. It will create a competitive advantage for lower carbon products and means of production and in so doing will drive innovation to create new technologies to capitalize on these advantages (Ibid, p. 34).” In other words, while Alberta’s carbon levy will produce benefits, reductions will not be significant. The price on carbon of $30/tCO$_2$e is set to provide a nudge for Albertans to start investing in alternatives at the margins.

3A) Is the policy on-track to achieving its own carbon reduction target, and is the policy on-track to achieving its respective province’s carbon reduction target?

As part of Alberta’s *Climate Leadership Plan*, on January 1, 2016 the $15/ tCO$_2$e for SGER facilities was raised to $20 and is set to increase by an additional $10 to $30 the following year (Alberta Treasury Board and Minister of Finance, 2016, p. 93). SGER facilities will also be tasked to achieve a greater reduction in their emissions intensity output from their baseline emissions. The current reduction requirement of 12% was raised to 15%, and in 2017, it will be raised again to 20% (Government of Alberta, 2016, p. 8). To clarify, compliance for SGER facilities will require emission intensities relative to their particular baseline, to be less than 85% for 2016 and 80% for 2017.

In five year increments, Alberta’s emission reduction targets from 2008 business-as-usual (the amount of emissions estimated to be released should no action be taken) for 2020, 2025, and 2030 are 261 MtCO$_2$e (50 MtCO$_2$e below BAU or 16%), 249 MtCO$_2$e (72 MtCO$_2$e below BAU or 22%), and 238 MtCO$_2$e (91 MtCO$_2$e below BAU or 27%) (Leach, Adams, Cairns, Coady, & Lambert, 2015, p. 25).

Alberta’s carbon levy is expected to reduce the provinces carbon emissions by 20 MtCO$_2$e by 2020 and 50 MtCO$_2$e by 2030 (Ibid, p. 40). These estimates take into consideration

the actions that the government of Alberta is currently undertaking, such as redistributing carbon levy generated revenue towards renewable energy programs, green infrastructure, technological development and innovation, and minimizing disproportional effects (Ibid, p. 42). However, the estimates also take into consideration a carbon price of $30/ tCO_2e that increases by 2% each year above inflation, which is a 'ramping' function that the government of Alberta has yet to confirm that the levy will have (Ibid, p.40). It is observable that Alberta's carbon levy alone will not produce sufficient reductions that would allow the province to meet its emissions targets. Even if the 20 $MtCO_2e$ reduced from Alberta's methane reduction program is included (Ibid, p. 65), Alberta would still be short 10 $MtCO_2e$ from its 2020 target and 21 $MtCO_2e$ short from its 2030 target.

Other modeling data provided in the *Climate Leadership Report to the Minister* suggests that Alberta's emissions targets are significantly unrealistic. This particular model assumes a price of $30/$tCO_2e$ starting in 2018 and ramps up yearly until it reaches $100/$tCO_2e$ in the year 2030. What is troubling is that this model has a ramping effect of approximately $6/$tCO_2e$ per year, which is significantly larger than a 2% increase, and still, Alberta is slated to miss their 2030 target by 12 $MtCO_2e$ (Ibid, p. 25).

3.2.2 Criteria B: Allocation of Public Resources

1B) Where are policy generated revenues being allocated to?

Alberta's carbon levy is revenue-neutral. The government of Alberta has estimated that the levy will result in a positive economic impact, increasing Alberta's GDP by 0.4% by 2020 (Government of Alberta, 2016). The government also estimates that five years after implementation, the carbon levy will generate $9.6 billion in revenues (Government of Alberta,

Carbon levy and rebates, 2016). These revenues will be re-allocated as follows: $3.4 billion will be allocated to large-scale renewable energy projects, $2.3 billion will be allocated to carbon rebates for low and middle-class households, $2.2 billion will be allocated to green transit infrastructure, $865 million will be allocated to small businesses, $645 million will be allocated to the Energy Efficiency Alberta agency, and $195 million will be allocated to a coal transition fund for coal-intensive and Indigenous communities (Ibid).

For the $2.3 billion being reallocated to low and middle-class households, Alberta has split the carbon rebates into two categories: full rebates and partial rebates, which are determined based on family size and income. Those that will be receiving a full rebate to offset the additional costs of the carbon levy are families that generate $47,500 per year or less and families with children that generate $95,000 per year or less (Ibid). Those that will be receiving a partial rebate are single individual families that earn $51,250 per year or couple families with children that earn between $100,000 and $103,000 per year (Ibid). The rebate itself is split up in the following way: in 2017, $200 for an adult, $100 for a spouse, and $30 for each child of the household (maximum rebate of $120) (Alberta Treasury Board and Minister of Finance, 2016, p. 98). In 2018, the rebates will increase to $300 for an adult, $150 for a spouse, and $45 per child (Ibid). For a family of four (two adults and two children), the maximum amount of rebate an eligible household is expected to receive in 2017 is $360 and $540 in 2018 (Ibid).

Considering the estimated additional costs that the carbon levy is said to create, those households eligible for a full-rebate will have these additional costs covered. This observation is supported by Winter and Dobson, whom through their own evaluation of Alberta's attempt at minimizing disproportional effects, found "only households in the highest income quintile are expected to incur total direct carbon-tax costs that exceed the amount of the rebate. Households

will incur additional indirect costs … but these are likely to be small relative to the direct costs. This suggests that households in the first and second income quintiles, which are most likely to receive the full rebate, will likely be made better off after accounting for both the costs of the carbon tax and the rebate. Households in the third income quintile may not be made strictly better off but they should come close to breaking even (Winter & Dobson, 2016, p. 5).” In other words, households that would be impacted most by the carbon levy are eligible for a full-rebate and more.

Alberta’s carbon levy also plans to distribute generated revenues towards energy efficiency programs, such as bioenergy, green infrastructure, innovation and technology, and renewables (Ibid, pp. 37-8). It is largely unknown what exactly these energy efficiency programs consist of and how they will reduce emissions. It is also unknown how the levy generated revenues will be used within the context of these energy efficiency programs. What is known is that by 2030, Alberta plans to add 5,000 megawatts of renewable energy (either from solar, wind or hydro), which is estimated to generate $10.5 billion in new investment and create 7,200 new jobs (Government of Alberta, Renewable Electricity Program, 2017).

The most information available is on the newly created government agency *Energy Efficiency Alberta*. Alberta’s Energy Efficiency Advisory Panel was created to advise and make recommendations to the government of Alberta with regards to Energy Efficiency Alberta. One of the recommended actions is the Residential Direct Install program, which is designed to allow consumers to have low-cost energy efficiency products, such as LED lights, smart power bars, low-flow showerheads, and smart thermostats at no cost (Alberta's Energy Efficiency Advisory Panel, 2017, p. 44). Other recommendations offered by the Panel are to provide incentives to consumers to purchase ‘top-tier’ energy efficient technologies and appliances, a solar panel

incentive program, and an incentive program for businesses to make their buildings more energy efficient (Ibid, pp. 44-5). The Residential Direct Install program has started (Alberta Ministry of Environment and Parks, Register now for no-charge energy efficiency program, 2017). The Residential and Commercial Solar Program has also started, which seeks to add 10,000 new solar panels by 2020, and by 2019, the program is expected to create 900 jobs, cut solar costs by 30%, and reduce the provinces GHGs by 500,000 tCO_2e (Alberta Ministry of Environment and Parks, Rebates to help Albertans tap solar resources, 2017).

It is too early to determine if the Alberta government has decided to redistribute levy generated funds to energy efficiency programs will be beneficial. On the one hand, it can be said that it looks promising, but on the other, it may be considered promising only because not much is known. For these allocations to be effective and efficient, the societal benefit that these programs provide needs to outweigh the social costs of implementing the levy (McKenzie, 2016, p. 10). Again, while green infrastructure and transportation, and innovation and development for renewables will no doubt have a positive societal benefit vis-à-vis lower emissions, without a detailed plan of these programs, it is difficult to say for sure what can or cannot be achieved.

It is also too early to assess whether the redistribution of levy generated revenues into efficiency programs and green infrastructure will be effective in reducing the province's emissions. There is some commentary to suggest that the $645 million allocated for Energy Efficiency Alberta may not be enough. In a report by the Pembina Institute, it was estimated that should Alberta invest heavily ($34 per capita per year) in energy efficiency programs, Alberta can create 15,000 jobs, increase its annual GDP by $3 billion, reduce annual electricity and fuel costs by 1.75%, and reduce natural gas costs by 1.25% (Becker & Hastings-Simon, 2017, p. 7). In other words, for these results to be realized, the government of Alberta would need to allocate

$144,252,900 of levy generated revenue per year towards Energy Efficiency Alberta. With the current allocation of $645 million over five years ($129,000,000 per year), the Alberta government is short $15,598,600 per year. The report goes on to state "[to] increase the effectiveness of efficiency programs, additional income sources should be considered (Ibid, p. 27)." On a positive note, the Climate Act itself restricts the use of levy generated revenues to initiatives related to reducing GHGs, climate change adaptation, minimizing disproportional impacts of low-income households, and other such tax credits or reductions (Province of Alberta, Climate Leadership Act - Chapter C-16.9, 2017, pp. 9-10).

3.2.4 Criteria C: Policy Design

1C) Is the policy simple and clear?

Before implementation, polls were displaying a relatively positive reception to Alberta adopting a climate change policy. In 2015, 50% of Albertan's were supportive of an economy-wide carbon tax, which jumped to 72% when told that revenues would be allocated to green infrastructure and community projects (Pratt, 2015). However, support dropped to 52% when told that revenues would be allocated to reduce income taxes (Ibid). Furthermore, in 2016, 67% of Albertan's now oppose the carbon levy (Wood, 2016). Another poll in 2016 found that 63% of Albertan's oppose the carbon levy, while 53% oppose Alberta's climate leadership plan (Dormer, 2016). It has been suggested by Alberta's Environment Minister Shannon Phillips that the reason Alberta's carbon levy is so unpopular is that Albertans do not have enough of an understanding of the carbon levy (CBC News, 2016). In part, Minister Phillips is not wrong. The government has implemented a half-finished carbon levy. As such, it should not be unreasonable to suggest that Albertans do not have a full understanding of the policy.

For implementation costs, while I was unable to find direct figures for the cost of Alberta's carbon levy, I was able to find figures for the Panels the government of Alberta put together for the specific reason of the carbon levy. In June of 2015, the Climate Change Advisory Panel was established by the government of Alberta to advise the government on greenhouse gas reduction policies. The cost in carrying out the panel's mandate was approximately $2.1 million (Alberta Ministry of Environment and Parks, 2015-2016 Environment and Parks Annual Report, 2016, p. 30).

Similar to the role of the Climate Change Advisory Panel, the government of Alberta established the Energy Efficiency Advisory Panel, which was asked to provide the government with recommendations for Energy Efficiency Alberta with regards to its long-term goals and objectives while taking into consideration the opinions of the public, stakeholders, NGOs, academics, municipalities and First Nations (Alberta's Energy Efficiency Advisory Panel, 2017, p. 14). The Ministry of Environment and Parks did not provide a cost figure for the Energy Efficiency Advisory Panel, but they did provide the cost of their entire provincial energy efficient plan, which is priced at approximately $7.4 million (Alberta Ministry of Environment and Parks, 2015-2016 Environment and Parks Annual Report, 2016, p. 36).

The government of Alberta has also created two other such advisory groups, though neither group has completed their mandate yet. One is the Climate Technology Task Force, which focuses on innovations and technologies that can contribute to a global low carbon economy and provide recommendations on specific outcomes (Government of Alberta, Climate Technology Task Force, 2017). The other is called the Oil Sands Advisory Group, which is mandated to consider how to implement the 100 $MtCO_2e$ per year limit for the oil sands industry and provide advice to government on investing carbon price revenue in innovations that reduce

future emissions intensity (Government of Alberta, Oil Sands Advisory Group, 2017). Presumably, these two advisory panels will increase the implementation time and costs of the carbon levy. Although for how much and how long is uncertain. The exact costs involved with the creation of these two advisory panels are still uncertain.

Alberta's carbon levy is more complex than that of BC. Not only is the levy not yet finished in its entirety, but it also is not politically acceptable, and implementation costs can be seen to reasonably exceed $9.5 million. Additionally, should large emitters become subject to an ETS, it will no doubt increase the complexity of the carbon levy. Overall, the clear and simplicity component of the evaluative framework is not compelling.

2C) How rigorous is the policy; is the policy evaluated regularly, and is the policy transparent?

In evaluating Alberta's carbon levy for transparency, BC's tax can serve as a useful proxy. BC's carbon tax can be considered transparent because the Minister of Finance is mandated to review the carbon tax every year and evaluate it every three years. In examining Alberta's Climate Leadership Act, it seems that the legislation gives the Minister of Environment and Parks the responsibility to collect information and evaluate the carbon levy (Province of Alberta, Climate Leadership Act - Chapter C-16.9, 2017, p. 56). However, it is not clear whether the Alberta Minister is held to the same accountability standard as the BC's Minister of Finance (Government of British Columbia, Carbon Tax Act, 2008).

It should be expected that progress reports would continue to be provided by the Minister of Environment and Parks in their annual report as is currently done, however, this should not be taken as consolation. I am not suggesting that Alberta's carbon levy will not be regularly evaluated, I am pointing out the difference between the two regimes. Without regular evaluation how is the government supposed to know how the levy is performing against their targets and

whether alternative measures should be taken. "[Performance] measurement … entails a management regime that requires a public organization to have a clear idea of what its objectives are, and a regular means of reporting on its success in achieving on those objectives. … Performance measurement should be viewed as … [trying] to link results with strategic planning an budgeting and resource allocation (Pal, 2009, p. 301)."

The Climate Change Leadership Panel recommends that the Alberta government undertake periodic reviews of its climate change policies, whereby policies can be evaluated and adjusted according to the province's goals and objectives (Leach, Adams, Cairns, Coady, & Lambert, 2015, p. 30). As of yet, there is no indication to suggest that the government of Alberta has adopted this recommendation. Although, in examining *Alberta's Climate Act: Chapter C-16.9*, it seems to give power to the Lieutenant Governor in Council to expand or contract the scope of the carbon levy (Province of Alberta, Climate Leadership Act - Chapter C-16.9, 2017, p. 59). However, it is not explicitly stated that the scope could be altered according to the performance of the levy. Similar recommendations were made by the Energy Efficiency Alberta Advisory Panel with regards to Energy Efficiency Alberta. Such recommendations entail clear reporting, approval, and evaluation procedures; third-party evaluators; transparency; accountability; access of data and information; track outcomes against performance targets; and set up a formal process to assess and report on all performance targets and indicators (Alberta's Energy Efficiency Advisory Panel, 2017, p. 36).

On to rigorousness, facilities that emit more than 50,000 tCO_2e under the SGER standard must report their emissions (Government of Alberta, Alberta Greenhouse Gas Reporting Program 2013 Facility Emissions, 2016, p. 9). Such facilities include conventional and non-conventional oil and oil sands operations, coal mining, natural gas generation, and electricity

generation, to name a few (Ibid, p. 10). For mandatory reporting facilities, their data is then checked and confirmed by Environment and Climate Change Canada and the Alberta Climate Change Office (Ibid). For facilities that emit less than 50,000 tCO_2e per year, emissions' reporting is voluntary (Ibid, p. 11). Under the Climate Change Emissions and Management Act, incorrect reporting by those facilities where reporting is mandatory can result in a fine of up to $500,000 (Province of Alberta, Climate Change and Emissions Management Act - Specified Gas Emitters Regulation - Alberta Regulation 139/2007, 2007, p. 28). Although GHG reporting for SGER facilities is made available for public scrutiny, reporting is three years behind. The documents themselves are detailed. Emissions reported is broken down by sector, emission type, the source of combustion, as well as, comparing current reporting data with the previous years and baseline year data.

3.3 Ontario's Cap and Trade System

3.3.1 Criteria A: Policy Effectiveness:

1A) What is the scope (coverage of carbon) of the policy? Are there any exemptions? If so, what are the extent of the exemptions?

Ontario's C&T system divides participants into three categories: mandatory, voluntary, and market participants. Mandatory participants are facilities and natural gas distributors that emit 25,000 tCO_2e eq per year, fuel suppliers that sell more than 200 litres of fuel per year, and electricity importers (Ministry of the Environment & Climate Change, Cap and trade: program overview, 2016). Voluntary participants are those facilities that emit between 10,000 tCO_2e eq and 24,999 tCO_2e eq per year (Ibid). These facilities may opt into Ontario's C&T program and will be treated as if they were mandatory participants (Ibid). Regardless of their emissions output, electricity generators whose emissions are covered upstream and natural gas distributors are illegible to be voluntary participants (Ministry of the Environment & Climate Change, Cap and trade: register as a voluntary participant, 2016). Lastly, market participants are companies, organizations, and individuals with no emissions to report, and no compliance obligation, but may choose to participate in emission credit auctions (Ministry of the Environment & Climate Change, Cap and trade: program overview, 2016).

At the end of each compliance period, mandatory participants, and voluntary participants that opt in to Ontario's C&T system must have enough emissions allowances, offset credits, or early reduction credits equivalent to their total tCO_2e eq throughout the compliance period (Ibid). For the first compliance period (January 1, 2017 to December 31, 2020), the government of Ontario has awarded the majority of large emitters with free emissions allowances although the amount of allowances allocated is set to decrease each year (Ibid).

In 2017, Ontario's total GHG emissions are predicted to be 172.5 Mt/CO_2e (Saxe, Cap and Trade, 2016, p. 65). According to the Ministry of the Environment and Climate Change, Ontario's C&T program will have a scope of 82% of Ontario's GHG emissions (Ibid). GHG emitters, such as electricity importers, gas-fired generators, natural gas distributors, and other distributors of fuels, which make up 100 Mt/CO_2e of Ontario's emissions will be forced to have their emissions covered by emission allowances (Ibid). Large industrial emitters, which comprise of 40 Mt/CO_2e of Ontario's emissions will have their emissions provided for them free of charge for the 2017-2020 compliance period (Ibid, p. 66). The number of free allowances allocated to large emitters will decrease 4.57% each year (Ibid, p. 68). The remaining 31Mt/CO_2e that is attributed to primarily by the agricultural, waste management, and forestry sectors, they will not be required to have their direct emissions covered for the first compliance period (Ibid, p. 66). Nonetheless, their indirect emissions, those produced by their suppliers of petroleum products, natural gas, and electricity, will need to be covered via emissions allowances (Ibid).

