Ontario's low-carbon transition: The role of a provincial cap-and-trade program

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Foreword

When I started the Masters in Environmental Studies program in September 2009 I knew that I would focus my research on climate change policy, but had no idea how challenging it would be to find a suitable topic within that broad area to write on. Having realized that I wouldn't be able to solve the world's greenhouse gas problem single-handedly, I narrowed down my research interests in the Plan of Study to climate change governance in Canada. Given the intimate link between greenhouse gases and economic activity and the predominance of market-based instruments in policy proposals, the theoretical perspective of my work became the political economy of climate change. Through course work I learned about the dynamic process through which climate change policy is formed at the national and provincial levels and the major barriers to effective policy development in Canada. I also honed my skills as a policy analyst through several terms papers and other course work. The role of business actors in climate change mitigation is another major theme of my Plan of Study which I explored again through course work and independent study. In this major research paper I have explored, in depth, how a sub-national jurisdiction in Canada (Ontario) could design an environmentally effective emissions trading program multilaterally in collaboration with other sub-national jurisdictions. This research aligns with at least two aspects of my area of concentration: Canadian environmental policy and environmental economics, and satisfies several of my learning objectives: understanding the dynamics of climate change federalism in Canada, role of business in climate change policy, and the range instruments available to policymakers wishing to regulate GHGs and the advantages and disadvantages of each. I hope that the findings and recommendations found herein are useful to policymakers in Ontario and beyond as climate change governance evolves.

Abstract

This major research paper addresses the question of how a sub-national entity such as Ontario can design an environmentally effective greenhouse gas (GHG) emissions trading system in the context of policy gridlock in Canada and through the UNFCCC process. The paper begins by exploring the historical context of climate change policy at the international and national levels in order to demonstrate how we have arrived at the current situation of policy gridlock and illustrate the opportunity for sub-national entities such as Ontario to take a progressive approach to climate change mitigation. But as climate change policy develops in an asymmetrical fashion within Canada, North America and the globe, policymakers in Ontario need to carefully design the proposed emissions trading system to balance the need to maintain environmentally integrity of the system (i.e. make a contribution to the decarbonization of the provincial economy) without overly harming the economic competitiveness of the province vis-à-vis neighboring jurisdictions who are not implementing comparably stringent policies. Such asymmetrical policy development could damage the long-term political acceptability of the program should economic losses reduce the relative prosperity of Ontarians and also the environmental integrity of the program if emissions-intensive activities relocate to jurisdictions without stringent GHG controls. As such the paper examines important elements of emissions trading programs: setting the cap; distributing allowances; designing the offset system; managing the interaction with existing renewable energy policies; and the treatment of emissions-intensive trade-exposed industries; with a view to improving the environmental integrity of Ontario's proposed program without harming its economic competitiveness. In each of these areas the experience garnered in the European Union Emissions Trading program (EU ETS) has been leveraged to provide policy recommendations to Ontario policymakers. The EU ETS has been in operation longer than any other GHG emissions trading program, and is the closest in design to Ontario's proposed system. With the EU ETS having undergone a major revision in 2009 which will apply for the 2013-2020 time period, there is a major opportunity for Ontario to apply the lessons learned in Europe to its emissions trading program. The research methodology for this paper was a comparative analysis that used primary sources in the form of policy documents and interviews to understand the proposed design of Ontario's program and secondary research using academic research that has evaluated the effectiveness of emissions trading programs in Europe and beyond.

Contents

1. Introduction: Ontario's place in multi-level climate governance

The Canadian Province of Ontario has staked out a significant role in the global effort to mitigate climate change. Its electricity policies, including the phase-out of coal and the related feed-in tariff for renewable electricity sources have made it a leading jurisdiction in North America. Ontario has also allied itself with a group of environmentally progressive sub-national North American jurisdictions through the Western Climate Initiative (WCI) which includes California, British Columbia, and Quebec as active members. As an active WCI member Ontario is committed to developing a provincial cap-and-trade program that is linked to other jurisdictions to create a regional market. The regional cap-and-trade program is being proposed to directly manage GHG emissions reductions across major sectors of the Provincial economy: electricity, transportation, buildings, industry and indirectly in others: waste management, agriculture and forestry (and potentially others) through a complementary offset program.