Ultimately, free allowances allocated to large emitters are done to maintain economic competitiveness and minimize carbon leakage (Ibid). The trade-off is that free allowances undermine the financial incentive for large emitters to switch to alternatives, reduce the amount of money the government is eligible to collect and decrease the effectiveness of the C&T system itself (Ibid). When given a restricted scope, a carbon tax or a C&T system will be less effective than if the policies operated with a larger scope (Beugin, Dion, Elgie, Olewiler, & Ragan, 2017, p. 13). The wider the scope that a carbon price is applicable too, the more effective that price is at encouraging or incentivizing investment in alternatives, and in turn, reducing emissions. According to the ECO, no sufficient evidence currently exists to justify the blanket allocation of free allowances to all EITE (Emission-Intensive and Trade-Exposed) emitters (Saxe, Cap and

Trade, 2016, p. 68). Not providing free allowances to large emitters can be equally as problematic as if they were. In their report, Sawyer et al. state that even with large emitters having their emission allowances covered free of charge, Ontario is still expected to experience a decrease in exports, which is indicative of carbon leakage (Sawyer, Peters, & Stiebert, 2016, p. 6). The drop is considered to be minimal, but there still exists a real risk of investment leaving Ontario in favour of other jurisdictions (Ibid, p. 7).

The availability of early reduction credits seems to pose a scoping issue. Early reduction credits allow for emitters to earn emission allowances for emissions already reduced between 2012 and 2016 (Ministry of the Environment & Climate Change, Cap and trade: program overview, 2016). It is said that up to two million credits (2 Mt/CO_2e) would be issued (Ibid). The scoping problem in question is that not only can these credits be used towards future compliance periods, but according to the Auditor General, Ontario's emission cap does not take these credits into account (Lysyk, 2016, p. 173). This means that whatever the cap is set at, there is a possibility that two million additional credits may be available in the secondary market. Notably, large emitters will be able to use 8% of their early reduction credits, earned offset credits, or a combination of the two towards covering their emissions for any compliance period (Ibid, p. 172).

The most concerning aspect of Ontario's C&T system is the allocation of free allowances for large emitters. The implications are that 40 Mt/CO_2e, or 23% of Ontario's 2017 emissions, will not be accounted for; not to mention the direct emissions from the agricultural, waste management, and forestry sectors. Modeling data and the literature both agree that carbon leakage can have major competitiveness consequences. Conversely, should effectiveness be the primary objective, there is a particular balance between carbon leakage and carbon reduction.

Perhaps then, the most important question is whether a blanket exemption is advantageous for the effectiveness of Ontario's C&T system.

2A) How does the carbon price influence the cost of direct uses of carbon and to what extent are carbon reductions being undertaken?

The reserve price per carbon allowance for Ontario's first auction held on March 22, 2017 was $18.07 (Ministry of the Environment and Climate Change, 2017). The reserve price is the minimum bid that an auction participant can make for one emission allowance (Ibid). Each year until 2020 the reserve price is set to increase by 5% plus inflation (Lysyk, 2016, p. 159). This means that by 2020, the cost of carbon in Ontario would approximately be $20 /$CO_2$e, and $30 /$CO_2$e by 2028. The total number of allowances that are made available for purchase in Ontario is equal to the forecasted emissions for that year by covered emitters minus 4% (Ibid).

Just like a carbon tax, a C&T system's ability to induce carbon reductions are equal to the cost of reducing one unit of CO_2e in relation to the cost of carbon, which in this case is $18.07 /$CO_2$e. However, this is only the auction price. The trading price in the secondary market can either be higher or lower than the auction price. Therefore, the degree that carbon reductions would be undertaken is equivalent to that new carbon price.

It is suggested that Ontario's C&T system's influence on increased energy costs will be 'marginal' (Sawyer, Peters, & Stiebert, 2016, p. 8). For households, Ontario's C&T system will increase direct costs of carbon by $13 per month or $156 per year in 2017 (Ibid, p. 9). In 2019, direct costs of carbon for households are expected to be approximately $210 a year, plus an additional $75 per year for indirect costs of carbon (Lysyk, 2016, p. 169). The additional rise in indirect costs of carbon is estimated to be 0.02%, which translates to a decrease in household

incomes of approximately 0.04% in 2020 (Sawyer, Peters, & Stiebert, 2016, p. 8). According to the ECO (Environmental Commissioner of Ontario), the implementation of Ontario's C&T system could result in the increase of household heating bills by an average of $5 per month and household gasoline prices by 4.3 ¢/ litre (Saxe, Cap and Trade, 2016, p. 77). The ECO notes that the additional direct and indirect costs of carbon "are likely too small to lead to a major shift towards lower carbon lifestyles (Ibid)."

With a linked and supported C&T system as Ontario has (linked with Quebec and California, and EITE industries have been given free emissions allowances), its impact on the economy and the additional costs of carbon is small (The Institute for Competitiveness & Prosperity, 2016, p. 30). It can be noted that if Ontario adopted an unlinked C&T system, a carbon price of $157/t$CO_2$e would have been required for Ontario to achieve its emissions reduction targets (Ministry of the Environment & Climate Change, How Cap and Trade Works, 2016). Such a reality would have raised households' carbon costs by $107 per month (Ibid). Additionally, according to EnviroEconomics, Ontario's C&T program is not expected to have a significant impact on Ontario's GDP. Without C&T, Ontario's GDP between 2015 and 2020 is projected to grow by 11%; while with C&T Ontario's economy is expected to be 10.97% (Ministry of the Environment & Climate Change, How Cap and Trade Works, 2016). According to the Institute of Competitiveness and Prosperity, in a BAU scenario, Ontario's economy is projected to grow by 2.08% per year; while in a C&T scenario, it will only grow by 1.9 and 2.05% (The Institute for Competitiveness & Prosperity, 2016, p. 30).

It is agreed that the price of carbon in Ontario is too low to produce carbon reductions in any substantial way (Lysyk, 2016, p. 167). Ontario's C&T system "does not establish a price for GHG emissions that would incentivize a transition to a decarbonized economy (Wilson &

Grochalova, 2016, p. 2).” The CELA (Canadian Environmental Law Association) recommends a floor price of carbon of \$50/tCO_2e; however, other models have suggested that a carbon price of \$100/tCO_2e still may not be sufficient for Ontario to meet its emissions reductions targets (Ibid, p. 3).

3A) Is the policy on-track to achieving its own carbon reduction target, and is the policy on-track to achieving its respective province’s carbon reduction target?

The government of Ontario has set the following GHG reduction targets: 15% below 1990 (182 Mt/CO_2e) levels by 2020, 37% below 1990 levels by 2030, and 80% below 1990 levels by 2050 (Ministry of the Environment & Climate Change, Cap and trade: program overview, 2016). In 2017, Ontario’s total GHG emissions are predicted to be 172.5 Mt (Saxe, Cap and Trade, 2016, p. 65).

In their working paper, the Institute for Competitiveness and Prosperity assumes a carbon price of \$23.12/tCO_2e for a linked C&T system in 2021 (The Institute for Competitiveness & Prosperity, 2016, p. 26). In a BAU scenario, Ontario’s emissions are expected to increase to 177Mt/CO_2e in 2020 and 183 Mt/CO_2e in 2030 (Ibid, p. 28). In the linked and support scenario, it is estimated that carbon leakage would be minimal and Ontario’s emissions will be reduced by 61Mt/CO_2e (Ibid, p. 29). Conversely, in a linked system with no support, emission reductions are estimated to be higher at 64Mt/CO_2e, in which 37.5% of this will be attributable to carbon leakage (Ibid). It should be noted that a linked C&T system with no support to EITE emitters will have significantly more force at coercing behaviour change towards fossil fuel alternatives (Ibid, p. 32). However, a linked and supported system is still expecting to cause some behaviour change, but it is estimated to be “not very significant (Ibid).”

The ECO came to a similar conclusion by suggesting that Ontario's C&T system alone is only projected to reduce emissions by 2.8 Mt/CO_2e, which in the report is considered as "optimistic" (Saxe, Cap and Trade, 2016, p. 77). The report goes on to state there is no "credible evidence that the Action Plan will produce as many emission reductions as the government claims, or as quickly as it predicts. Even if the Action Plan were highly successful, a large gap would remain between Ontario's predicted emissions for 2020, and the 2020 target (Ibid, p. 78)."

For the first compliance period (from 2017 to 2020), the cap of Ontario's C&T system is set to decrease 4% each. Although the ECO considers this cap decline to be "aggressive," for Ontario to achieve its 2030 emissions target, a minimum annual cap reduction of 4% is required (Ibid). Despite this, it is still suggested by the ECO that in a linked C&T system, Ontario is unlikely to meet its 2020 emissions reduction targets (Ibid, p. 71). The Auditor General has even suggested that Ontario's emissions reductions from their C&T program would be minimal, estimating that Ontario's emissions target would be missed by approximately 15 Mt/CO_2e (Lysyk, 2016, pp. 167-168). It is estimated that Ontario's C&T program will only be responsible for approximately 3.8 Mt/CO_2e (Ibid, p. 168). As previously mentioned, the auction generated revenues that are to be allocated towards GHG reduction programs are currently forecasted not to generate the 10Mt/CO_2e in reductions that were initially estimated (Ibid, p. 174). Even if these reductions were achieved, this would still leave Ontario 5Mt/CO_2e short of its 2020 target.

It is evident that Ontario is likely to miss its 2020 emissions reduction targets, however, the solution to close the emissions gap may be tricky. The cap decline rate is already considered as aggressive, although it is suggested that it may need to increase. It is equally as suggestive that should Ontario's scope widen prematurely by stopping the allocation of free emission allowances, there could be significant competitiveness and economic ramifications. By 2030 it is

estimated that if large emitters are not given free allowances, Ontario's GDP will decrease by 2.6% (a value of $18 billion) (The Institute for Competitiveness & Prosperity, 2016, p. 30).

3.3.2 Criteria B: Allocation of Public Resources:

1B) Where are policy generated revenues being allocated to?

Through the auctioning of emission allowances, Ontario's C&T system is expected to generate approximately $478 million in 2016-17 and $1.8-1.9 billion annually for the remainder of the compliance period (January 1, 2017 to December 31, 2020) (Ministry of the Environment & Climate Change, How Cap and Trade Works, 2016). As part of Ontario's Climate Change Mitigation and Low-carbon Economy Act, all generated revenues from Ontario's C&T program are deposited into the Greenhouse Gas Reduction Account. The GGRA's funding is estimated to range from $5.96 billion to $8.3 billion (Ministry of the Environment & Climate Change, How Cap and Trade Works, 2016). The Fund is solely intended to provide money for projects and initiatives aimed at reducing GHG emissions, such as retrofit programs, solar energy systems, battery storage, and building insulation (Ibid).

As for where the money is going, according to the Auditor General, the Government of Ontario has a plan to allocate C&T revenues to 34 different projects aimed at further reducing GHG emissions. These projects range from reducing energy bills to planting 50 million trees. Here it should be noted that the government of Ontario does not put revenues towards minimizing disproportional effects for low-income individuals, nor does it allocate revenues to reduce carbon leakage. The latter is achieved through free permits.

According to the Auditor General of Ontario, the estimated $8 billion of C&T generated revenue that is reinvested to reduce Ontario's emissions further is unlikely to sufficiently close the emissions gap to allow Ontario to meet its 2020 emissions reduction target (Lysyk, 2016, p. 174). For example, between 2017 and 2020, the Ministry of the Environment and Climate Change is planning to spend $1.32 billion to offset the additional costs of electricity bills caused by the C&T program (Ibid). While the Ministry claims this subsidy will result in a 3Mt/CO_2e reduction since it is intended to incentivize individuals to switch to alternatives, the Auditor General's report suggests that such an effect is unlikely considering that the subsidy will only decrease electricity costs by 2% (Ibid). Other such projects have also been highlighted by the Auditor General for similar issues (Ibid, p. 175). Most notably are the revenues allocated to zero-emission homes and electric vehicles. The Auditor General points out that emission reduction programs that utilize subsides are reliant on the assumption that the subsidy itself will be enough to incentivize individuals to make expensive upgrades to their homes and cars (Ibid, p. 176). However, such expensive upgrades would likely only be undertaken by individuals that could afford the upgrade regardless of the subsidy and not by those who rely on the subsidy for the upgrade (Ibid). Sawyer et al. suggest that such programs can help to minimize disproportional effects (Sawyer, Peters, & Stiebert, 2016, p. 8); however, disproportional effects would only be minimized for those individuals that can afford to take advantage of the subsidies. The Institute for Competitiveness and Prosperity also supports the use of C&T revenue towards subsides for zero-emission homes and cars, but the Institute makes it clear that the subsidy needs to be such that it will incentive consumers (The Institute for Competitiveness & Prosperity, 2016, p. 37) with regards to

the subsidy itself, as well as, the required infrastructure (Ibid, p. 38). For example, it is reasonable to suggest that charging stations, or the lack thereof, is a large determining factor in purchasing an electric vehicle. Similar concerns are also raised by the Canadian Environmental Law Association, which suggests that low-income people who are most disproportionally affected by a price on carbon and can benefit most from a lower carbon cost, are not the individuals engaging in these investments (Canadian Environmental Law Association, 2016, p. 2). The ECO has an analogous position, in that energy efficient subsides for low-income households do not necessarily reduce GHG emissions (Saxe, Spending the Money Well, 2016, p. 94). Moreover, the manner in which the Minister evaluates revenue spending cannot be advantageous for low-income individuals since low-income individuals do not emit the most carbon and therefore, this means of revenue allocation cannot meet the cost-effectiveness criterion or the GHG reduction criterion (this criterion is laid out in the section below) (Ibid).

The government of Ontario is also allocating $325 million to the Green Investment Fund, which is to act identical to the GGRA. A breakdown of the $325 million is as follows: $100 million will be invested in partnership with Enbridge Gas Distribution and Union Gas (Ontario Ministry of Energy, 2016). This will help 37,000 homeowners conduct energy audits (Ibid). $20 million from the GIF will be allocated to build a network of public fast-charging electric vehicle stations within cities (Office of the Premier, 2015). $92 million will be allocated into social housing energy retrofits, which over a 20-year period will reduce GHG emissions by approximately 3,600 tonnes (Ontario Ministry of Municipal Affairs, 2016). $74 million will be allocated to cleantech innovation, and it will encourage large emitters to invest and adopt cleaner technologies,

thereby reducing GHG emissions (Ontario Office of the Premier, 2016). Lastly, $13 million will be allocated to First Nations communities to help them towards the shift away from diesel power (Ministry of Indigenous Relations & Reconciliation, 2016).

Ontario's allocation of C&T revenues needs to be considered suspect at best. Large emitters are not discussed in this section because instead of allocating revenue to minimize carbon leakage, the province has instead opted to allocate free emissions credits or allowances. As for minimizing disproportional effects, there is no clear allocation of revenues towards minimizing disproportional impacts. The province has instead allocated revenues towards subsides for household retrofits, electric cars, and reducing electricity bills. While these initiatives can lend themselves easily to minimizing disproportional effects, the reductions these programs will bring will be minimal. Overall, the effectiveness of these types of subsidy programs has come under scrutiny since they are only beneficial to those that can afford to take advantage of them. Lastly, it is clear that the province of Ontario is relying on C&T revenues in an attempt to close the emissions gap between their emissions reduction targets and the actual reductions that are to be had by the C&T system itself. However, the current consensus suggests that the province will not close this gap.

3.3.3 Criteria C: Policy Design:

1C) Is the policy simple and clear?

While not much polling data exists regarding Ontario's C&T system, what does exist runs parallel to the polling data already shown in this paper. In one poll, it was found that approximately 56% of voters did not approve Ontario's C&T system because monthly electricity rates would increase (Bozinoff, 2016, p. 3). In another study done by Nanos Research, they

found that approximately 61% voters opposed Ontario's C&T system (Nanos Research, 2017, p. 5). When asked if whether Ontario's C&T system would be effective at reducing GHG emissions, there seems to be a split, in which 45% of voters responded 'no' and 39% responded 'yes' (Ibid, p. 7). Lastly, approximately 45% of voters stated that they would be less likely to support a party if that party intends to pursue a C&T system (Ibid, p. 9). Interestingly, this number climbs to 58% should the party pursue a tax aimed at gasoline and heating fuels (Ibid).

In my opinion, there does not seem to be enough data to show whether the voting public of Ontario dislikes Ontario's C&T for the system itself or because the nature of economic mechanisms aimed at reducing GHG emissions through raising the price of direct costs of carbon. In a recent study published by Angus Reid, it was found that rising electricity costs are indeed a big reason for Ontario's Premier Kathleen Wynne's poor approval rating (The Angus Reid Institute, Politics Electrified: Three-in-four Ontarians say their hydro bills are 'unreasonable'; think they'll rise further, 2017). While this is outside of the scope, it does point to why there is a correlation between disapproval of Ontario's C&T system and increased energy prices.

As for the implementation costs of Ontario's C&T system, it is not exactly clear. In the Ministry of the Environment and Climate Change 2015/2016 annual report, the Ministry allocated $191,868,000 to Environmental Protection projects in 2015 (Ballard, 2015). Unfortunately, this was the most relevant figure available that would shed some light on the cost of implementation of Ontario's C&T system.

Gaming the system was not discussed for carbon taxes, but for C&T systems it can be a serious concern. There are many ways to game a C&T system. One such way is through false emissions reporting. In Ontario's case, large emitters may find it lucrative to try to falsify their

emissions in an attempt to get greater allowances for free (Chan, 2010, p. 3). The same can be said for firms that find themselves in non-compliance, in which they may try to falsify their reported emissions to avoid penalties. To prevent false emissions reporting, all mandatory and voluntary participants within Ontario's C&T system must report their GHG emissions every year (Ministry of the Environment & Climate Change, Report greenhouse gas (GHG) emissions, 2016). A third party verifies all emissions reports, whereby either the Standards Council of Canada (SCC) and the American National Standards Institute (ANSI) ensures that any errors or miscalculations in emissions are fewer than 5% and to ensure that errors in production data are fewer than 0.1% (Ibid). Verifiers must submit Compromised Impartiality Assessment forms for each entity that is reviewed. A mitigation plan should also be submitted if there is a conflict of interest between the verifier and the entity.

Offset credits are another potential avenue for system gaming. This involves participants falsifying all types of documentation to obtain offset credits (Chan, 2010, p. 6). Offset credits allow entities that are covered under Ontario's C&T system to earn additional credits should entities undertake projects that reduce GHGs that are not already covered under the C&T system (Ministry of the Environment & Climate Change, Cap and trade: offset credits and protocols, 2016). If earned, entities would be able to use these offset credits towards their compliance obligations (Ibid). The incentive of offset credits is that it allows entities to meet their compliance obligations at a lower cost than through reducing their emissions, auctions, or trading (Ibid). Examples of projects that would earn offset credits are tree planting, manure management projects to capture and destroy methane gas, and upgrading to industrial cooling systems that use refrigerants that have little to no impact on global warming (Ibid). The problem with offset credits as made clear by the Auditor General is that in some instances it is difficult to measure

and verify the amount of emissions reduced by these projects (Lysyk, 2016, p. 172). Currently, there is no regulation governing the creation and use of offset credits, although a proposed regulation has been created by the Ministry of the Environment and Climate Change. If approved as is, the proposed offset regulation would enable the Ministry of the Environment and Climate Change to establish a public online Offsets Registry that will contain information regarding the project operator and the offset project (The Ministry of the Environment and Climate Change, 2017, p. 7). Offset credits would be awarded by the Ontario Offset Registrar and will be individually numbered and tracked by the CITSS (Ibid). For my purposes, before an offset credit(s) is awarded, all offset related documents, and physical sites must be verified by a third party. The Verification Report is prepared by an ISO 14065 accredited organization and a member of the International Accreditation Forum (Ibid, p. 18). In addition to reviewing documents, in order for an offset credit to be considered for approval, verifiers must visit offset project sites at least once (Ibid, p. 19). Notably, *carbon bribery* may be a future concern (Chan, 2010, p. 4).

The allocation, auction, and trading of emission allowances or credits is recorded by the Western Climate Initiative and the Compliance Instrument Tracking System Service (CITSS) (Ministry of the Environment & Climate Change, Cap and trade: auction of allowances, 2017). All participating members, whether they are mandatory, voluntary, or market participants, must register in the CITSS (Ibid). Without registration, participants cannot participate in Ontario's C&T system (Ibid). Lastly, should emitters be in non-compliance, significant financial penalties will be laid. If emitters are short of allowances at the end of a compliance period, they will be required to submit an additional three allowances for every allowance they are short, which can also be converted to a debt owed to the government (Saxe, Cap and Trade, 2016, p. 75).

2C) How rigorous is the policy; is the policy evaluated regularly, and is the policy transparent?

The section above concerning gaming answers many of the questions regarding rigorousness and measurement. As such, this section will primarily focus on transparency and evaluation of Ontario's C&T policy, particularly regarding the *Climate Change Mitigation and Low-Carbon Economy Act*.

At least once a year, the Minister of the Environment and Climate Change must report the status of the actions set out in Ontario's climate change action plan (The Ministry of the Environment and Climate Change, 2016, p. 8). The Minister must then put the report before the General Assembly and make it publicly accessible (Ibid). In one's opinion, the report should include a comprehensive plan if Ontario's reduction targets seem unattainable in the initial timeframe. Such a comprehensive review should include a review of strengthening the floor price of carbon allowances, lowering future allowance caps, and a more aggressive use of GGRA funds. The Minister is also able to alter the number of allowances made available. In the Act, the Minster may only alter allowances with respect to the provinces greenhouse gas reduction targets (Ibid, p. 22). Although, it has been recommended by the Canadian Environmental Law Association that having 'reduction targets' as the only criterion for the number of allowances is not sufficient (Wilson & Grochalova, 2016, p. 4). In their view, a stringent cap to bring emissions reductions not only has to include GHG targets, but must also include the number of carbon offsets available, the number of early reduction credits made available, and should take into consideration the amount of allowances made available in other jurisdictions (Ibid, p. 5).

Perhaps not surprisingly, the Act also restricts government spending from the Greenhouse Gas Reduction Account. Money in the account can only be used to fund projects that are reasonably likely to reduce GHG emissions, as well as, cover any Crown incurred costs in

connection with the administration of the Act (The Ministry of the Environment and Climate Change, 2016, p. 51). Furthermore, in order for the Minister to allocate funds from the Account into an initiative, the Minister must evaluate the initiative against the following criteria: A) the programs potential and ability to reduce GHG emissions; B) how will the program contribute to achieving Ontario's GHG reduction targets; C) the program's relationship to other initiatives; D) the programs relationship to the Climate Change Action Plan; E) whether the program will assist low-income households and vulnerable communities transition to a low-carbon economy; and F) other matters as the Minister considers appropriate (Saxe, Spending the Money Well, 2016, p. 93). Once the Minister completes this evaluation, he must then put it to the Treasury Board (The Ministry of the Environment and Climate Change, 2016, p. 51).

The Climate Change Mitigation and Low-carbon Economy Act requires that the GGRA must undergo annual reporting, whereby in-flows and out-flows and the respective descriptions are kept track of (Ministry of the Environment & Climate Change, Draft Cap and Trade Program Design, 2016). It also ensures that GGRA funds are spent in a manner as to result in reasonable GHG reductions (Ibid). According to the ECO, the Minister may allocate GGRA funds towards future projects and expenditures, however, like current initiatives, they must meet the criterion listed above (Saxe, Spending the Money Well, 2016, p. 95). While it is possible for the Minister to allocate GGRA funds outside of the criteria's scope, the ECO suggests that doing so will cause the Ontario government to subject itself to political and legal ramifications (Ibid, p. 91). Most importantly, every year, the Minister needs to make these evaluations available for public access (The Ministry of the Environment and Climate Change, 2016, p. 51).

Since revenue reallocation is such an integral component of Ontario's C&T system, accordingly to the ECO, there could be an improvement in transparency. As per the ECO, by the

Minister only publicising an annual report every year of the Accounts spending, it damages the integrity and effectiveness of Ontario's C&T program and leaves open the possibility that funds could be allocated to initiatives other than what they were intended for (Saxe, Spending the Money Well, 2016, p. 93). To create further transparency in these annual reports, the ECO suggests that all initiatives, even the ones that were not funded, should be included (Ibid, p. 94). Lastly, as for the descriptions of the projects that are funded, the ECO suggests that a description that is vague and brief is the opposite of ensuring transparency (Ibid). The CELA agrees with the ECO such that in order to ensure transparency and that funds are allocated towards GHG reducing initiatives, the Account should be entirely separate from Ontario's budget, but additionally, Account funds should be allocated only in a 'direct' manner into GHG reducing initiatives (Wilson & Grochalova, 2016, pp. 10-11). In this way, C&T revenues are allocated in such a way as to further reduce Ontario's GHG emissions, and it also ensures that revenues are allocated to reach Ontario's reduction targets more efficiently. The CELA also suggests that in these annual reports, justifications should be included as to why funds were allocated to a particular project and as to why funds were not allocated to other tabled proposals (Ibid, p. 13). Lastly, the CELA suggests that the Minister should publish a detailed plan for any funds remaining for the current year (Ibid). Again, the idea is to hold the Minister accountable for the Province's spending and to ensure that Account funds get allocated to their intended purpose, which is reducing GHG emissions.

As for free allowances that are allocated to large emitters, 24 months after allocation, the Minister needs to make public a list of emitters who received these allowances, as well as, the number of allowances they received (The Ministry of the Environment and Climate Change, 2016, p. 22). The Minister must also make the plan to phase out free emission allowances

available to the pubic (Ibid, p. 23). The ECO stipulates that while free allowances are reported, 24-months after the fact is limited, late, and not conducive of public trust (Saxe, Cap and Trade, 2016, p. 77). A 24-month disclosure rate would lend itself to suggest that the earliest the public would know which emitters received free allowances would be 2019.

It should be noted that Environmental Commissioner of Ontario is an independent officer of the Ontario Legislative Assembly that was created under the Environmental Bill of Rights (Lysyk, 2016, p. 202). As per the EBR, the ECO is responsible to annually report on the progress of the activities taken in Ontario with respect to reducing GHG emissions (Ibid).

3.4 Quebec's Cap and Trade System:

3.4.1 Criteria A: Policy Effectiveness

1A) What is the scope (coverage of carbon) of the policy? Are there any exemptions? If so, what are the extent of the exemptions?

Quebec's C&T system encompasses all emitters whose annual emissions exceed 25,000tCO_2e (Government of Quebec, Quebec's Cap-and-Trade System for Greenhouse Gas Emission Allowances: Technical Overview, 2014, p. 7). This equates to 80 facilities, which make up approximately 85% of Quebec's CO_2 emissions (Ibid). Facilities that distribute or import fossil fuels into Quebec will also be covered under the C&T system (Quebec Ministry of Sustainable Development & Environment and Parks, 2012, p. 21). Like Ontario's system, for individuals, organizations, or emitters that emit less than 25,000tCO_2e per year, although they are not covered by the system, they can participate in the carbon market (Government of Quebec, A Brief Look at the Quebec Cap-and-Trade System for Emission Allowances, 2016, p. 1). At the end of each compliance period, emitters must have enough credits acquired to cover the number of emissions they have emitted. These credits can be acquired through auctions, the secondary market, the acquisition of offset credits, or early reduction credits.

For industrial emitters exposed to foreign competition, the Quebec government will be allocating most of their emissions allowances free of charge to prevent carbon leakage (Ibid, p. 2). The number of allowances allocated decreases approximately 1% to 2% each year to encourage GHG reductions (Ibid). Electricity producers and fossil fuel distributors are not eligible to receive their emissions allowances free of charge (Ibid). Quebec's rationale is that exposed industries may be less successful at recouping their compliance costs through raising their prices since they are more susceptible to competitors, and in turn, more vulnerable to carbon leakage (Government of Quebec, Strengths and Advantages of Quebec's Cap-and-Trade

System, 2016, p. 6). On the other hand, electricity and fossil fuel distributors can pass their compliance costs downstream onto their consumers (Ibid). Notably, the allocation of emission allowances is not a blanketed approach, they are calculated on a case-by-case basis and are determined by actual annual production and profit levels should a voluntary decrease in production occur (Ibid, p. 8). The following industries are eligible for free emissions allowances: aluminium, lime, cement, chemical and petrochemical industry, metallurgy, mining and pelletizing, pulp and paper, petroleum refining, glass containers, electrodes, gypsum products, and certain agri-food establishments (Government of Quebec, Quebec's Cap-and-Trade System - Technical overview, 2014, p. 8). When free allowances are allocated, the Minister issues a notice in the *Québec Official Gazette* stating the number of allowances distributed and the names of the recipients (Ibid). This notice is then posted online and made accessible to the public. The only discrepancy is that it is unknown how many allowances each facility is given.

The industries in question which are eligible for free allowances are mostly from industrial processes and industrial combustion: oil refineries (2.48 $MtCO_2e$), pulp and paper (1.27 $MtCO_2e$), chemicals (1.19 $MtCO_2e$), ferrous metal (3.14 $MtCO_2e$), cement and lime plants (2.9 $MtCO_2e$), non-ferrous metals (0.55 $MtCO_2e$), and aluminum production (5.3 $MtCO_2e$) (Government of Quebec, Quebec Greenhouse Gas Emissions Inventory in 2014 and Their Evolution Since 1990, 2016, pp. 21-22). The entire industrial sector in Quebec is responsible for approximately 26 $MtCO_2e$ (Ibid, p. 21). In 2013, the ministry distributed 18,952,508 emission allowances (18.95 $MtCO_2e$) to 55 emitters in Quebec (Quebec Ministry of Sustainable Development Environment and Fighting Climate Change, 2013, p. 1). In 2014, the Ministry distributed 18,664,613 (18.66 $MtCO_2e$) to 52 emitters (Quebec Ministry of Sustainable Development Environment and Fighting Climate Change, 2014, p. 1). Lastly, in 2015, the

Ministry distributed 18,827,658 (18.82 $MtCO_2e$) emissions allowances to 53 emitters (Quebec Ministry of Sustainable Development, Environment and Fighting Climate Change, 2015, p. 1). These allowance figures suggest that over 70% of Quebec's industrial sector is eligible for free allowances. Regarding Quebec as a whole, free emission allowances are being allocated to approximately 23% of Quebec's emissions, meaning that the current scope of Quebec's C&T system is approximately 77%.

2A) How does the carbon price influence the cost of direct uses of carbon and to what extent are carbon reductions being undertaken?

Quebec's C&T system linked up with California's C&T system under the Western Climate Initiative on January 1st, 2014 (Government of Quebec, Quebec's Cap-and-Trade System for Greenhouse Gas Emission Allowances: Technical Overview, 2014, p. 5). Like Ontario's, the power of Quebec's C&T system comes from its allowances. Every year, the number of emission permits or credits made available for purchase decreases. This acts as a constant incentive for regulated emitters to reduce their emissions, adopt more energy efficient processes, and shift towards renewable energy or low-carbon alternatives (Government of Quebec, 2016, p. 2).

For auctions held in Quebec, the floor price on carbon was set in 2012 at \$10/tCO_2e, which is to increase 5% plus inflation each year until 2020 (Government of Quebec, Quebec's Cap-and-Trade System for Greenhouse Gas Emission Allowances: Technical Overview, 2014, p. 8). The current floor price for emission allowances in Quebec auctions is \$11.39 (Government of Quebec, Strengths and Advantages of Quebec's Cap-and-Trade System, 2016, p. 6). As for joint-auctions between Quebec, California, and soon to be Ontario, the floor price for emission allowances is currently \$13.56, which increases 5% each year plus inflation (Government of

Quebec, Historical Overview of Quebec's Cap-and-Trade System and WCI's Regional Carbon Market, 2016, p. 7). It should be noted that the price of emission allowances at joint-auctions are set in USD, which means that Canadian allowance prices are subject to currency fluctuations.

The extent to which emission reductions would be undertaken correlates to the floor price of carbon. For Quebec auctions, this is $11.39, while for joint-auctions it is $18.82 (floor price of May 16, 2017 auctions). It should be noted that a Quebec-only auction has not been held since August of 2014. However, for a few reasons which I will discuss below, there has been some volatility in the Quebec market, both regarding allowance prices and allowances sold.

It is estimated that Quebec's C&T system will affect Quebec's economy in a very similar way as it is projected to affect California's (Purdon, Houle, & Lachapelle, 2014, p. 34). That is, a reduction of BAU GDP by 2020 at an average of 0.34%, and a range of between +0.15% to -1.40% (Ibid). For Quebec to reduce its emissions by 14.4 - 18.3 million tCO_2e, it would cost Quebec between $694-1,030 million (Ibid, p. 36). However, because Quebec's C&T is linked with California's, Quebec is estimated to save between $387-532 million (Ibid). In turn, this also means that the impact on the direct cost of carbon also decreases. It is also estimated that between 14.4-18.3 million of excess allowances produced in California will be purchased by Quebec emitters (Ibid). This decreases the incentive for firms to switch to alternatives, but overall it dilutes the ability for price signals to be meaningful. Since California has a surplus of emission allowances, it is considered a real possibility that instead of Quebec firms reducing their GHG emissions, they can buy their credits from California instead. Not only does this decrease the effectiveness of Quebec's C&T system, but it also compromises the CCAP (Climate Change Action Plan) 2020, which relies on auction revenues.

In a study done by Barrington-Leigh et al. two different scenarios were assumed: one where cost pass-through was limited and one where cost pass-through was not limited. For the average individual living in Quebec, 83% of their direct emissions come from the use of gasoline (Barrington-Leigh, Tucker, & Lara, 2014, p. 28). Overall, households emit approximately 15.7 tCO_2e of direct emissions annually (Ibid, p. 23) and 10.6 tCO_2e of indirect emissions (Ibid, p. 29). In the scenario with limited cost pass-through, it was found that "direct fuel consumption for heating and transport by households is closely related to income (Ibid, p. 31)." This relationship is considered to be more regressive for the second scenario assuming full cost pass-through (Ibid, p. 32).

The extent that Quebec's C&T system is likely to affect the price of gasoline is minimal (Ibid). Carbon prices of \$25/tCO_2e and \$48.20/tCO_2e are only expected to raise gasoline prices by \$0.05 and \$0.10 per litre, respectively (Ibid). Assuming a price of carbon at the ceiling price, the average spending on gasoline is only expected to decrease by \$42.40 annually (Ibid, p. 34). These changes are characterized as "moderate (Ibid)." Also, it is stated that "incentives to reduce gasoline use will need to come from elsewhere (Ibid)." It is estimated that for Quebec to meet its 2020 emissions reductions targets, it would cost the average Quebec resident \$255 annually (Ibid, p. 18). The Auditor General of Quebec shares similar comments. In the Spring 2016 Audit gas prices have only increased \$0.04 as a result of Quebec's C&T system, which the Auditor General unquestionably describes as a "weak price signal (Auditor General of Québec, Observations of the Sustainable Development Commissioner, Mr. Jean Cinq-Mars, 2016, p. 9)." The Auditor General goes on to suggest that if the price signal remains weak, and does not become more aggressive, Quebec's emission reduction targets will remain an ambitious venture (Ibid, p. 10). Although not particularly relevant in this section, the Auditor General does state

that the allocation of free emission allowances is hindering behavioural change (Ibid). The Pembina Institute agrees that Quebec's C&T system lacks cohesive power: "Quebec [needs] to be more ambitious in setting its price floors because … \$15/tCO_2e in 2013 and escalating to \$25.77/tCO_2e in 2020 is relatively low [in relation to] … what will be needed to achieve meaningful change in the Quebec (Horne & Partington, Recommendations for Quebec's draft cap-and-trade regulations, 2011, p. 4)".

Throughout all the auctions that were held either by Quebec, or joint-auctions, the average selling price has always been higher than the minimum price of emission allowances for that year. Despite this, credits have not sold as anticipated. At the latest joint-auction in May 2017, 100% of allowances sold where the floor price was \$18.51, with the average sale price of allowances was \$19.74. However, it would seem that a sell-out is an anomaly when compared to the past allowance sales. In November, August, and May auctions the ratio of emission allowances provided versus sold were 88%, 35%, and 11%, respectively. After that, November 2015, August 2015, and May 2015 auctions all performed well with selling percentages of 100%, 95%, and 85% respectively.

In a C&T system it is difficult to point to one variable as the sole cause for inconsistent auction results, and indeed as should be expected, in this case, there are many. It has been noted by the ECO that because California's credits greatly outnumber Ontario's credits (Quebec having even less than Ontario) that not only will California have a cumulative surplus of unneeded allowances, but because California is less stringent and has a slower cap decline rate, it becomes a real possibility that Quebec firms can purchase some of their credits from California instead of Quebec (Saxe, Cap and Trade, 2016, pp. 71-72). Other issues that can cause market and auction inconsistency are due to California's legal troubles: "There are legal doubts about whether the

California program will survive its litigation and legislative challenges long enough to reach the next decade. This legal uncertainty has contributed, in part, to suppress the selling price of allowances (Ibid, p. 72)." Inconsistent auctions could also be a ploy by some emitters gambling by not purchasing emission credits during the auction and hoping to buy them on the secondary market at a lower cost (Blinch, 2016). According to Dave Sawyer of EnviroEconomics, inconsistency in auctions could also be a sign that the C&T system is working and reductions are being achieved quicker than expected, meaning fewer allowances are necessary (Ibid). Other commentators have also cited an oversupply of emissions credits, legal uncertainty, and long compliance periods as the reasons for auction inconsistency (Busch, 2017).

The incentive behind an economy based instrument is that the price on carbon creates a price signal that influences individuals to invest in lower carbon alternatives. This process is incentivized further by reallocating generated revenues towards these alternatives, thereby making it more advantageous for individuals to switch to the alternative. Although extensive data does not yet exist for the relationship between Quebec's C&T system and the effect it has on direct uses of carbon, the data does exist suggests that the price put on carbon is currently too low for significant behaviour change. In other words, the price is not yet such that it would incentivize individuals to switch to alternatives.

3A) Is the policy on-track to achieving its own carbon reduction target, and is the policy on-track to achieving its respective province's carbon reduction target?