If implemented, cap-and-trade would be a central element of the Province's effort to reduce greenhouse gases (GHGs). But the devil is in the details of course, of which cap-and-trade has many. Design elements such as how to set the overall cap (i.e. cap-setting), distribute the allowances that result (allowance allocation), determine eligible offset projects, manage interaction effects with existing policies, and mitigate trade and competitiveness impacts are all important factors that will determine the success of the overall program. Such details are currently being developed at the supra-subnational level through the WCI design process.

The WCI began in 2007 when a group of western U.S. States (California, Oregon, Washington, New Mexico and Arizona) agreed to work towards the development of a regional cap-and-trade program. Over the next year four Canadian Provinces (B.C., Manitoba, Quebec and Ontario) and two U.S. states (Utah and Montana) would join, bringing the total number of participating jurisdictions to eleven. Design details for the program began to emerge in 2008 and culminated with the release in July 2010 of the final recommended design for the regional cap-and-trade program (actual implementation of the recommended design will occur at the member-jurisdiction level and so there are likely to be differences between the linked cap-and-trade systems). Additional design details, including the offset system design, and the central tracking and auction system for emission allowances, remain to be worked out and were intended to be released prior to the January 2012 start date of the regional program. None of the original WCI members are prepared for the 2012 start date however, with some having officially removed themselves from the cap-and-trade program (Arizona & Utah), others having not enacted enabling legislation (Oregon, Washington and Montana), and others behind in developing and implementing the policy architecture for emissions measurement, reporting and verification required for a proper functioning system (Ontario and Manitoba). As of June 30, 2011 the leading jurisdiction in the WCI, California, officially delayed the start of its cap-and-trade program to 2013 in order to give the State's Air Resources Board more time to work out the design details.

In spite of the uncertainty surrounding the Western Climate Initiative, the current Ontario Government has stated that it remains committed to implementing a cap-and-trade system. This research paper seeks to contribute to the effort to design an environmentally-effective cap-and-trade system in Ontario. It will start by outlining the climate change problem, and the political response at the international, national and Provincial (Ontario) levels. Having set the context of Ontario operating in a multi-level climate change governance regime, the paper will move to examine select design elements of Ontario's proposed cap-and-trade program. Using experiential evidence from the European Union Emissions Trading Program (EU ETS), which is closest in design to that being proposed by Ontario, the paper will make recommendations to the Province on the design of its program to improve its effectiveness.

1.1. The Climate Change "Threat"

Anthropogenic climate change caused by increasing concentrations of greenhouse gases (GHGs) in the atmosphere is one of the most serious threats facing humanity in the modern era. The impacts of climate change are already becoming evident as changing weather patterns deteriorate water availability and food security and collapsing ecosystems intensify a decline in biodiversity that threatens the very fabric of life on this planet. These impacts are predicted to intensify because GHG emissions reside in the atmosphere for decades and continue to rise. There is confirmation that the Earth's temperature has increased by approximately 0.74% over the past century which has resulted in sea-level rise and increased frequency and intensity of heat waves, storms, floods and droughts (IPCC, 2007). The best estimate for warming over this century from the Intergovernmental Panel on Climate Change (IPCC) is a further 1.8 to 4°C. This will intensify the impacts already being witnessed leading to potentially catastrophic consequences for vulnerable human societies and natural ecosystems. The physical threats of climate change are compounded by the scale of response required to effectively respond. Indeed a fundamental revolution in the way that human societies produce and consume energy is necessary over a very short time horizon.

International consensus has emerged around the need to limit temperature rise to 2°C above pre-industrial levels so as to avoid triggering positive feedback effects that could intensify climate change impacts and thus render mitigation and adaption efforts exponentially more difficult. Two such feedback effects include: (1) a decline in the extent of summer arctic sea ice which, because open water absorbs more heat than ice, would amplify warming and (2) melting permafrost which will release huge stores of methane long-stored in arctic peat bogs. Among other impacts, amplification of the global warming process could intensify ice sheet melting in Greenland and Antarctica thus leading to greater than anticipated sea-level rises (Lenton et al., 2008). The 2°C threshold for warming was formally incorporated into the global policy discussion as part of the 'Copenhagen accord' produced by the UN Climate Change negotiations in December 2009.

Despite global rhetoric around the need to limit warming to 2°C, the reality is that this threshold has already been passed (IEA, 2011). Indeed, assuming a mid-range of climate sensitivity, IPCC models suggest that achieving a maximum temperature rise of 2°C would require limiting atmospheric concentrations of CO2 to 370ppm (Dessler and Parson, 2006). Given that current atmospheric concentrations of CO2 are at 380ppm and rising rapidly, it is likely that temperature rises over the century will be closer to 4°C. The sea-level rise predicted to occur in a world 4°C warmer would inundate major cities like London, Boston, New York, Mumbai and Shanghai and devastate other low-lying coastal areas like Bangladesh (Fitzgerald et al., 2008). Thus the evidence tells us that we need to reduce GHG emissions quickly in order to avoid catastrophic impacts on human societies and natural ecosystems. How quickly? A paper published in *Nature* in April 2009 showed that a global GHG emission reduction of 80% by 2050 is necessary to have a less than 50% chance of exceeding the 2°C threshold by 2100 (Allen & al., 2009 and Meinshausen & al, 2009).

As the discussion above has made clear, dealing effectively with climate change will require a collective transformation of our global economy on a scale and time-trajectory unprecedented in human history. In contrast to global environmental problems like ozone depletion and water pollution where policy solutions can be targeted at a much narrower scope of substances and activities, climate change is deeply connected to the growth of the global capitalist economy and so dealing with it will require either a reconsideration of the capitalist growth model, or the development of new avenues of growth that are not dependent on the combustion of fossil fuels (i.e. decoupling emissions growth from economic growth) (Newell & Paterson, 2010). Related to this conundrum of how to stimulate a shift to low-carbon economic activity is the question of distribution of effort. Given that developed countries have contributed disproportionately more to the climate change problem through their carbon-intensive development pathway and that the world's poor have an urgent need for economic growth to reduce the impacts of poverty, a fair solution to climate change would see the rich world reduce their emissions comparatively more to make 'atmospheric space' for developing countries to increase their emissions and fuel the economic growth required to provide the basic human requirements for sustenance. This concept of "common but differentiated responsibilities" has been enshrined in the international response to climate change which will be discussed in the following section.

1.2. The International Response

Climate change is a quintessential example of what Garret Hardin termed as a "commons problem" (Hardin, 1968) where the actions of individuals, firms and nations emit GHGs into the atmosphere that deplete a shared resource (in this case a "benign" climate). Given that each individual actor is behaving in what is perceived as their own self-interest, they have little incentive to curb their own destructive actions unless they are assured that others will follow suit and not free-ride on the efforts of others. This theoretical perspective underlies the idea that climate change is best governed through a global multilateral approach that coordinates the actions of all and thus mitigates the potential for individual nations to "free-ride" on the benefits of others. This is similar to the "matching principle" found in environmental-law literature which argues that the level of jurisdictional authority (local, regional, national, global) that should take action to resolve a particular externality should match the geographic scope of the problem (Butler & Macey, 1996).

The response to climate change that began to emerge in the late 1980's has followed this theoretical guidance in that it has focused on the global political arena. The Intergovernmental Panel on Climate Change (IPCC) was formed shortly after the 1988 "Toronto Conference on the Changing Atmosphere" and was tasked with reviewing and assessing information relevant to the understanding of climate change (IPCC, 2010). Subsequently in 1992 the UN Framework Convention on Climate Change

(UNFCCC) was produced at the Earth Summit in Rio de Janeiro which represented the first global treaty addressing climate change. While not legally-binding, the UNFCCC established national-level reporting on GHG mitigation programs and annual inventories and set a target of returning GHG levels to 1990 levels by the end of the decade (Bodansky & Diringer, 2010). National reports were subject to review by the UNFCCC Conference of the Parties (CoP), thus creating the possibility for reputational sanctions for nations perceived as not acting in congruence with the UNFCCC target.