Quebec's emissions reduction goals are 20% below 1990 levels by 2020 (71MtCO_2e) and 37.5% below 1990 levels by 2030 (55 MtCO_2e) (Ministry of Sustainable Development, Environment & the Fight Against Climate Change, 2017). According to the Quebec government, the former target should be achieved by the CCAP and the C&T system (Ibid). As for the latter target, there are no concrete actions in place to achieve this target besides "the urgent need to act

(Ibid).” According to Quebec’s Normal Course of Business (NCB) or BAU, Quebec’s 2020 GHG emissions should be 84.4MtCO_2e (Quebec Ministry of Sustainable Development & Environment and Parks, 2012, p. 47). For Quebec to achieve its GHG reduction target of 20% below 1990 levels, Quebec’s NCB is required to drop by approximately 17MtCO_2e (Ibid). Notably, Quebec’s NCB is re-evaluated yearly to enable the Quebec government to better understand what changes are required to reduce their GHG emissions accordingly (Ibid). As of March 31st, 2015, from 2013-2014, Quebec’s GHG emissions have dropped by 0.92 MtCO_2e (The Ministry of Sustainable Development, Environment and the Fight against Climate Change, 2017, p. 3). The majority of these reductions came from the energy and transportation sectors (Ibid).

To date, several programs invested in through the Green Fund have reduced Quebec’s GHG emissions by 0.2MtCO_2e annually (Ibid, p. 12). Examples of these initiatives include an increase in fuel-efficient vehicles, green fleets, and an increase in energy efficient buildings both commercial and residential (Ibid). By 2020, 2 MtCO_2e are expected to be reduced annually through these projects (Ibid). The government of Quebec notes that while investment in some programs may not immediately reduce many GHG emissions, the government is anticipating that the new technologies and innovations, which are created through these programs and the possible behaviour change that comes with it to eventually reduce emissions (Ibid). It is estimated that by 2020, should all of Quebec’s CCAP programs be implemented, Quebec’s GHG emissions would be reduced by 6MtCO_2e (The Ministry of Sustainable Development, Environment and the Fight against Climate Change, 2017, p. 9). Even if we consider the 2MtCO_2e as additional emission reductions, Quebec is still 11MtCO_2e short of its 2020 target.

Between 2010 and 2014, industrial emissions have been "stable" at approximately 25MtCO_2e (Government of Quebec, Quebec Greenhouse Gas Emissions Inventory in 2014 and Their Evolution Since 1990, 2016, p. 16). While emissions have dropped an average of 2.5% each year for the transportation sector after implementation, as of 2014, transportation emissions were reported to be 33.67MtCO_2e (Ibid). Decreases in emissions have also been found in the heating of buildings, both commercial and residential (Ibid, p. 13). However, the province of Quebec has experienced a "stable" overall level of emissions at 82 MtCO_2e (Ibid, p. 16). Although emissions have not increased, they have not decreased either since the implementation of Quebec's C&T system.

Quebec's C&T was established in 2012, but perhaps the "stability" of the province's emissions can be attributed to only industrial and electricity sectors being covered for the first compliance period. It was not until 2015 where fossil fuel distributors were covered by the C&T system (Ibid). It should stand to suggest that with a tighter scope, 2015 emissions should be reduced. However, it is too early to say since the most recent emissions report is for 2014. According to Clean Energy Canada, it is still too early to determine the effectiveness of Quebec's C&T system (Clean Energy Canada, 2015, p. 26). It is also estimated that Quebec's CCAP will only account for approximately half of the emissions required for Quebec to meet its 2020 targets (Ibid, p. 24). As was mentioned in earlier sections, at the current price of carbon in Quebec, significant behaviour changes will not occur. Even at the ceiling price of carbon, behaviour change is still estimated to be minimal.

3.4.2 Criteria B: Allocation of Public Resources

1B) Where are policy generated revenues being allocated to?

In 2006 the Green Fund was created to promote sustainable development in Québec (Government of Quebec, Green Fund, 2017). All C&T auction revenues are put into the Green Fund, which are then used to carry out the initiatives and programs outlined in Quebec's 2013-2020 Climate Change Action Plan (Ibid). Revenues allocated to Quebec's Climate Change Action Plan center around reducing GHG emissions, mitigating economic and social pitfalls that stem from these reductions, and increased public awareness and adaptation of climate change and global warming (Government of Quebec, Green Fund - Management Framework, 2016, p. 7). During the 2015-2016 fiscal year, $996.7 million was put into the Green Fund (The Ministry of Sustainable Development, Environment and the Fight against Climate Change, 2017, p. 7). It is estimated that by 2020, $3.3 billion is to be put into the Green Fund and invested into the implementation of 30 priorities and over 150 actions to reduce GHG emissions in Quebec (Ibid, p. 11). Since the majority of Quebec's emissions come from the transportation sector, two-thirds of the Green Fund will be allocated to reducing GHG emissions from this sector (Quebec Ministry of Sustainable Development & Environment and Parks, 2012, p. 22). Such programs include improving public transportation and increasing efficiency and innovation in all modes of transportation (Ibid). Quebec has also allocated $140 million to public transportation in a bid to increase ridership and decrease GHG emissions. The government will be implementing a complementary light-duty vehicle inspection and maintenance program, which although as of yet has not, has the capacity to be expanded to other classes of vehicles, such that vehicles over eight years old are required to complete an environmental compliance inspection when ownership changes (Ibid, p. 24). Other such programs involve providing individuals with up to $8,000 in subsidies to incentivize them to purchase electric vehicles (Government of Quebec, Transport Electrification Action Plan, 2011). A $5,000 subsidy is also available for the installation of

charging stations, either for personal or business use (Government of Quebec, Transport Electrification Action Plan, 2011). For subsidies like this, it is important to keep in mind the comments made by the ECO, which are that these types of subsidies only benefit those individuals that have the means to purchase an electric vehicle in the first place.

Quebec will also be allocating Green Fund money to technological development and innovation. Quebec has offered financial support to firms that engage in R&D that centers around new technologies that have the potential to significantly reduce GHG emissions (Quebec Ministry of Sustainable Development & Environment and Parks, 2012, p. 13). Quebec will also be providing financial assistance to businesses that are willing to equip their facilities with new low-carbon technologies (Ibid). While these particular projects are not expected to reduce GHG emissions significantly, according to the Green Fund Accounts report, $4.4 million has been allocated to these types of projects (Government of Quebec, Green Fund - Management Framework, 2016, p. 15).

One stark omission from Quebec's CCAP is the notion of disproportional impacts. From the programs offered by CCAP and funded through the Green Fund, it would seem that while Quebec is not addressing disproportional impacts directly, they may be doing so indirectly. One program that Quebec is focusing on is "consciousness-raising," that is, the implementation of educational institutions that will create awareness and hopefully initiatives that will reduce GHG emissions (Quebec Ministry of Sustainable Development & Environment and Parks, 2012, p. 16). It would seem that Quebec is relying on the enhancement of energy performance in both buildings and vehicles, which in turn will make these two sectors "less vulnerable to higher energy prices (Ibid, p. 18)." Ultimately, Quebec's position seems to be that "taxpayers will benefit through lower costs stemming from efficiency gains (Ibid)." According to the Green

Fund Accounts report, there are several programs allocated to energy efficiency. The Fund allocates close to $80 million cumulatively to these types of programs, which are estimated to reduce GHG emissions by 1.36 $MtCO_2e$ by 2020 (Government of Quebec, Green Fund - Management Framework, 2016, p. 13).

Another program that would benefit individuals through efficiency gains is Quebec's program aimed at providing funds to replace all heating systems within all existing buildings that still use light fuel oil (Quebec Ministry of Sustainable Development & Environment and Parks, 2012, p. 18). For residents within Quebec that still use light fuel oil to heat their homes, the government will financially support these residents who wish to convert their fossil fuel heating systems to systems that rely on geothermal, hydroelectric, wind or solar power (Quebec Ministry of Sustainable Development & Environment and Parks, 2012, p. 29). A similar subsidy program will be offered to commercial buildings for the same conversion (Ibid). Also, for the construction of new buildings, it will be mandatory that their heating systems be either geothermal, solar power, wind power, or hydroelectric (Ibid, p. 18).

It is usually agreed upon that one main avenue in which C&T or tax revenues are allocated to is investing in alternative, greener, or less carbon-intensive forms of energy. However, because 97% of Quebec's energy comes primarily from renewable energy, Green Fund revenues are allocated towards the transportation, industry, and building sectors (Ibid, p. 44). Additionally, it should not be ignored that Quebec's plan to reduce its GHG emissions are reliant on the revenues collected from its C&T auctions (Quebec Ministry of Sustainable Development & Environment and Parks, 2012, p. 43). CCAP 2020 only considers program allocations if all allowances are sold at the floor price. As such, there is a possibility that funds allocated to programs would be less than initially expected. On the other hand, there is also a

possibility for surplus revenues to be made available for re-investment (Ibid). However, it is noted in the CCAP that any additional funds will be allocated towards the attainment of CCAP objectives (Ibid).

Lastly, large emitters are not mentioned in this section because Quebec has decided to address carbon leakage through allocating free emissions credits instead of C&T revenues.

3.4.3 Criteria C: Policy Design

1C) Is the policy simple and clear?

Regarding gaming prevention, the Quebec system requires that mandatory and voluntary emitters register to participate in the C&T system. Registering ensures that allowances that are being purchased or traded are indeed going to the participant in question (Auditor General of Québec, Carbon Market: Description and Issues, 2016, p. 25). It is also used to determine the risk of non-compliant behaviour by each participant (Ibid). Once registered, all transactions, whether they are from the auctions or in the secondary market, are kept track of by the WCI's centralized registration system (the CITSS) (Ibid, p. 26). Although this does not eliminate the possibility of fraud, it does limit its application (Ibid).

To reduce market manipulation, there is a limit as to how many credits any one participant can purchase at auction (Ibid). For mandatory participants, one entity cannot purchase more than 25% of the total amount of allowances available for sale for that year (Ibid). Entities are also limited by the number of allowances they can possess at any one time (Ibid). Should this limit be exceeded, the Minister has the authority to confiscate allowances (Ibid). To limit collusion during auctions, bidders are not permitted to disclose their involvement in the auction and any entity with privileged information is not permitted to bid on allowances (Ibid, p. 27). To prevent over-allocation of credits into the market, the Minister may take unsold credits out of

circulation and put them back into circulation when the selling price for allowances climbs above the minimum auction price (Benoit & Côté, 2015, p. 57). To prevent non-compliance (emitters not purchasing enough credits for the amount of emissions they released during the compliance period), in addition to a possible fine, the Minister can suspend any allocation of allowances to the emitter in question (International Carbon Action Partnership, 2017, p. 5). The emitter must also remit the total amount of credits missing plus three additional credits for each missing credit (Ibid).

For projects that are eligible for offset credits, to receive these credits, facilities must be verified and reports validated in compliance with ISO standards (Government of Quebec, Strengths and Advantages of Quebec's Cap-and-Trade System, 2016, p. 7). Additionally, to avoid double-counting the offset credits, whether used or sold, must stay within the jurisdiction that awarded them (Ibid). Should there be any illegitimacy issues, the emitter which was awarded the offset is responsible for each illegitimate credit (Ibid).

An offset credit registry is provided online and can be accessed publicly. The registry provides the name of the operation, its location, description, the amount of emissions credits the operator is expected to receive (or the amount of credits the project is expected to generate), and whether the allowances were issued or not (The Ministry of Sustainable Development, Environment and the Fight against Climate Change, 2017). Lastly, any relevant documents are also made available for the projects in question (Ibid). If it is found that reductions did not occur, the project proponent must replace the same amount of offset credits it received (Government of Quebec, Quebec's Cap-and-Trade System - Technical overview, 2014, p. 10).

With regards to public opinion, many commentators suggest that the reason Quebec was the pioneering province for C&T in Canada is due to positive public opinion: “In contrast [to] …

much of North America, climate policy has never been a controversial political issue in Québec. Public opinion polls have … demonstrated that Quebecers accept climate science, prefer taking action now, [and] are more concerned about the impacts of climate change (Purdon, Houle, & Lachapelle, 2014, p. 40).” Additionally: “Quebecers know and understand that human activity causes global warming; therefore, caring about climate disruption is a political winner in the province (Clean Energy Canada, 2015, p. 8).” Polling data seems to represent this. For example, “The strongest levels of climate change belief exist in … BC, Quebec [and], Nova Scotia (Mildenberger, et al., 2016, p. 7).” Also, “places that are more significantly contributing to climate change show lower beliefs that humans are the cause (Ibid).” These places would include Alberta and Saskatchewan (Ibid). While I have not been able to find public opinion polls solely for Quebec, national polling data paints Quebec as a pro-climate change province. In an Angus Reid poll, 81% of Quebecers were supportive of a national C&T system, in which the split falls to 68% for a national carbon tax and 32% against it (The Angus Reid Institute, Most Canadians support carbon pricing; but less consensus on effectiveness of such measures, 2015, pp. 2-3). In a Nanos survey, it was found that 65% of Quebecers are willing to pay more if it means meeting environmental commitments (CTV News / Nanos, 2015, p. 4). Additionally, 75% of Quebecers believe that climate change is a threat and that the science behind it cannot be denied (Ibid, pp. 6-7). Except for British Columbia, the other provinces examined in this paper, public perception towards climate change and market mechanisms has not been great. However, as can be seen in Quebec, public opinion is undeniably positive. One reason for this is that public opinion towards climate change in Quebec has always been favourable (Purdon, Houle, & Lachapelle, 2014, p. 40). Another reason is that opposition from the fossil fuel industry in Quebec has been limited (Ibid, p. 41).

For cost implementation, it is largely unclear how much money the Quebec government allocated to the implementation of its C&T system. No figures that would shed light on the cost of implementation were found. What is known is that in 2005 the Quebec Minister of the Environment commissioned a report to understand the feasibility of a C&T program.

2C) How rigorous is the policy; is the policy evaluated regularly, and is the policy transparent?

In Quebec, it is the responsibility of the Ministry of Sustainable Development, Environment and Climate Change to collect emissions data and measure Quebec's GHG emissions through the province's GHG inventory. It is the responsibilities of facilities and businesses that emit 10,000tCO_2e or more annually to report their emissions every year before June 1st (Government of Quebec, Greenhouse Gas Emissions Registry, 2017). For emitters that emit 25,000tCO_2e or more per year, third-party verification is required (Government of Quebec, Quebec's Cap-and-Trade System - Technical overview, 2014, p. 12). Yearly emissions reports are made available to the public, in which the most recent emissions report is from 2014.

Each year, The Minister of Sustainable Development, Environment and the Fight Against Climate Change must publish a report on the implementation of CCAP 2020 (Quebec Ministry of Sustainable Development & Environment and Parks, 2012, p. 41). This report is meant to record the progress of each program that is slated to be implemented, as well as, the progress of each program that has already been implemented (Ibid). Every three years the Minister releases a general evaluation report (Ibid). These reports are meant to monitor CCAP 2020 outcomes, with one of the highlights of the report being that there will be a section that will show the discrepancies between anticipated and actual results (Ibid, p. 42). Furthermore, CCAP 2020 will be evaluated at its midpoint to ensure that the funds allocated to the particular projects have been effective in creating results relative to the results that were anticipated (Ibid). Every year, *the*

Ministry of Sustainable Development, the Environment and Climate Change, must also release annual reports which present the progress of the Ministry's objectives for that year (Government of Quebec, Green Fund - Management Framework, 2016, p. 19). The plan must include how much Green Fund money was used for the Ministry's objectives, which projects received Fund money and how much, and the results of each Ministry project (Ibid). Lastly, the Minister must disclose how much money was put into the Green Fund for that year (Ibid).

The Green Fund itself undergoes periodic monitoring, which ensures that programs that were given money are kept track of (Government of Quebec, Green Fund - Management Framework, 2016, p. 17). Not only does this provide more transparency when programs undergo overall assessments, but it allows for corrective actions to be taken, when necessary (Ibid). When Green Fund programs are evaluated, the results of the program are compared against its benefits and goals (Ibid). Ultimately, recommendations are made as to whether the program should be renewed, altered, or stopped altogether (Ibid). Additionally, the government has a website completely dedicated to its C&T program, where one can view the CCAP, the progress of CCAP programs, auction results, offset credits, Quebec's GHG inventory, the Green Fund, and all projects that are funded by Green Fund money.

Chapter 4: Recommendations and Conclusions:

4.1 British Columbia:

1. **The price of carbon needs to be raised \$10/tCO_2e per year until the price on carbon hits a minimum of \$100/tCO_2e**

In the BC case study, it was pointed out that BC will not meet its 2020 emissions reduction targets. It was recommended that an expanded scope and a higher price of carbon are required. Regarding the former, BC's scope is already considered as one that is very lean with few exemptions. However, for the latter, there is a clear correlation between emissions reductions and the 'ramping' of the tax. In BC, emissions levels are such that when ramping stops, emissions rise, but when ramping starts, emissions drop. For BC to maintain emission reductions, it would also need to maintain this 'ramping' effect as to incentivize further behavioural shifts. BC's Climate Leadership Team has made it clear that CO_2e reductions in BC have stalled. In agreeing with the Leadership Team, BC's carbon tax needs to be more aggressive if BC is to achieve its GHG reduction targets. An aggressive \$10 per year increase to the price of carbon until it reaches \$100/tCO_2e has been suggested for BC. Modeling data has suggested that if implemented, the carbon tax will enable BC to achieve its 2050 GHG emissions reduction targets.

2. **A portion of generated revenues need to be allocated to renewable technologies and incentive programs**

Another big point of contention for BC's carbon tax is how tax generated revenues are allocated. Currently, the tax is revenue-neutral, which means that whatever money the tax collects is redistributed back to the public, either in the form of a rebate or different subsidies.

While the redistribution aspect of BC's tax that covers disproportional effects can stay as is, the revenues that are allocated to other social programs can be reallocated to green technological development and behavioural incentive programs. Currently, the way that revenues are allocated, they are not producing further emissions reductions. By reallocating funds towards renewable development and incentive programs, further emissions reductions can be achieved. Just as the Minister is mandated to provide a revenue-neutral carbon tax, the Minister can be equally mandated to ensure that whatever funds are not used towards reducing disproportional impacts goes towards clean energy, retrofits, and incentive programs; or in other words, methods that would seek to reduce emissions further.