When the parties to the UNFCCC convention met at the first CoP in 1995 the non-binding "pledge and review" global policy trajectory set in motion earlier was superseded by an effort to create a more robust and legally binding set of emission reduction commitments and timetables. Developed countries who signed on to Annex B of the Kyoto Protocol set legally binding emission reduction targets for the 2008-2012 period. This approach of setting binding targets and timetables followed the successful model of the Montreal Protocol addressing ozone depletion (Sunstien, 2006). Two years after CoP-1 this form of climate governance would become enshrined in the Kyoto Protocol as a group of developed countries (so-called annex B countries) adopted binding emission caps to be achieved by the end of the agreement in 2012.

The global approach to climate change also came to take on a decidedly market-based, neoliberal flavour. Newell and Paterson (2010) describe this aspect of the response to climate change as having emerged from a period of economic crisis in the 1970's that shifted economic ideology to the right (*ibid:* 18). Neo-liberalism is an ideology that emphasizes the role of unbridled financial markets in economic growth, accepts rising inequality as a consequence of wealth-creating economic policies, and reduces the role of the state as a provider of goods and services in favour of private business. With this ideology dominant flexible economic instruments have taken prominence in climate change policy. Rather than setting regulatory performance standards for large emitters, policy makers have to date preferred voluntary and market-based approaches (i.e. emissions trading or carbon taxation) to manage GHG emissions (Stavins, 2003). However this trend appears to be changing of late in North America where regulators are moving forward with sectoral emission standards for the electricity sector and select industrial sectors (i.e. automotive).

The idea that market incentives could be used as the basis of environmental policy emerged on the political agenda in the 1980's as ecological modernization became accepted as a legitimate approach (Newell & Paterson, 2010: 24). As an approach, ecological modernization recognizes that capitalism is concomitant with environmental problems, but can be made more environmentally friendly through the reform of political, economic and social institutions. *Dematerialization* of production processes and *decoupling* of economic growth from resource use are key ideas underpinning ecological modernization discourse (Carter, 2007). Within the context of ecological modernization, emissions trading emerged as the most prominent policy tool for managing climate change because compliance flexibility achieved through permit trading can theoretically support greater cost efficiency than a carbon taxation regime (Morris, 2009). In addition to the support from economic theory for emissions trading, the political economic theory of instrument choice suggests that industrial actors will favour it because there is greater flexibility in complying with regulations and potential to leverage their privileged position in the policy process to influence the design of the program to suit their interests (Hepburn, 2006: 236).

Emissions trading formally entered the global climate change policy regime during Kyoto Protocol negotiations in 1996-97 (Ellerman, Convery, & de Perthuis, 2010: 17). U.S. negotiators, facing stiff domestic political resistance to the Kyoto Protocol and supported by the apparent success of emissions trading under the US Acid Rain Control program, overcame the resistance of the EU and other Kyoto parties to successfully include provisions for nations to achieve their emission reduction targets flexibly through the use of international emissions trading (IET), Clean Development Mechanism (CDM) and Joint Implementation (JI) credits (Labatt & White, 2007). Kyoto Protocol IET allows countries holding excess assigned amount units (AAUs) to sell them to other countries who have exceeded their Kyoto Protocol target. The CDM allows market participants in industrialized countries to invest in developing country emission reduction projects and obtain Certified Emissions Reductions credits (CERs) that can be used in lieu of reducing their own emissions for compliance in a cap-and-trade system. Finally, JI projects are implemented in industrialized countries, or economies in transition (typically former Soviet Union countries) and generate emission reduction units (ERUs) for use in a cap-and-trade system (Labatt & White, 2007: 206).