4.2 Alberta:

1. **The province of Alberta needs to significantly expand the carbon levy's scope.**

Overall, making recommendations for Alberta's carbon levy may prove to be difficult, primarily because the levy is not completed. However, Alberta's carbon levy needs a less lenient scope. Since SGER emitters make up approximately half of the province's emissions, any exemption given to SGER emissions is detrimental to the levy's scope. While the fate of the SGER standard is not entirely known, that is, whether SGER facilities will be amalgamated under the carbon levy or covered via an ETS, the province must be careful in the way they exempt SGER emitters should they decide to do so. For Alberta to maintain a proper scope, one that is comparable with BC's, SGER emitters must be responsible for at least 60% of their emissions. This means that at most SGER emitters can only be given a maximum exemption on 40% of their emissions. Ultimately, the province's scope plays a big role in determining whether the policy will result in emissions reductions. While concerns about competitiveness are a huge factor in determining a policy's scope, having a scope that is too lenient undermines the entire

purpose of the levy. A small scope not only limits the amount of emissions to be reduced, but it limits the emitters that have to pay for their emissions, as well as, limits the ability of the levy to incentivize behaviour change. Lastly, it also limits the amount of revenues the province can collect, which in turn also limits the amount of money the province can invest into renewables and other similar programs.

I suspect that exemptions will be a large point of contention for Alberta's carbon levy. Should this be the case, the province needs to adopt a reporting program analogous to that of Quebec. That is, the number of exemptions should be made available to the public. However, I think this is just the start. Again, in the event the exemptions make up a large portion of the levy's scope, as they currently do, the Minister needs to make how much of an exemption each firm or facility is being given available and must be able to justify these exemptions (this is expanded on in the Ontario recommendations).

2. **The province of Alberta needs to increase the price put on carbon to at least $100/tCO_2e$**

Not surprisingly, a large point of contention for Alberta's levy is the price put on carbon. In the *Climate Leadership Report to the Minister*, the estimates for how many emissions the levy is expected to reduce is calculated using a carbon price of $\$30/tCO_2e$ that increases 2% each year above inflation. As is mentioned in the case study, at this price, the province will miss its emissions reduction targets. The reductions made at $\$30/tCO_2e$ would be marginal, wherein behavioural change and investing in alternatives would not occur in any substantial way. What's more, it is largely uncertain whether the province will indeed increase the carbon price by 2% each year. In the same report, it is also shown that should the province increase the carbon price

to $100/tCO$_2$e; the possibility still exists that Alberta will miss its long-term emissions reduction goals. However, the emissions gap between Alberta's target and actual emissions reduced will be much narrower than if the price stayed at $30/tCO$_2$e.

3. **The Advisory Panels that the province has created should be mandated to have reporting and evaluative functions**

In creating their carbon levy, the province of Alberta created four advisory panels: the *Climate Change Leadership Panel*, the *Energy Efficiency Alberta Advisory Panel*, the *Climate Technology Task Force*, and the *Oil Sands Advisory Group*. As mentioned in the case study, the latter two panels have yet to complete their respective mandate. However, the former two panels have each recommended that the province undertake significant reporting and evaluative functions to improve the effectiveness of the province's levy. Instead of the government undertaking these functions, I think an easier solution would be to have the panels themselves carry out the reporting and evaluative function of Alberta's carbon levy. The panels would effectively be performing the same task that they have been performing, which is to evaluate the policy and recommend what needs to be done should the province wish to achieve its reduction goals. On the same note, revenues generated and spent should also be reported. Such reporting should include what projects are being invested in, how much money is being invested, what the benefits are of the program, and how the program will enable the province to achieve its reduction goals and objections. Additionally, it should also include projects that were not invested in and why. Of course, reporting and evaluating should be done on a regular basis and reports must be made available to the public. Lastly, recommendations should be cross-referenced with actual actions to determine whether the government did act on those recommendations or not. Overall, not only does extensive reporting and evaluating help the

province achieve its goals and objectives in the most effective manner possible, but it also adds transparency and legitimacy to the policy. It is a way to ensure that the province is using the policy for its intended purpose – reducing emissions.

4. **SGER emitters should not be covered via ETS but rather should be amalgamated as part of the carbon levy**

While it is uncertain whether SGER facilities will indeed be covered via an ETS, the possibility remains open. Ontario's and Quebec's C&T systems are complex, more so than BC's and Alberta's carbon tax. Furthermore, their systems rely on a centralized body to keep track of credits (auction, secondary, early reduction, and or offset). This is not to mention the administrative and enforcement burden the provinces still have the responsibility of undertaking. For SGER emitters to be covered via an ETS and for the remainder of the province to be covered via a carbon tax, it adds complexity that is not required to achieve the same goal. Effectively, Alberta would need a centralized body to record emissions, hold auctions, keep track of credits and trading, ensure that credits are submitted before compliance periods expire, prevent gaming of the system, and punish noncompliance. The point being, on top of all these requirements, the province would need to balance credit allocation and floor prices against carbon leakage and emission reduction goals. Of course, this is just a simple outline of some of the things required in an ETS. However, the point to be made is just how complex an ETS can be. As I will point out in the Quebec recommendations, Quebec has four years of experience with their C&T system, and they are still having complexity issues.

4.3 Ontario:

1. **The province of Ontario needs to expand the scope of its C&T system**

In the case study, it is shown that for the first compliance period, Ontario has given full exemptions to large emitters and the agricultural sector. It is uncertain whether these exemptions will carry over to the second compliance period. However, this recommendation assumes that they the exemptions will carry over. Both Sawyer et al. and the Institute for Competitiveness and Prosperity both argue that Ontario's GDP will suffer (carbon leakage) should large emitters not be given free allowances (Sawyer, Peters, & Stiebert, 2016, p. 6), (The Institute for Competitiveness & Prosperity, 2016, p. 30). On the other hand, the ECO argues that there is no evidence to suggest that carbon leakage will occur without free allowances (Saxe, Cap and Trade, 2016, p. 68). Regardless Ontario's current scope is currently approximately 60%, whereas a respectable scope is 80%.

A potential solution to widen Ontario's scope and decrease free allocation of credits is for the Minister to adopt a similar criterion to that of revenue allocation. Such a criterion can include: A) how does the C&T adversely impact the facility? B) is the impact such that carbon leakage is likely? C) is the impact adverse in comparison to similar facilities? D) what are the possible effects should credits not be allocated? E) how do allocating credits help Ontario regarding GDP and achieving its carbon reduction goals? Such a criterion, or a derivative or it, can help the Minister in allocating credits to those facilities that are severely vulnerable and in turn, are more likely susceptible to carbon leakage. Additionally, facilities will receive credits according to need rather than just handing out credits. By minimizing carbon leakage instead of a blanketed allocation, Ontario's scope would likely improve since fewer credits would be allocated. Additionally, the Minister should be releasing which facility was granted free allowances, how many, and why with relation to the criterion. On top of the other benefits of an

expanded scope that I have already mentioned above, by making this information publicly accessible, it increases the legitimacy and transparency of the policy.

2. **The price put on carbon needs to increase to a minimum of $100/tCO$_2$e**

Currently, the price put on carbon in Ontario is such that shifts to alternatives and behaviour changes will be minimal. At the current rate, Ontario's price on carbon will not reach $30/tCO$_2$e until 2028. The ECO has suggested that current estimates for the amount emissions that Ontario's C&T system will reduce are likely inflated. In the best case scenario, Ontario is still expected to miss its 2020 reduction target by 10Mt/CO$_2$e. It is recommended that to get shifts to alternatives and behaviour changes that will result in significant reductions in GHG emissions, a floor price on carbon of $100/tCO$_2$ is required.

3. **The cap decline rate needs to be increased beyond 4%, as well cap availability require further considerations**

Currently, Ontario's emissions cap is determined by the estimated amount of emissions to be emitted for that particular year minus 4%. The only other consideration that can determine the cap is whether the emissions cap falls in line with the provinces reduction targets. Instead, as recommended by the CELA, a much more effective cap would not only include the province's reduction targets, but the amount of free allowances, early reduction credits, offset credits and must take into account the amount of credits available by jurisdictions that Ontario's C&T system is linked too. By putting these restrictions and considerations into forming a cap, the amount of allowances available become fewer and in turn, creates further downward pressure on participants to reduce their emissions. Particularly, the latter consideration is crucial, as it is mentioned in both the Ontario and Quebec case study, California has so many credits available,

commentators have suggested that it is a real possibility that both Ontario and Quebec firms in need of credits will just purchase them from California instead of reducing their emissions.

As mentioned above, the cap plays a crucial role in inhibiting emissions reductions. What that means is that should Ontario want to achieve its reduction goals, it has been recommended that Ontario will have to adopt a more aggressive cap decline rate. Currently, Ontario's cap decline rate is 4%, which is concerned as aggressive, is not however enough for Ontario to meet its reduction targets. Therefore a greater decline rate is required.

4. **Incentive programs need to such that society can benefit from them as a whole and not solely high-income individuals who can afford to capitalize on the incentive**

In commenting on Ontario's C&T system, the Auditor General made it clear that the way Ontario seeks to use its incentive programs is flawed. By having programs that would only be capitalized on by those that could afford them, such as expensive retrofits, the incentive program's appeal is not only limited, but the effect it will have towards reducing GHG emissions will be limited as well. Greater access to efficient public transportation or greater access to energy efficient technologies that more individuals can capitalize on and not just high-income earners will increase the effectiveness of these programs because they can be used by more individuals.

Also, because Ontario's C&T system relies so heavily on the redistribution of generated revenues, increased transparency is required. Particularly, the ECO suggests that an annual report outlining where money is allocated to is not conducive to transparency. Instead, an annual report should include where money is being allocated too, the justification behind it (the criterion that the Minister uses in deciding what gets funded), what projects were not funded, and why were

they not funded (again using the criterion). This is needed to promote transparency, but also to make the spending of revenues more in line with the province's underlined goals.

4.4 Quebec:

1. Quebec's scope of its C&T system can be tightened further

The word 'can' is used in this recommendation because even if Quebec does not adjust their scope, they are left with a scope of 77%. The manner in which Quebec allocates free allowances is something that should be aspired to, especially by Alberta and Ontario. Instead of a blanketed allocation of allowances, they are determined by a case-by-case basis, and there are clear requirements, such as exposure to foreign competition and the inability to pass additional costs downstream to consumers. The way they can expand their scope is through the decline rate of their free allowances. While Ontario's decline rate is over 4%, Quebec's is only 1-2% each year. By increasing the decline rate, Quebec would effectively be allocating fewer allowances over a shorter period, and in turn, expanding their scope at a faster rate.

Additionally, although the Minister already publishes the amount of free allowances allocated in the Quebec Gazette, the Minister should go a couple of steps further by adding the amount of allowances each emitter was given and explain why emitter were given that amount.

2. The price of carbon in Quebec needs to increase to a minimum of $\$50/tCO_2e$

Currently, the price of carbon in Quebec is approximately $\$18/tCO_2e$, however, this is not a function of the policy itself but more due to a struggling Canadian dollar. Regardless, since Quebec's C&T system started, emissions have remained "stable," The Auditor General of Quebec has made it clear that the current price of carbon was not high enough to allow Quebec to reach its reduction targets, nor was it enough to result in significant behaviour change. Although the Auditor General does not specifically recommend a higher price, it is clear that one

is needed. While it is unclear what the new price of carbon needs to be, a good starting point would need to be \$50/tCO_2e. Although, there are speculations as to whether a carbon price of \$50/tCO_2e will be sufficient.

3. The province of Quebec needs to create Advisory Panels

The reason for such a recommendation is due to the auction inconsistencies and the lack of information regarding the reason for them. Of the many commentators I cite in the case study about the inconsistency of auctions, each one cites a different reason for it. For this reason, I think it is important for the province to establish an advisory panel to understand the different indicators that can influence the performance of Quebec's C&T system. Inconsistent auctions are problematic because if the province does not know why the auctions are inconsistent, the province does not know how it should proceed. Simply, there are many reasons why a C&T auction can be inconsistent, and one reason could be that the C&T system is working. However, there are many other reasons as well, such as too many allowances available, too long compliance periods, early reductions or offset credits could be influencing auctions, Quebec firms could be purchasing allowances from other jurisdictions, or the carbon price is causing inconsistencies. There could be more reasons still. If the province of Quebec is unsure why the C&T system is operating the way that it is, how can the province be expected to alter the system in such a way as to ensure that their objectives are being met.

Conclusion:

The landscape of Canadian climate change policy at the subnational level is divided, on one side, two provinces have implemented carbon taxes, and on the other, two provinces have implemented cap and trade systems. Of all four systems, it is clear that neither towers above the rest as a clear example to follow. Starting with the latter, this evaluation has made it clear that because both Ontario's and Quebec's systems are complex, there is a real impetus for extensive government reporting and evaluation of every respect of the system. That is, emissions reports, free allowance allocation, offset allocation, early reduction allocation, auction results, revenue collection and redistribution, and an overall system evaluation. In addition to this, not only must all this information be made publicly accessible, but in some instances, there needs and should be clear justifications for decision makings, such as the allocation of credits, and the redistribution of revenues. The justification aspect of the cap and trade system is particularly important because it forces decision-makers to justify actions such as free allowances or revenue reallocation that affects the system as a whole. The justification of revenue allocation ensures that money is not going to places that would not secure further emission reductions, and the justification of emissions allowances adds legitimacy to the system by not putting the burden only on downstream emitters, but also on large upstream emitters. More than that, the justification of allowance allocation gives the system a reasonable scope to work with. Without such a scope, minimal emissions reductions will be realized, and again only downstream emitters will be affected.

The price of carbon is particularly detrimental to all four systems, but the cap and trade systems especially. Both systems have a carbon price that is sub $20 and will not hit $30 until approximately 2028. While carbon leakage is a strong incentive for a lower price on carbon, the

trade-off is that emissions reductions do not materialize quickly. While there are many other factors and a low price may not be the sole cause, Quebec serves as a perfect example. Since 2013, the start of their cap and trade system, Quebec's annual emissions have constantly been stable. The purpose of pricing carbon is to coerce individuals from using carbon. That is, those individuals that can no longer afford to use carbon because the price of carbon is too high, these individuals will seek lower cost alternatives. With such a low price on carbon, this coercion does not happen at a high enough rate. That is, not enough individuals are forced into alternatives, and as a result, the emissions reduction targets are not met. Of course, while the price on carbon is not the only factor in an effective market mechanism, this is especially so in a cap and trade system; nonetheless, the price on carbon is still an essential component.

Another key aspect that has come out of this evaluation is the importance of the cap. In Ontario's and Quebec's case particularly, because California has a greater surplus of credits, there is a real possibility of Canadian firms purchasing credits from California instead of their respective provinces. As a result, both Quebec and Ontario need to be careful in how they issue their credits, in that, they need to take into consideration, free allowances, offset credits, early reduction credits, and the number of allowances issued by other jurisdictions. This is, of course, to prevent the cap from being larger than it would otherwise need to be. The cap is an integral component of a cap and trade system because a lower cap brings with it a higher price. It adds to the downward pressure provided by the price of carbon. By having a larger cap than otherwise needed, both provinces will lose this downward pressure resulting in fewer emission reductions. As mentioned in the introduction, the EU is a perfect example of what happens when over-allocation of allowances occurs.

When observing the carbon taxes, it seems as if they are opposites. The similarities are slim, they are both carbon taxes, they both are revenue neutral, and they will both have the same price on carbon in 2018. When it comes to scope, BC's does not have any major exemptions besides agriculture, while Alberta has many exemptions including SGER emitters. For revenue reallocation, BC's tax revenues are solely going towards social programs and minimizing disproportional effects, while redistribution to achieve further carbon reductions is nonexistent. Alberta also allocates revenues towards minimizing disproportional effects; however, the majority of funds is said to be allocated towards further emissions reductions. Even when it comes to reporting and evaluation, BC's carbon tax is reported on annually, and reviewed every three years by the Minister of Finance, not to mention the responsibility on the Minister to produce a review neutral carbon tax each year. Alberta, on the other hand, is lacking in this manner so much so that two of the advisory groups have recommended major improvements in reporting and evaluative functions.

In performing the evaluations, a few key aspects do jump out. First is the price of carbon. Unlike a cap and trade system that has the cap to aid in providing downward pressure, a carbon tax only has to rely on the carbon price. With that said, it has also become apparent that the redistribution of revenues towards achieving secondary means of carbon reductions is essential. By allocating revenues towards, renewable forms of energy, green technologies and infrastructure, building retrofits, and incentive programs, help to bridge the emissions gap between what the tax itself will accomplish and the reduction target. Third, just like a cap and trade system, proper scoping is essential for carbon taxes for the same exact reasons. By having large emitters not covered under the tax, it severely limits the amount of reductions the tax can achieve. However, this is true of all exemptions, in that, every exemption made forgoes the

ability to reduce emissions. As such there is a fine line, while provinces do not want to leave themselves vulnerable to carbon leakage, there must also still be emissions reductions. Lastly, what is not discussed much in this paper but is important nonetheless is the clear lack of price ramping. The only province that utilizes the ramping effect is BC, and in the case study, I have shown that stopping the ramping effect has been to the taxes detriment. The ramping effect serves to provide constant downward pressure, and as seen in BC, without the ramping effect, emissions are bound to be regressive.

As a whole, these four policies are interesting. Scoping wise, the two provinces (Ontario and Alberta) that have the greatest annual emissions are the two provinces that have the least lean scope and embody the most amount of obscurity at least with regards to large emitters. While the two provinces (Quebec and BC) that have the least annual emissions are the two provinces that have least exemptions. Not to mention that it is in the latter provinces where their respective policies are politically acceptable. While in the former provinces, their respective policies are politically unacceptable. BC and Quebec have the most rigorous and transparent policy, although neither is perfect. Lastly, it was challenging to collect implementation costs data for each policy. When trying to find figures, they were usually presented as a budget allocation to a government Ministry rather than a breakdown of programs or initiatives to be undertaken. Alberta provided the most helpful figures when it came to implementation costs because they reported the costs of the two advisory panels that played a role in shaping the province's levy.

My research question was the following: "are British Columbia's and Alberta's carbon tax, and Quebec's and Ontario's Cap and Trade System, cumulatively sufficient to significantly reduce Canada's CO_2 emissions and why?" To answer this question I have evaluated each policy by putting each one through an evaluative framework and observing whether the policy was able

to meet the criterion of a 'good' policy according to the framework. No one province had a perfect policy which satisfied all aspects of the framework. But in other respects such as the scope and the price, the requirement went beyond the framework itself.

Canada's national GHG reduction target as outlined in the Pan-Canadian Strategy is 30% below 2005 levels (523 $MtCO_2e$) by 2030. Before going any further, it needs to be reminded that under the best case scenario (all recommendations and more were implemented today) neither policy is likely to achieve its 2020 emissions reductions targets. The recommendations made would only enable the policies to reach their mid and long-term targets.

BC does not have a 2030 target; instead, they have a 2020 and a 2050 target. BC's emissions targets are to reduce the province's emissions by 33% and 80% from 2007 levels by 2020 and 2050, respectively. Currently, BC is around 20$MtCO_2e$ short of its target, and are unlikely to reach their 2020 target. While the price on carbon is a large point of contention, perhaps the largest contributor to this failure is the fact that they have no secondary means of reducing emissions. Since all collected review is going to social programs and none to renewable forms of energy or incentive programs, carbon reductions only occur as a result of the price on carbon. Such programs would no doubt be a requirement should further reductions want to be achieved.

Alberta has taken a more diluted approach concerning the province's emissions targets. In relation to the federal target, Alberta's 2030 emissions target should be 162.96 $MtCO_2e$ (69.84 Mt/CO_2e or 30% below 2005 emissions) by 2030. However, because the province opted for a BAU target, while the amount of emissions to be reduced is higher, the target is less stringent than at the federal level. Even with a lax target, Alberta is still slated to miss its 2020 BAU target. I suspect, and the evaluation points to this as well, that a large factor in Alberta achieving

its reduction targets will be its scope. It would be interesting to know if in the modeling done for Alberta's carbon tax, whether SGER emitters were amalgamated within the tax or left aside. Furthermore, the fact that there is a possibility that the SGER standard may be replaced by an ETS is problematic. Outside of this, not much else is known regarding the potential new system. This should be concerning because it allows the province to split their emissions in half and treat one half differently than the other. Whether one half will be treated less stringently than the other remains to be seen, however, if we use Ontario as a proxy, I suspect it will be a likely possibility.

Ontario has taken a different yet more ambitious approach to its target, instead of 30% below its 2005 levels (143.08 $MtCO_2e$) by 2030, Ontario has opted to have its target at 37% below its 1990 levels (114.22 $MtCO_2e$) by 2030. Although Ontario has opted for a much more stringent target, the province is estimated to miss its 2020 target, 15% below 1990. Like Alberta, I suspect that a large factor in whether Ontario will meet its target is scope related. Regarding effectiveness, a blanketed free allocation of allowances is inefficient, it undermines the goal of the policy, it restricts the ability to create behaviour shifts, and it limits the ability of the province to collect and reinvest revenue. Another significant factor to consider is the cap itself. This equally applies to Quebec. Both systems must not have their cap determined solely on the targets themselves. While this would be fine if the system was not linked, in a linked system the pool of available allowances is not limited to one jurisdiction. Furthermore, setting the cap should also take into consideration the number of carbon offsets and early reduction credits made available. With a surplus of allowances available at any one time, the coercive power that a C&T system is intended to have becomes diminished. When too many allowances are made available, it incentivizes firms to purchase credits instead of reducing their emissions.

Quebec's 2030 emissions reduction goals is 37.5% below 1990 levels (55 $MtCO_2e$). Like Ontario, Quebec has also opted to achieve a more stringent target than the federal government. As was already mentioned, Quebec is expected to miss its 2020 target. On the same note though, it is proving very difficult to critique the system on the same level as the other ones examined in the paper. Should we examine other recommendations given not only by me but commentators as well, Quebec has a scope that is sufficient, free allowances are not allocated in a blanketed fashion, but are done so based on reducing carbon leakage, revenues are being allocated to programs that will allow further reductions to be realized, and it is the most transparent policy of all the others examined. However, these positives should not take away from the fact that Quebec's C&T system has been active for years and emissions have remained stable. Perhaps more troubling is that neither the province nor commentators have an accurate idea as to why this is the case. Since a C&T system involves many different components, perhaps this is to be expected. Regardless as I mention a few times in the paper, without knowing how the system can be improved, it is difficult to improve it. As such, this is why I think that the greatest improvement Quebec can make is to add advisory groups similar to Alberta.

The policies put forward in this paper are not cumulatively sufficient to significantly reduce Canada's CO_2 emissions. With the recommendations that are put forward and the changes that are required, I find it difficult to believe that the provinces will meet their 2030 targets. On top of all the other changes needed to be made and the downfalls unique to each respective policy, perhaps the largest barrier in addition to the ones mentioned above is the price on carbon. Simply, $\$18/tCO_2e$ and $\$30/tCO_2e$ is much too low to result in any significant change. Furthermore, as I have shown in the BC and Alberta case study, there is a reluctance to price

carbon anywhere above $30/tCO_2e, citing competitiveness and carbon leakage as the main factor.

While the price on carbon is indeed low, as I mentioned above, no one policy stands out amongst the rest as a stellar example to follow. With that said, I think the federal government can play a big role in providing guidance and leadership to the provinces. As I mentioned in the introduction, the federal government has never been aggressive in showing its power when it comes to the environment. Instead, the federal government has tended to defer environmental responsibilities to the provinces. However, because it is clear that there is a deadlock within the provinces, that is, no one province has implemented a policy that will aggressively reduce carbon emissions. This is an opportunity for the federal government to show leadership in the environmental sector. At least in one's opinion, The Pan-Canadian Strategy is a clear example of how the federal government is showing leadership and trying to amalgamate all provinces under one carbon reduction policy. I have mentioned the Pan-Canadian Strategy in the introduction, and while it is a comprehensive plan, a few things stand out. For one, it sets out a price of carbon of $50/tCO_2e, a price higher than all four provinces discussed in this paper. It also sets out a scope which should be at par with BC's. Notably, both Alberta and Ontario easily fail to meet this requirement. Additionally, while whatever revenues are generated go back to their respective provinces, the federal government has given them leeway to spend those revenues how the province sees fit. Perhaps more than that, the federal government sets out guidelines for provinces to follow, in terms scope, a reduction target, the manner in which revenues should be allocated, and the types of initiatives that should be taken. It is in this way to guide reluctant provinces that the federal government can be a leader in promoting stronger carbon reduction policies.

Appendixes I: Evaluative Criteria

Criteria A: Policy Effectiveness:	Criteria B: Allocation of Public Resources:	Criteria C: Policy Design:
1A) What is the scope (coverage of carbon) of the policy? Are there any exemptions? • Coverage of at least 75% is considered average • Coverage of 75% and over is considered good	**1B) Where are policy generated revenues being allocated to?** • Are revenues being used to minimize disproportional effects, both for industry and for low-income individuals • Are revenues being allocated towards energy efficient programs in order to expedite carbon reductions • Overall, the distribution of revenue is considered "good" if society as a whole benefits from the redistribution.	**1C) Is the policy simple and clear?** • Policies that are 'simple and clear' usually cost less to implement, less likely to be 'gamed', and more likely to be politically acceptable. For BC and Alberta, gaming is not taken into consideration, but it is for Ontario and Quebec.
2A) How does the carbon price influence the cost of direct uses of carbon and to what extent are carbon reductions being undertaken? • A carbon price less than \$30/tCO_2e is considered poor • A carbon price of \$30/tCO_2e is considered average • A carbon price above \$30/tCO2e is considered good • A carbon price at or above \$50/tCO2e is considered very good.		**2C) How rigorous is the policy; is the policy evaluated regularly, and is the policy transparent?** • Who must have their emissions measured, who does the measurement, and are the measurements open to public scrutiny • Is the policy regularly evaluated and is it made available • Is there a constant issuing of news releases, backgrounders, performance reviews, and annual reports
3A) Is the policy on-track to achieving its own carbon reduction target and is the policy on-track to achieving its respective province's carbon reduction target? • The main determination of answering this question is available modeling data. However, other consideration should be given to a rising carbon price and redistribution of revenues to technologies. Consideration should be given to whether the government is taking steps to secure future carbon reductions		

Appendix II: Evaluative Criteria Matrix

	British Columbia's Carbon Tax	**Alberta's Carbon Tax**	**Quebec's Cap & Trade System**	**Ontario's Cap & Trade System**
Criteria A: Policy Effectiveness				
1A) What is the scope (coverage of carbon) of the policy? Are there any exemptions? • Coverage of at least 75% is considered average • Coverage of 75% and over is considered good	• Scope: 75-77% of BC's emissions • Exemptions: First Nations; fuel used as a raw material; fuels for export; locomotive, aviation, and marine fuel; coloured fuels for farmers • Overall BC's scope offers few exempts and can be considered between average and good	• Scope: 70-90% of Alberta's emission • Exemptions: natural gas that is produced and consumed on-site by conventional oil and gas producers until January 2023, the use of fuel by farmers for farming operations, inter-jurisdictional flights, on-reserve fuels for Indigenous peoples, fuels sold for export, and SGER facilities. • Given the exemptions, a scope of 70% is unlikely. Alberta's scope for its carbon levy is likely around 51%. • Alberta's scope can be considered poor	• Scope: 85% of Quebec's emissions • Quebec's scope encompasses all emitters whose annual emissions exceed 25,000tCO_2e, or 80 facilities • Free emission allowances are allocated to industrial emitters exposed to foreign competition • The number of allowances allocated decreases approximately 1% to 2% each year • The allocation of emission allowances is determined on a case-by-case basis • When free allowances are taken into consideration, Quebec's scope likely is around 77%, which is still considered good.	• Scope: 82% of Ontario's emissions. • Exemptions: Large industrial emitters will have their emission allowances provided for them free of charge for the 2017-2020 compliance period. The agricultural, waste management, and forestry sectors will not be required to have their direct emissions covered for the first compliance period • The number of free allowances allocated to large emitters will decrease 4.57% each year • For the first compliance period Ontario's scope will be 58%. While in the second compliance period Ontario's scope can potentially be increased to 75%, as it currently stands, Ontario's scope is considered poor.
2A) How does the carbon price influence the cost of direct uses of carbon and to what extent are carbon reductions being undertaken? • A carbon price less than \$30/tCO_2e is considered poor • A carbon price of \$30/tCO_2e is	• The extent in which carbon reductions would be undertaken is whether doing so is cheaper than paying \$30/tCO_2e. • For direct costs of carbon particularly gasoline, at \$30/ tCO_2e, results in an increase of ¢ 6.67/L.	• The extent in which carbon reductions would be undertaken is whether doing so is cheaper than paying \$30/tCO_2e. • The cost of gasoline is to increase by 6.73¢/L. • The carbon levy will raise household fuel	• The extent in which carbon reductions would be undertaken is whether doing so is cheaper than paying the floor price of carbon, \$18.82 (May 16, 2017) • The floor price on carbon will increase 5% plus inflation each	• The extent in which carbon reductions would be undertaken is whether doing so is cheaper than paying the floor price of carbon, \$18.07 (March 22, 2017) • The floor price on carbon will increase 5% plus inflation each year

considered average • A carbon price above $30/tCO2e is considered good • A carbon price at or above $50/tCO2e is considered very good.	• Every ¢5 increase in the cost of gasoline; the demand for gasoline in BC reduces by 2.1%. • BC's carbon price is considered average	costs by an additional $508. Indirect costs of carbon will rise by $70 - $105. • Alberta's carbon price is considered average	year until 2020 • The extent that Quebec's C&T system is likely to affect the price of gasoline is minimal • Carbon prices of $25/t$CO_2$e and $48.20/t$CO_2$e are only expected to raise gasoline prices by $0.05 and $0.10 per litre, which is only expected to decrease gasoline spending by $42.40 annually. • Quebec's carbon price is considered poor	until 2020 • By 2020, the cost of carbon in Ontario would approximately be $20 /$CO_2$e, and $30 /$CO_2$e by 2028. • The total number of allowances that are made available for purchase in Ontario is equal to the forecasted emissions for that year by covered emitters minus 4%. • In 2019, direct costs of carbon for households are expected to be approximately $210 a year, plus an additional $75 per year for indirect costs of carbon. • Ontario's carbon price is considered poor
3A) Is the policy on-track to achieving its own carbon reduction target and is the policy on-track to achieving its respective province's carbon reduction target? • The main determination of answering this question is available modeling data. However, other consideration should be given to a rising carbon price and redistribution of revenues to technologies. Lastly, consideration should be given to whether the government is taking steps to	• Currently, it is unlikely that BC will reach its 2020 target. • The province has also made it clear that there are no plans to either increase the scope or the price on carbon • Currently, no tax revenues are allocated towards green technologies. • BC is not on track to achieving its emissions targets, revenues are not allocated to reduce emissions further, but also the government has made it clear that necessary changes will not occur.	• Modeling data has shown that Alberta's carbon levy alone will not produce sufficient reductions that would allow the province to meet its emissions targets. • It is also too early to determine whether the revenues reallocated to green technologies will reduce emissions in a substantial way • It is too early to determine whether the government of Alberta will be taking additional steps to further reduce emissions.	• The price on carbon is such that incentives to switch to alternatives are not high enough. • Although Quebec is investing a large portion of its revenue into the transportation sector, even if all CCAP programs are to be implemented, Quebec's GHG emissions would be reduced enough for Quebec to reach its target • Throughout the joint-auctions, Quebec has also had very inconsistent auction results, which could play a role in the C&T systems lack	• With a linked and supported system that Ontario has, not only is the system not expected to coerce behaviour, but the province is expected to miss their targets. • It is skeptical whether the C&T system will even be able to reduce the amount of emissions that the government has approximated that it would • The C&T generated revenue that is reinvested to further reduce Ontario's emissions is unlikely to sufficiently close the emissions gap to allow Ontario to meet its 2020

secure future carbon reductions		• Overall, it is too early to determine the effectiveness of Alberta's carbon tax and whether it will reach its emissions target. However, it is clear that changes must be made.	luster performance • Though Quebec invests revenues to create additional reductions, the province may still miss its emissions target.	emissions reduction target. • It is too early to tell whether the government is willing to alter the structure of the C&T system in future in order to meet its emissions reduction targets. Although like Alberta in order for the province to meet its targets, major changes are required.
Criteria B: Allocation of Public Resources				
1B) Where are policy generated revenues being allocated to? • Are revenues being used to minimize disproportional effects, both for industry and for low-income individuals • Are revenues being allocated towards energy efficient programs in order to expedite carbon reductions • Overall, the distribution of revenue is considered "good" if society as a whole benefits from the redistribution.	• Revenue Neutral • Revenues are allocated to lowering personal income taxes, minimizing disproportional effects, lower corporate taxes, and taxes of small businesses • Revenue is allocated to other social programs, but none related to reducing emissions • No revenue is allocated to green technologies, renewables, sustainable development, or R&D research • While revenues are used to minimize disproportional effects, revenues are not redistributed to reducing emissions further. This eliminates the possibility of society benefiting as a whole. Instead, only those who benefit are those who fall under the social programs that BC	• Revenue Neutral • $2.3 billion allocated to minimizing disproportional impacts of low and middle class households • $3.4 billion allocated to large scale renewable energy projects, $2.2 billion allocated to green transit infrastructure, • (at the time that this paper being written) there is not enough detail on these efficiency programs determine if the redistribute levy generated funds to energy efficient programs will be beneficial. • The way the province is allocating is revenue is promising, disproportional impacts can be minimized and emissions can be further reduced, overall should be considered "good". However,	• All C&T auction revenues are put into the Green Fund, which are used to carry out 30 priorities and over 150 actions to reduce GHG emissions in Quebec as outlined in Quebec's 2013-2020 Climate Change Action Plan. • By 2020, $3.3 billion is to be put into the Green Fund, where two thirds will be allocated to the transportation sector • Quebec will also be allocating Green Fund money to technological development and innovation, financial support to firms that engage in R&D for emissions reducing technologies, and financial support to businesses willing to equip their facilities with new low-carbon	• All generated revenues are deposited into the Greenhouse Gas Reduction Account. The Account is solely intended to provide money for projects and initiatives aimed at reducing GHG emissions, particularly 34 different projects aimed at further reducing GHG emissions. • Here the government does not put revenues towards minimizing disproportional effects for low-income individuals • Although the government tries to rationalize upgrade subsidies and reducing energy costs as a type of minimizing disproportional effects, it is clear that these subsidies will not be undertaken by those who are low-income.

	has laid out.	because there is not enough information on these programs it cannot be considered as such.	technologies. • No revenues are allocated towards minimizing disproportional effects, although they try to do so indirectly through consciousness-raising and efficiency improvement in both buildings and vehicles. • Revenues are being used to secure future emissions reductions, although no to minimizing disproportional impacts.	• Like Quebec, while further emissions reductions will be achieved through revenue reallocation, disproportional effects will not be minimalized
Criteria C: Policy Design				
1C) Is the policy simple and clear? • Policies that are 'simple and clear' usually cost less to implement, less likely to be 'gamed', and more likely to be politically acceptable. For BC and Alberta, gaming is not taken into consideration, but it is for Ontario and Quebec.	• Implementation costs of BC's carbon tax are not explicitly stated. • As time has progressed after implementation, public acceptance of the tax has increased and has strengthened.	• No figures were available for implementation costs, but figures related to the advisory panels were available. • The Climate Change Advisory Panel costed approximately $2.1 million, and the Energy Efficiency Advisory Panel costed approximately $7.4 million. • The two other advisory panels, the Climate Technology Task Force and the Oil Sands Advisory Group, neither has yet to complete their mandate. Presumably, these two advisory panels will increase the cost. • The levy is found to be politically unacceptable. Partially this is due to the fact that Alberta has presented an	• It is unclear how much money the Quebec government allocated to the implementation of its C&T system. Although the Quebec Minister of the Environment commissioned a report in 2005 to understand the feasibility of a C&T program. • Quebec's C&T system is politically acceptable. Commentators suggest that because Quebec is almost seen as a pioneer for C&T in Canada, it has bolstered positive public opinion. • For gaming prevention, the Quebec system requires that mandatory and voluntary emitters register with the CITSS • Registrations is also used to	• Implementation costs of Ontario's C&T system is not exactly clear. What is known is that in the 2015/2016 annual report for the Ministry of the Environment and Climate Change, $191,868,000 was allocated to Environmental Protection • While not much polling data, what little there is suggests that Ontario's C&T system is politically unacceptable. • System Gaming: To prevent false emissions reporting, all participants must register with the CITSS, as well, all participants must report their GHG emissions every year. A third party verifies all emissions reports • All participants

		incomplete carbon levy.	determine the risk of non-compliant behaviour, and to track all transactions, whether they are from the auctions or in the secondary market. • There is a limit as to how many credits any one participant can purchase at auction. Participants also cannot exceed a certain amount of credits held at any one time. • During auctions bidders are not permitted to disclose their involvement in the auction and any entity with privileged information is not permitted to bid on allowances. • For projects that are eligible for offset credits, facilities must be verified and reports validated in compliance with ISO standards. • An offset credit registry is provided online and can be accessed publicly. The registry provides the name of the operation, its location, description, the amount of emissions credits the operator is expected to receive, and whether the allowances were issued or not.	will have their allowances tacked, whether they are given freely, purchased at auction, or traded in the secondary market • Currently there is no offset regulation, however, if the proposed regulation is approved, the Ministry of the Environment and Climate Change will establish a public online Offsets Registry that will be similar to Quebec's. Before offset credit(s) are awarded, all offset related documents and physical sites must be verified by a third party.
2C) How rigorous is the policy; is the policy evaluated regularly, and is the	• The BC government reports its emissions in its	• Annually the Minister of Environment and Parks provides	• Parts of rigorousness is covered in System Gaming	• Parts of rigorousness is covered in System Gaming

policy transparent? • Who must have their emissions measured, who does the measurement, and are the measurements open to public scrutiny • Is the policy regularly evaluated and is it made available • Is there a constant issuing of news releases, backgrounders, performance reviews, and annual reports	GHG Inventory annually, which brakes down emissions by sector and activity • Industrial emitters that emit more than 10,000tCO_2e per year must report their GHG emissions. While Industries that emit 25,000tCO_2e per year or higher must have their emissions independently verified. • All emissions reports are publically accessible • Every year the Minister of Finance provides a schematic in BC's yearly budget which shows how much revenue the carbon tax generated and where that money has been allocated to • Every three years the carbon tax is reviewed • Every two years the Minister of the Environment released Progress to Targets Reports, outlining the provinces progress towards its emissions targets.	progress reports, as well, has the mandate to evaluate the carbon levy • Facilities that emit more than 50,000 tCO_2e annually must report their emissions, and must have their data verified by Environment and Climate Change Canada and the Alberta Climate Change Office. • Incorrect reporting by these facilities can result in a fine of up to $500,000. • For facilities that emit less than 50,000 tCO_2e per year, emissions' reporting is voluntary. • Although GHG reporting for SGER facilities is made available for public scrutiny, reporting is three years behind.	• The Minister of Sustainable Development, Environment and the Fight Against Climate Change must collect emissions data, and measure Quebec's GHG emissions through the province's GHG inventory. • Emitters that emit 10,000tCO_2e or more annually must report their emissions every year • For emitters that emit 25,000tCO_2e or more per year, third party verification is required. • Yearly emissions reports are made available to the public • Each year, the Minister of Sustainable Development, Environment and the Fight Against Climate Change must publish a report on programs that are slated to be implemented, as well as, the progress of each program that has already been implemented from the CCAP 2020. • Every three years the Minister releases a general evaluation report. • CCAP 2020 will be evaluated at its midpoint to ensure that the funds allocated to the particular projects have been effective in creating results • Every year, the Ministry of	• The Minister of the Environment and Climate Change must report the status of the actions set out in Ontario's climate change action plan each year, and must then put the report before the General Assembly and make it publicly accessible • In order for the Minister to spend generated revenues, it must be justified using the criterion set out in the case study • As for free allowances that are allocated to large emitters, 24 months after allocation, the Minister needs to make public a list of emitters who received these allowances, as well as, the amount of allowances they received. The Minister must also make the plan to phase out free emission allowances available to the pubic • Every year the GGRA must undergo annual reporting, whereby in-flows and out-flows and the respective descriptions are kept track of. It ensures that GGRA funds are spent in a manner as to result in reasonable GHG reductions. These reports must then be made

			Sustainable Development, the Environment and Climate Change, must also release annual reports which present the progress of the Ministry's objectives for that year. • The Minister must disclose how much money was put into the Green Fund for that year. • The Green Fund itself undergoes periodic monitoring • All of this information is made available online	publically accessible.