While the global climate change regime has evolved in important ways by setting up a system for national reporting of emission reduction programs and inventories and financial mechanisms such as the CDM, its development has stalled due to the absence of the United States from the Kyoto Protocol, and the inability of some developed country signatories (i.e. Canada) to mobilize serious domestic efforts, or accept significant international commitments – a problem exacerbated by the global economic crisis. The stalling of the global climate regime became evident at the Copenhagen negotiations in December 2009 where it was hoped that a successor to the Kyoto Protocol would be agreed upon. Instead, a non-binding set of agreements on emission reductions and mobilizing climate finance resulted that represents a retrenchment from the international process (Bodansky & Diringer, 2010). With the global top-down approach to climate change now in a state of limbo, the focus has gradually shifted back to the local, regional and national scale of action.

1.3. Canada's Response

Canada took a leadership role at the beginning of the global effort to address climate change. It hosted the first international conference on global warming in Toronto in 1988, and was one of the first countries to sign the UNFCCC in 1992 (MacDonald, 2009). However, translating Canada's international commitments into implemented policy has proven to be challenging for Canada. Its federal make-up gives significant power to the Provinces in the area of natural resource management which creates veto points for climate change policy. Related to this is a lack of leadership at the federal level to develop institutions that creatively address the challenges presented by the Canadian federal context (*ibid*).

Between 1992 and 1995 a federal-provincial process of collaboration between the Canadian Council of Ministers of Environment (CCME) and Council of Energy Ministers, referred to as the Joint Meeting of Ministers (JMM) operated in an attempt to implement programs that would reduce GHGs. The decision-making process was consensual which gave resistant fossil energy-producing Provinces (most notably Alberta) a defacto veto . The resulting "National Action Program" represented a lowest-common-denominator result of voluntary actions without the use of coercive law and/or tax measures to motivate reductions (*ibid*: 154).

Three years later Canada adopted the Kyoto Protocol in April 1998, where it committed to a 6% reduction below 1990 levels over the 5-year commitment period of 2008-2012. While the overall UNFCCC goal was to return GHG emissions to 1990 levels, the concept of common but differentiated responsibilities meant that Canada and other developed countries were to take on greater cuts in order to allow emissions to rise in less-developed countries. The JMM process was used again to negotiate a second national program, "Action Plan 2000 on Climate Change", which again relied on voluntary action and $500m in fiscal measures to support GHG reduction (Government of Canada, 2000).

Canada's liberal-majority Parliament officially ratified the Kyoto Protocol in 2002 despite the fact that the U.S. considered it "economically irresponsible" and refused to do so, and that industry and several Provinces were vociferously opposed (MacDonald, 2007). Unilateral ratification of the Protocol by the Federal government without the support of all of the Provinces resulted in the collapse of the collaborative Federal-Provincial JMM process that had been operating up until that time. The Federal government then embarked on a set of bilateral negotiations with Provinces and industry over 2003-2005 that was backed up with another $1b in incentives, bringing total federal spending on Kyoto to $3.7 billion. While significant progress was made through this approach as Individual agreements were reached with six provinces, Alberta maintained is vociferous opposition to federal action (Winfield & MacDonald, 2008). The result of Federal private negotiations with the oil and gas industry was an agreement that compliance costs would be capped at $15/tonne CO2eq and with the auto industry that vehicle emission standards would cut emissions 5.3mt by 2010 (Pew Center, 2005).

By April 2005 the minority Liberal government under Paul Martin finally announced its Kyoto Implementation Plan entitled "Project Green" which fundamentally revamped the plan announced in 2002. The government added the six GHGs from the Kyoto protocol to the Canadian Environmental Protection Act (CEPA) list of Toxic Substances in December 2005 and proposed regulations to control emissions from large final emitters (LFEs). The new plan continued to rely on fiscal "carrots" ($10b in funding was announced in the budget for GHG reduction measures) and sought to win-over powerful industry stakeholders by relaxing emission reduction targets for LFEs to 15% (the upshot of which would be that a more significant burden would be carried by smaller emitters and individuals). In spite of the efforts to woo emissions intensive industry, the plan elicited a formal objection from Alberta who rejected the Federal Government's jurisdiction to regulate GHGs (CBC News, 2007).