Appendix III: Recommendations

Recommendations			
British Columbia	**Alberta**	**Ontario**	**Quebec**
• The price of carbon needs to be raised $\$10/tCO_2e$ per year until the price on carbon hits a minimum of $\$100/tCO_2e$ • A portion of generated revenues need to be allocated to renewable technologies and incentive programs. Just as the Minister is mandated to provide a revenue-neutral carbon tax, the Minister can be equally mandated to ensure that whatever funds are not used towards reducing disproportional impacts goes towards clean energy, retrofits, and incentive programs.	• The province of Alberta needs to increase the price put on carbon to at least $\$100/tCO_2e$ • The SGER Standard should not be replaced by a new ETS, but rather SGER emitters should be amalgamated with the carbon levy • The scope of Alberta's carbon levy needs to be expanded to include SGER emitters. Should SGER emitters be granted exemptions, they should not exceed 40% of the SGER sectors emissions. Exemptions need to be justified by the Minister, and should be made publically accessible. Documents pertaining to which firms are exempt and how much they are exempted by must also be made available to the public. • The four Advisory Panels the province has created should be given reporting and evaluative mandates. That is, these panels should be responsible for reporting on and evaluating the province's carbon levy.	• Ontario needs to expand its scope by changing the way free credits are allocated. A robust process that is analogous to how Ontario justifies spending revenues. • Like the Alberta recommendations, exemption figures and justifications need to be made public. • The price put on carbon needs to increase to a minimum of $\$100/tCO_2e$ • The emissions allowance decline rate, while it is considered aggressive, needs to increase beyond 4%, as well, the considerations that go into setting the cap itself should not only include the provinces reduction targets, but the amount of free allowances, early reduction credits, offset credits, and the amount of credits available by jurisdictions, must also be taken into consideration. • Incentive programs need to such that society can benefit from them as a whole and not solely high income individuals who can afford to capitalize on the incentive	• The price of carbon in Quebec needs to increase to $\$100/tCO_2e$ • Like Alberta the province should create advisory panels which would carry out a similar mandate. That is, constantly reporting and evaluating the C&T system. • (optional) While Quebec has a decent scope, it can be improved, this would be done through adopting an analogous justification process for allocating free credits (similar to the recommendations in Ontario)

Bibliography

Alberta Ministry of Environment and Parks. (2016, June). 2015-2016 Environment and Parks Annual Report. 6-181. Retrieved from http://aep.alberta.ca/about-us/corporate-documents/documents/AEP-AnnualReport-2015-2016-B.pdf

Alberta Ministry of Environment and Parks. (2017, February 27). *Rebates to help Albertans tap solar resources*. Retrieved from https://www.alberta.ca/release.cfm?xID=463610A3269CE-0D2C-C140-6E391B3112A56664

Alberta Ministry of Environment and Parks. (2017, February 28). *Register now for no-charge energy efficiency program*. Retrieved from https://www.alberta.ca/release.cfm?xID=463703B3DFEE3-92E3-23B1-E1D239BB3D838281

Alberta Treasury Board and Minister of Finance. (2016, April 14). Budget 2016: The Alberta Jobs Plan – Fiscal Plan. 1-134. Retrieved from http://finance.alberta.ca/publications/budget/budget2016/fiscal-plan-complete.pdf

Alberta's Energy Efficiency Advisory Panel. (2017). Getting it Right: A More Energy Efficient - Alberta Final Report of the Alberta Energy Efficiency Advisory Panel. 13-63. Retrieved from https://www.alberta.ca/documents/climate/EEAP-Report-Getting-It-Right.pdf

Anderson, C. D., & Stephenson, L. B. (2016). Environmentalism and Austerity in Canada: Electoral Effects. In D. L. VanNijnatten (Ed.), *Canadian Environmental Policy and Politics: The Challenges of Austerity and Ambivalence* (4th ed., pp. 4-19). Don Mills: Oxford University Press.

Auditor General of Québec. (2016, Spring). Carbon Market: Description and Issues. *Report of the Auditor General of Québec to the National Assembly for 2016-2017: Report of the Sustainable Development Commissioner*, 6-49. Retrieved from http://www.vgq.gouv.qc.ca/en/en_publications/en_rapport-annuel/en_fichiers/en_Rapport2016-2017-CDDE.pdf

Auditor General of Québec. (2016). Observations of the Sustainable Development Commissioner, Mr. Jean Cinq-Mars. In *Report of the Auditor General of Québec to the National Assembly for 2016-2017* (pp. 4-13).

Bailey, I. (2016, August 19). *The Globe and Mail*. Retrieved from B.C. government rules out increase to carbon tax: http://www.theglobeandmail.com/news/british-columbia/bc-releases-climate-plan/article31469785/

Ballard, C. (2015, November 6). *Published plans and annual reports 2015-2016: Ministry of the Environment and Climate Change*. Retrieved from Ministry of the Environment and Climate Change: https://www.ontario.ca/page/published-plans-and-annual-reports-2015-2016-ministry-environment-and-climate-change#section-3

Barrington-Leigh, C., Tucker, B., & Lara, J. K. (2014, November). The Short-Run Household, Industrial, and Labour Impacts of the Quebec Carbon Market. 4-51. Retrieved from http://wellbeing.ihsp.mcgill.ca/publications/Barrington-Leigh-Tucker-2014-quebec-carbon-system.pdf

Beck, M., Rivers, N., Wigle, R., & Yonezawa, H. (2015, April 24). Carbon tax and revenue recycling: Impacts on households in British Columbia. *Resource and Energy Economics*(41), 40–69.

Becker, J.-M., & Hastings-Simon, S. (2017, January). Kick-starting Energy Efficiency in Alberta: Best practices in the use of efficiency as an energy resource. 3-29. Retrieved from http://www.pembina.org/reports/kick-starting-ee-alberta.pdf

Benoit, J.-Y., & Côté, C. (2015, January 1). Essay by The Québec Government on Its Cap-and-Trade System and the Western Climate Initiative Regional Carbon Market: Origins, Strengths and Advantages. *Journal of Environmental Law, 33*(42), 42-60.

Bertram, C., Luderer, G., Pietzcker, R. C., Schmid, E., Kriegler, E., & Edenhofer, O. (2015, March). Complementing carbon prices with technology policies to keep climate targets within reach. *Nature Climate Change, 5*, 235-239.

Beugin, D., Dion, J., Elgie, S., Olewiler, N., & Ragan, C. (2017, January). Comparing Stringency of Carbon Pricing Policies. 5-19. Retrieved from http://ecofiscal.ca/wp-content/uploads/2016/07/Ecofiscal-Commission-Comparing-Stringency-Carbon-Pricing-Report-July-2016.pdf

Blinch, M. (2016, August 24). *Bombing cap and trade auctions in California, Quebec threaten Ontario's $8-billion climate change plan*. Retrieved from The Financial Post: http://business.financialpost.com/commodities/energy/bombing-cap-and-trade-auctions-in-california-quebec-threaten-ontarios-8b-climate-change-plan/wcm/b23bea9d-0861-43e4-a984-f76123160ace

Bozinoff, L. (2016, August 17). Majority Disapprove of Cap and Trade Plan. *Forum Research Inc*, 1-4. Retrieved from http://poll.forumresearch.com/data/cf7a5594-bc5a-4edc-ade0-a42a6b797652ON%20Cap%20and%20Trade%20Release%20(JC).pdf

Bramley, M., Huot, M., Dyer, S., & Horne, M. (2011, December). Responsible Action? An assessment of Alberta's greenhouse gas policies. 1-61.

Brink, C., Vollebergh, H. R., & van der Werf, E. (2016, August 13). Carbon Pricing in the EU: Evaluation of Different EU ETS Reform Options. *Energy Policy*(97), 603–617.

British Columbia Climate Action Secretariat. (2016). 2014 British Columbia Greenhouse Gas Inventory Report. Retrieved from http://www2.gov.bc.ca/gov/content/environment/climate-change/reports-data/provincial-ghg-inventory

British Columbia Minister of the Environment. (2012). Making Progress on BC's Climate Action Plan. 1-57. Retrieved from http://www2.gov.bc.ca/assets/gov/environment/climate-change/policy-legislation-and-responses/2012-progress-to-targets.pdf

British Columbia Minister of The Environment. (2014). Climate Action in British Columbia 2014 Progress Report. 1-11. Retrieved from http://www2.gov.bc.ca/assets/gov/environment/climate-change/reports-and-data/provincial-ghg-inventory-report-bcs-pir/2014-progress-to-targets.pdf

British Columbia Ministry of Finance. (2008, February 19). Budget and Fiscal Plan: 2008/09 – 2010/11. 1-201. Retrieved from http://www.bcbudget.gov.bc.ca/2008/bfp/2008_Budget_Fiscal_Plan.pdf

British Columbia Ministry of Finance. (2013, June 27). Budget and Fiscal Plan – 2013/14 to 2015/16 (June Update). 1-130. Retrieved from http://www.bcbudget.gov.bc.ca/2013_June_Update/bfp/2013_June_Budget_Fiscal_Plan.pdf

British Columbia Ministry of Finance. (2013, February 19). Budget and Fiscal Plan 2013/14 – 2015/16. 1-142. Retrieved from http://www.bcbudget.gov.bc.ca/2013/bfp/2013_Budget_Fiscal_Plan.pdf

British Columbia Ministry of Finance. (2014, September). Sales to First Nations, and the Exempt Fuel Retailer Program. *Motor Fuel Tax Act and Carbon Tax Act*, 1-12. Retrieved from http://www.sbr.gov.bc.ca/documents_library/bulletins/mft-ct_002.pdf

British Columbia Ministry of Finance. (2015, December). Registered Consumers. *Motor Fuel Tax Act and Carbon Tax Act*, 1-8. Retrieved from http://www.sbr.gov.bc.ca/documents_library/bulletins/mft-ct_004.pdf

British Columbia Ministry of the Environment. (2016, August). Methodology Document for the British Columbia Provincial Greenhouse Gas Inventory. 4-29. Retrieved from http://www2.gov.bc.ca/assets/gov/environment/climate-change/reports-and-data/provincial-ghg-inventory-report-bcs-pir/303525_provincial_inventory-2014-methodology.pdf

Busch, C. (2017, March 21). *Demand Falls In First 2017 California-Quebec Cap-and-Trade Auction, But Set To Rise Through 2020*. Retrieved from Forbes: https://www.forbes.com/sites/energyinnovation/2017/03/21/demand-falls-in-first-2017-california-quebec-cap-and-trade-auction-but-set-to-rise-through-2020/2/#13cf5d298a1c

Campion-Smith, B. (2016, October 3). *Justin Trudeau's Liberals unveil plan to price carbon*. Retrieved from The Toronto Star: https://www.thestar.com/news/canada/2016/10/03/justin-trudeaus-liberals-unveil-plan-to-price-carbon.html

Canadian Environmental Law Association. (2016, February). Briefing Note: Fair and Equitable Carbon Pricing: Comments on Ontario's Cap and Trade Program. 1-4. Retrieved from http://www.cela.ca/sites/cela.ca/files/Briefing-Note-Cap-and-Trade-Vulnerable-Communities.pdf

CBC News. (2016, October 21). *Carbon tax opposed by 67% of Albertans, poll suggests*. Retrieved from CBC News: http://www.cbc.ca/news/canada/calgary/carbon-tax-poll-opposition-coal-fired-electricity-phase-out-lethbridge-college-1.3815791

Chan, M. (2010, May). Ten Ways to Game the Carbon Market. 2-8.

Clean Energy Canada. (2015, April). Inside North America's Largest Carbon Market: Ten Lessons from the Front Lines of Quebec's Fight Against Carbon Pollution. 2-30. Retrieved from http://cleanenergycanada.org/wp-content/uploads/2015/04/InsideNorthAmericaLargestCarbonMarket_ENGL_Spreads2.pdf

Climate Leadership Team. (2015, October 31). Recommendations to Government. 2-35. Retrieved from http://engage.gov.bc.ca/climateleadership/files/2015/11/CLT-recommendations-to-government_Final.pdf

Connelly, J., Smith, G., Benson, D., & Saunders, C. (2012). Policy Principles and Instruments. In *Politics and the Environment: From Theory to Practice* (3rd ed., pp. 172-210). New York: Routledge.

Craik, N., & Prior, T. (2016). Retreat from Principle: Canada and the System of International Environmental Law. In D. L. VanNijnatten (Ed.), *Canadian Environmental Policy and Politics: The Challenges of Austerity and Ambivalence* (4th ed., pp. 197-215). Don Mills: Oxford University Press.

CTV News / Nanos. (2015, November). Canadians say climate change a threat to Canada's economic future and that Canada's reputation has taken a hit on the global stage. 2-10. Retrieved from http://www.nanosresearch.com/tickers/PDF/POLNAT-S15-T661.pdf

Doelle, M., & Tollefson, C. (2013). Canadian Parks & Wilderness Society v. Canada (Minister of Canadian Heritage). In *Environmental Law: Cases and Materials* (2nd ed., pp. 605-611). Toronto: Carswell.

Dormer, D. (2016, September 29). *63% of Albertans oppose NDP carbon tax, poll suggests*. Retrieved from CBC News: http://www.cbc.ca/news/canada/calgary/thinkhq-poll-climate-leadership-plan-carbon-tax-1.3784326

Ekins, P., & Terry, B. (2001). Carbon Taxes and Carbon Emissions Trading. *Journal of Economic Surveys, 15*(3), 325-376.

Elgie, S., & McClay, J. (2013). BC's Carbon Tax Shift is Working Well after Four Years (Attention Ottawa). *Canadian Public Policy, 39*, 1-10.

Environment Canada. (2015). Greenhouse Gas Sources and Sinks in Canada: The Canadian Government's Submission to the UN Framework Convention on Climate Change. *1990–2013 National Inventory Report*(Part 3), 13-85. Retrieved from http://publications.gc.ca/collections/collection_2016/eccc/En81-4-2013-3-eng.pdf

Government of Alberta. (2016, September 15). Alberta Greenhouse Gas Reporting Program 2013 Facility Emissions. *Greenhouse Gas Reporting Program*, 7-35. Retrieved from http://aep.alberta.ca/climate-change/reports-and-data/documents/2013ReportGreenhouseGasEmissions-Sep2016.pdf

Government of Alberta. (2016). *Carbon levy and rebates*. Retrieved from https://www.alberta.ca/climate-carbon-pricing.aspx#p184s7

Government of Alberta. (2016). *Economic impact*. Retrieved from http://www.alberta.ca/climate-economic-impact.aspx

Government of Alberta. (2017). *Climate Technology Task Force*. Retrieved from Government of Alberta: https://www.alberta.ca/climate-technology-task-force.aspx

Government of Alberta. (2017). *Oil Sands Advisory Group*. Retrieved from Government of Alberta: https://www.alberta.ca/oilsands-advisory-group.aspx

Government of Alberta. (2017). *Renewable Electricity Program*. Retrieved from Government of Alberta: https://www.alberta.ca/renewable-electricity-program.aspx

Government of British Columbia. (2008, May 29). Carbon Tax Act. Victoria: Queen's Printer. Retrieved from Government of British Columbia: http://www.bclaws.ca/civix/document/id/consol22/consol22/00_08040_01

Government of British Columbia. (2008). Climate Action Plan. 1-126. Retrieved from http://www2.gov.bc.ca/assets/gov/environment/climate-change/policy-legislation-and-responses/climateaction_plan_web.pdf

Government of British Columbia. (2016). *British Columbia Greenhouse Gas Inventory*. Retrieved from http://www2.gov.bc.ca/gov/content/environment/climate-change/reports-data/provincial-ghg-inventory

Government of British Columbia. (2016). *Exemptions*. Retrieved from Government of British Columbia: http://www2.gov.bc.ca/gov/content/taxes/sales-taxes/motor-fuel-carbon-tax/business/exemptions

Government of British Columbia. (2016). *Low Income Climate Action Tax Credit*. Retrieved from Government of British Columbia: http://www2.gov.bc.ca/gov/content/taxes/income-taxes/personal/credits/climate-action

Government of British Columbia. (2017). *Climate Action Legislation*. Retrieved from Government of British Columbia:

https://www2.gov.bc.ca/gov/content/environment/climate-change/planning-and-action/legislation#ggerr
Government of Canada. (2015, May 15). Canada's INDC Submission to the UNFCCC. 1-4. Retrieved from http://www4.unfccc.int/Submissions/INDC/Published%20Documents/Canada/1/INDC%20-%20Canada%20-%20English.pdf
Government of Canada. (2016). Pan-Canadian Framework on Clean Growth and Climate Change: Canada's Plan to Address Climate Change and Grow the Economy. 1-77. Retrieved from https://www.canada.ca/content/dam/themes/environment/documents/weather1/20170125-en.pdf
Government of Quebec. (2011). *Transport Electrification Action Plan*. Retrieved from Government of Quebec: http://vehiculeselectriques.gouv.qc.ca/particuliers/rabais.asp
Government of Quebec. (2011). *Transport Electrification Action Plan*. Retrieved from Government of Quebec: http://vehiculeselectriques.gouv.qc.ca/entreprises/remboursement.asp
Government of Quebec. (2014). Quebec's Cap-and-Trade System for Greenhouse Gas Emission Allowances: Technical Overview. 4-17.
Government of Quebec. (2014). Quebec's Cap-and-Trade System - Technical overview. 4-17. Retrieved from http://www.mddelcc.gouv.qc.ca/changements/carbone/documents-spede/technical-overview.pdf
Government of Quebec. (2016). A Brief Look at the Quebec Cap-and-Trade System for Emission Allowances. 1-2.
Government of Quebec. (2016). A Brief Look At The Quebec Cap-And-Trade-System For Emission Allowances. 1-2.
Government of Quebec. (2016, April). Green Fund - Management Framework. 4-27.
Government of Quebec. (2016). Historical Overview of Quebec's Cap-and-Trade System and WCI's Regional Carbon Market. 3-8. Retrieved from http://www.mddelcc.gouv.qc.ca/changements/carbone/documents-spede/historical-overview.pdf
Government of Quebec. (2016, December). Quebec Greenhouse Gas Emissions Inventory in 2014 and Their Evolution Since 1990. 4-31. Retrieved from http://www.mddelcc.gouv.qc.ca/changements/ges/2014/Inventaire1990-2014.pdf
Government of Quebec. (2016). Strengths and Advantages of Quebec's Cap-and-Trade System. 3-9. Retrieved from http://www.mddelcc.gouv.qc.ca/changements/carbone/documents-spede/strengths-advantages.pdf
Government of Quebec. (2017). *Green Fund*. Retrieved from Government of Quebec: http://www.mddelcc.gouv.qc.ca/ministere/fonds-vert/index.htm
Government of Quebec. (2017). *Greenhouse Gas Emissions Registry*. Retrieved from Government of Quebec: http://www.mddelcc.gouv.qc.ca/changements/ges/registre/index.htm
Guglyuvatyy, E. (2010). Climate Change Policy Evaluation: Method and Criteria. *Environmental Policy and Law, 40*(6), pp. 355-362.
Harrison, K. (2013, October 8). The Political Economy of British Columbia's Carbon Tax. *OECD Environment Working Papers*(63), pp. 1-22.

Horne, M. (2011, June 30). Measuring the Appetite for Climate Action in BC: British Columbians' perspectives on climate change and carbon taxes. 1-5. Retrieved from http://www.pembina.org/reports/measuring-the-appepite-for-climate-action-in-bc.pdf

Horne, M., & Partington, P. (2011, September 8). Recommendations for Quebec's draft cap-and-trade regulations. 1-7. Retrieved from https://www.pembina.org/reports/quebec-ct-sub.pdf

Horne, M., Sauvé, K., & Pedersen, T. (2012, October). British Columbians' perspectives on global warming and the carbon tax. 1-11. Retrieved from http://www.pembina.org/reports/carbon-tax-polling-results-2012-backgrounder.pdf

Howlett, M., & Kinney, N. (2016). The Current (Post-Staples?) State of Canada's Resource Industries. In D. L. VanNijatten (Ed.), *Canadian Environmental Policy and Politics: The Challenges of Austerity and Ambivalence* (4th ed., pp. 38-56). Don Mills: Oxford University Press.

International Carbon Action Partnership. (2017, May 3). Canada - Québec Cap-and-Trade System. 1-5. Retrieved from https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems[]=73

Ipsos Reid. (2008, June 18). BC Liberals Maintain Lead. 1-5. Retrieved from http://www.ipsos-na.com/download/pr.aspx?id=7492

Jaccard, M., Hein, M., & Vass, T. (2016, September 20). Is Win-Win Possible? Can Canada's Government Achieve Its Paris Commitment ... and Get Re-Elected? 1-33.

Leach, A., Adams, A., Cairns, S., Coady, L., & Lambert, G. (2015, November 20). Climate Leadership Report to Minister. 13-97. Retrieved from https://www.alberta.ca/documents/climate/climate-leadership-report-to-minister.pdf

Lysyk, B. (2016). Climate Change. *2016 Annual Report of the Office of the Auditor General of Ontario*, 148-204. Retrieved from http://www.auditor.on.ca/en/content/annualreports/arreports/en16/v1_302en16.pdf

Macdonald, D. (2009). The Failure of Canadian Climate Change Policy: Veto Power, Absent Leadership, and Institutional Weakness. In D. L. VanNijnatten, & R. Boardman, *Policy Instruments in Canadian Environmental Policy: Prospects for Leadership and Innovation* (3rd ed., pp. 152-166). Ontario, Canada: Oxford University Press.

MacKay, W. R. (2013). Canadian Federalism and the Environment: The Literature. In M. Doelle, & C. Tollefson, *Environmental Law: Cases and Materials* (2nd ed., pp. 212-222). Toronto, Ontario, Canada: Carswell.

McKenzie, K. J. (2016, April). Make the Alberta Carbon Levy Revenue Neutral. *The School of Public Policy, 9*(15), 1-13. Retrieved from http://www.policyschool.ca/wp-content/uploads/2016/05/carbon-levy-revenue-neutral-mckenzie.pdf

Mildenberger, M., Howe, P., Lachapelle, E., Stokes, L., Marlon, J., & Gravelle, T. (2016, August 3). The Distribution of Climate Change Public Opinion in Canada. *PLOS ONE*, 1-14.

Ministry of Environment & the Environmental Assessment Office. (2014, June 26). 2013/14 Annual Service Plan Report. 5-48. Retrieved from http://www.bcbudget.gov.bc.ca/Annual_Reports/2013_2014/pdf/ministry/env.pdf

Ministry of Environment. (2010, September). British Columbia Greenhouse Gas Inventory Report 2008. 1-67.

Ministry of Environment. (2012, June). British Columbia Greenhouse Gas Inventory Report 2010. 1-73.

Ministry of Environment. (n.d.). British Columbia Greenhouse Gas Inventory Report 2012. 1-77.
Ministry of Indigenous Relations & Reconciliation. (2016, March 17). *Ontario Partnering With First Nations to Address Climate Change*. Retrieved from Government of Ontario: https://news.ontario.ca/mirr/en/2016/03/ontario-partnering-with-first-nations-to-address-climate-change.html
Ministry of Sustainable Development, Environment & the Fight Against Climate Change. (2017). *Québec's Commitments: Our GHG Emissions Reduction Targets*. Retrieved from Ministry of Sustainable Development, Environment & the Fight Against Climate Change: http://www.mddelcc.gouv.qc.ca/changementsclimatiques/engagement-quebec-en.asp
Ministry of the Environment & Climate Change. (2016, November 15). *Cap and trade: offset credits and protocols*. Retrieved from Government of Ontario: https://www.ontario.ca/page/cap-and-trade-offset-credits-and-protocols
Ministry of the Environment & Climate Change. (2016, December 29). *Cap and trade: program overview*. Retrieved from Government of Ontario: https://www.ontario.ca/page/cap-and-trade-program-overview
Ministry of the Environment & Climate Change. (2016, August 16). *Cap and trade: register as a voluntary participant*. Retrieved from Government of Ontario: https://www.ontario.ca/page/cap-and-trade-register-voluntary-participant
Ministry of the Environment & Climate Change. (2016, February 25). *Draft Cap and Trade Program Design*. Retrieved from Government of Ontario: https://news.ontario.ca/ene/en/2016/02/draft-cap-and-trade-program-design.html
Ministry of the Environment & Climate Change. (2016, November 30). *How Cap and Trade Works*. Retrieved from Government of Ontario: https://news.ontario.ca/ene/en/2016/11/how-cap-and-trade-works-1.html
Ministry of the Environment & Climate Change. (2016, December 23). *Report greenhouse gas (GHG) emissions*. Retrieved from Government of Ontario: https://www.ontario.ca/page/report-greenhouse-gas-ghg-emissions
Ministry of the Environment & Climate Change. (2017, January 13). *Cap and trade: auction of allowances*. Retrieved from Government of Ontario: https://www.ontario.ca/page/cap-and-trade-auction-allowances
Ministry of the Environment and Climate Change. (2017, May 23). *March 2017 (auction #1): Auction Summary Results Report*. Retrieved from The Ministry of the Environment and Climate Change: https://www.ontario.ca/page/march-2017-auction-1-auction-summary-results-report
Murray, B., & Rivers, N. (2015, August 10). British Columbia's revenue neutral carbon tax: A review of the latest "grand experiment" in environmental policy. *Energy Policy, 86*, 674–683.
Nanos Research. (2017, February). Views of Ontarians on potential policy priorities for the Government of Ontario. 1-17. Retrieved from http://www.nanosresearch.com/sites/default/files/POLONT-S15-T725.pdf
Nikiforuk, A. (2010). It Ain't Oil. In *Tar Sands: Dirty Oil and the Future of a Continent* (pp. 11-17). Vancouver: Greystone Books Ltd.
Office of the Premier. (2015, December 8). *More Electric Vehicle Charging Stations On The Way*. Retrieved from Government of Ontario: https://news.ontario.ca/opo/en/2015/12/more-electric-vehicle-charging-stations-on-the-way.html

Ontario Ministry of Energy. (2016, February 4). *Ontario Investing $100 Million to Create Jobs and Help Homeowners Save Energy*. Retrieved from Government of Ontario: https://news.ontario.ca/mei/en/2016/02/ontario-investing-100-million-to-create-jobs-and-help-homeowners-save-energy.html

Ontario Ministry of Municipal Affairs. (2016, February 12). *Ontario Investing $92 Million to Create Jobs and Retrofit Social Housing*. Retrieved from Government of Ontario: https://news.ontario.ca/mma/en/2016/02/ontario-investing-92-million-to-create-jobs-and-retrofit-social-housing.html

Ontario Office of the Premier. (2016, February 17). *Ontario Invests Nearly $100 Million to Boost Cleantech Innovation and Create Jobs*. Retrieved from Government of Ontario: https://news.ontario.ca/opo/en/2016/02/ontario-invests-nearly-100-million-to-boost-cleantech-innovation-and-create-jobs.html

Pal, L. A. (2009). Evaluation. In *Beyond Policy Analysis: Public Issue Management in Turbulent Times* (pp. 285-328). Nelson Education Limited.

Pratt, S. (2015, September 30). *Albertans support strong action on climate change, including carbon tax: poll*. Retrieved from The National Post: http://news.nationalpost.com/news/canada/canadian-politics/albertans-support-strong-action-on-climate-change-including-carbon-tax-poll

Province of Alberta. (2007). Climate Change and Emissions Management Act - Specified Gas Emitters Regulation - Alberta Regulation 139/2007. 1-29. Retrieved from http://www.qp.alberta.ca/documents/Regs/2007_139.pdf

Province of Alberta. (2017, January 1). Climate Leadership Act - Chapter C-16.9. 1-71. Retrieved from http://www.qp.alberta.ca/documents/Acts/C16P9.pdf

Purdon, M., Houle, D., & Lachapelle, E. (2014). The Political Economy of California and Québec's Cap-and-Trade Systems. 5-60. Retrieved from http://institute.smartprosperity.ca/sites/default/files/publications/files/QuebecCalifornia%20FINAL_0.pdf

Quebec Ministry of Sustainable Development & Environment and Parks. (2012). Quebec in Action Greener by 2020: 2013-2020 Climate Change Action Plan. 1-55. Retrieved from http://www.mddelcc.gouv.qc.ca/changements/plan_action/pacc2020-en.pdf

Quebec Ministry of Sustainable Development Environment and Fighting Climate Change. (2013, May). Allocation of Emission Units Without Charge. 1-2. Retrieved from http://www.mddelcc.gouv.qc.ca/changements/carbone/ventes-encheres/allocation-gratuite/M2013.pdf

Quebec Ministry of Sustainable Development Environment and Fighting Climate Change. (2014, May). Allocation of Emission Units Without Charge. 1-2. Retrieved from http://www.mddelcc.gouv.qc.ca/changements/carbone/ventes-encheres/allocation-gratuite/M2014.pdf

Quebec Ministry of Sustainable Development, Environment and Fighting Climate Change. (2015, September). Allocation of Emission Units Without Charge. 1-2. Retrieved from http://www.mddelcc.gouv.qc.ca/changements/carbone/Avis_allocation.pdf

Rhodes, E., & Jaccard, M. (2013). A Tale of Two Climate Policies: Political Economy of British Columbia's Carbon Tax and Clean Electricity Standard. *Canadian Public Policy, 39*, 37-51.

Rivers, N. (2010, January 21). Impacts of climate policy on the competitiveness of Canadian industry: How big and how to mitigate? *Energy Economics*(32), 1092–1104.

Rivers, N., & Schaufele, B. (2015). Salience of Carbon Taxes in the Gasoline Market. *Journal of Environmental Economics and Management, 74*, 23–36.
Sadik, P. (2015, January 6). Essentials of a Carbon Tax for Canada. 1-11.
Sawyer, D., Peters, J., & Stiebert, S. (2016, May 27). Overview of Macroeconomic and Household Impacts of Ontario's Cap and Trade Program. 1-18. Retrieved from https://drive.google.com/file/d/0B9FT5KrVwYmwZHV2M1RZbnZmUGM/view
Saxe, D. (2016, November). Cap and Trade. In *Greenhouse Gas Progress Report 2016: Facing Climate Change* (pp. 64-87). Toronto, Ontario, Canada.
Saxe, D. (2016). Spending the Money Well. In *Greenhouse Gas Progress Report 2016: Facing Climate Change* (pp. 90-102). Toronto, Ontario, Canada.
Simmons, J. M. (2016). Federalism Intergovnmental Relations, and the Environment. In D. L. VanNijnatten (Ed.), *Canadian Environmental Policy and Politics: The Challenges of Austerity and Ambivalence* (pp. 130-145). Don Mills: Oxford University Press.
Statistics Canada. (2015, November 10). *Gross domestic product, expenditure-based, by province and territory*. Retrieved from Statistics Canada: http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ15-eng.htm
Statistics Canada. (2015, July 30). *Sales of fuel used for road motor vehicles, by province and territory*. Retrieved from Statistics Canada: http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/trade37c-eng.htm
Stern, N. (2009). Policies to Reduce Emissions. In *The Global Deal: Climate Change and the Creation of a New Era of Progress and Prosperity* (pp. 99-123). Public Affairs.
The Angus Reid Institute. (2015, April 22). Most Canadians support carbon pricing; but less consensus on effectiveness of such measures. 16. Retrieved from http://angusreid.org/wp-content/uploads/2015/04/Cap-and-Trade2.pdf
The Angus Reid Institute. (2017, March 24). *Politics Electrified: Three-in-four Ontarians say their hydro bills are 'unreasonable'; think they'll rise further*. Retrieved from The Angus Reid Institute: http://angusreid.org/hydro-one/
The Environics Institute. (2015). Canadian public opinion about climate change. 1-8. Retrieved from http://www.environicsinstitute.org/uploads/institute-projects/environicsinstitute-dsf%20focus%20canada%202015%20-%20climate%20change%20survey%20-%20final%20report%20-%20english.pdf
The Institute for Competitiveness & Prosperity. (2016, April). Toward a Low Carbon Economy: The Costs and Benefits of Cap and Trade (Working Paper). 6-48. Retrieved from https://www.competeprosper.ca/uploads/2016_WP25_FINAL.pdf
The Ministry of Sustainable Development, Environment and the Fight against Climate Change. (2017, March 27). Green Fund: 2015/2016 Green Fund Accounts. 1-33. Retrieved from http://www.mddelcc.gouv.qc.ca/ministere/fonds-vert/comptes/comptes-fonds-vert-2015-2016.pdf
The Ministry of Sustainable Development, Environment and the Fight against Climate Change. (2017). *The Carbon Market: Register of offset credit projects*. Retrieved from The Ministry of Sustainable Development, Environment and the Fight against Climate Change: http://www.mddelcc.gouv.qc.ca/changements/carbone/credits-compensatoires/registre_creditscompensatoires-en.htm
The Ministry of the Environment and Climate Change. (2016, May 18). Climate Change Mitigation and Low-Carbon Economy Act. 1-59. Retrieved from http://www.ontla.on.ca/bills/bills-files/41_Parliament/Session1/b172ra.pdf

The Ministry of the Environment and Climate Change. (2017). Compliance Offset Credits Regulatory Proposal. 4-25.

Toner, G., & Meadowcroft, J. (2009). The Struggle of the Canadian Federal Government to Institutionalize Sustainable Development. In D. L. VanNijnatten, & B. Robert, *Policy Instruments in Canadian Environmental Policy: Prospects for Leadership and Innovation* (3rd ed., pp. 77-90). Ontario, Canada: Oxford University Press.

United Nations Climate Change Conference (COP 21). (2015, December 12). Retrieved from More Details About the Agreement: http://www.cop21.gouv.fr/en/more-details-about-the-agreement/

Wilson, J., & Grochalova, B. (2016, March 22). CELA Submission on Bill 172 (Climate Change Mitigation and Low-carbon Economy Act, 2016). 2-22. Retrieved from http://www.cela.ca/sites/cela.ca/files/Cap-Trade-Bill172-Response.pdf

Winfield, M. (2009). Policy Instruments in Canadian Environmental Policy. In D. L. VanNijnatten, & R. Boardman, *Policy Instruments in Canadian Environmental Policy: Prospects for Leadership and Innovation* (3rd ed., pp. 46-63). Ontario, Canada: Oxford University Press.

Winfield, M. (2012). Introduction. In *Blue-Green Province: The Environment and the Political Economy of Ontario* (pp. 1-16). Vancouver, British Columbia, Canada: UBC Press.

Winfield, M. (2016). Implementing Environmental Policy. In D. L. VanNijnatten (Ed.), *Canadian Environmental Policy and Politics: The Challenges of Austerity and Ambivalence* (4th ed., pp. 74-96). Don Mills: Oxford University Press.

Winter, J., & Dobson, S. (2016, June). Who is Getting a Carbon-Tax Rebate? *The School of Public Policy, 8*(10), 1-6. Retrieved from https://www.policyschool.ca/wp-content/uploads/2016/07/carbon-tax-rebate-winter-dobson1.pdf

Wood, J. (2016, October 21). *Albertans give NDP carbon tax thumbs down in new poll*. Retrieved from Calgary Herald: http://calgaryherald.com/news/politics/albertans-give-ndp-carbon-tax-gets-thumbs-down-in-new-poll