The Conservative party came to power in January 2006 with an election promise to scrap Canada's Kyoto Protocol commitments and develop a "made-in-Canada" approach to climate change that was bundled with urban air quality issues . While not formally backing out of Kyoto, Canada announced that it would join the Asia-Pacific Partnership on Clean Development and Climate, an initiative spearheaded by the U.S. Government as a voluntary alternative to the legally binding Kyoto Protocol. Just as the new Conservative Government was moving to dismantle the Kyoto-related programs set up by the predecessor Liberal government; polling data was showing the environment, driven by concern about climate change, was rising as an issue of public concern trumping health and environment (The Strategic Council, 2007). The Conservatives responded to this rising public concern with a new plan, *Turning the Corner,* which marked a return to the previous Liberal government policy albeit with weaker objectives and longer time-lines (Simpson, Jaccard, & Rivers, 2007). The plan shifted the Kyoto emissions baseline (1990) by setting a target of reducing emissions by 20% of 2006 levels by 2020 but only required LFEs to reduce the intensity of their emissions (18% by 2010), rather than make absolute cuts as was proposed under the Martin government.

With the failure of the Federal Liberal party's carbon tax-focused *Green Shift* election platform in 2008, the Conservative government's obstinate stance on climate change was strengthened. However election of the Obama administration in the U.S. later in 2008, and the announcement that it intended to enact comprehensive climate legislation that included an economy-wide cap-and-trade program, resulted in another evolution in Canadian climate change policy. The Conservative government moved from a desire for the "made-in-Canada" approach articulated in *Turning the Corner* to an attempt to harmonize policy with the U.S. in order to protect Canada's bilateral trade (Environment Canada, 2008).

The U.S. Federal Government was unable to pass such comprehensive regulation, and has instead introduced regulations under the Clean Air Act that provides the Environmental Protection Agency (EPA) with the authority to set emission performance standards for new or retrofitted industrial facilities. These regulations came into effect on January 1, 2011 but continue to be the subject of numerous challenges in both legislative and judicial arenas. While harmonization with the US was the stated Canadian government position, its proposed sectoral approach is less comprehensive than the U.S. EPA's regulatory agenda (Partington, 2010). For example, it has proposed regulations for the coal-fired electricity sector that will apply a performance standard for new facilities and those that have reached the end of their economic life that is set at the emission intensity level of natural gas combined cycle (NGCC) technology (*ibid*). In contrast, the U.S. EPA's regulatory approach would apply to all coal-fired electricity facilities, not just those that are new or undergoing significant retrofits. The Canadian government has also suggested that GHG emission regulations for the oil sands sector will be passed later in 2011, although no details are yet available on the shape that these regulations will take.

1.4. Ontario's Response

Ontario was initially opposed to the ratification of the Kyoto Protocol. It refused to sign the final version of the National Implementation Strategy at the JMM in October 2000, and supported Alberta's attempts to consider alternatives to the Kyoto Protocol in Federal-provincial consultation sessions . Ontario's initial resistance to the Kyoto Protocol was due in part to the deregulatory agenda pursued by the Conservative government of the day, but also to concerns over the competitiveness impacts on key Provincial industrial sectors - such as automotive, chemicals and metal production - in North American markets (Bjorn et al., 2002: 68).

Ontario's position changed in 2003 with the election of a Liberal government on an environmentally-progressive platform that included the phase-out of the Province's coal-fired electricity plants. The Province successfully concluded a bilateral agreement with the Federal government that included significant amounts of federal funding to support Provincial GHG reduction efforts (Winfield & MacDonald, 2008) and began to increase its institutional capacity on climate change. In 2005 the Province designated the Ministry of the Environment (MOE) as the lead ministry coordinating the climate change response across departments and created a Climate change directors group of 13 senior managers from different ministries who began to meet on an ad hoc basis. While these developments signaled an evolution in the Province's climate change governance regime, it still lacked a formal plan or strategy that was anchored on specific emission reduction targets and subject to performance review (Environmental Commissioner of Ontario, 2005: 61).

Ontario's climate change regime evolved yet again in 2007 with the release of the *Climate Change Action Plan* (CCAP) that for the first time set a timeline of provincial GHG reduction targets that were in line with Canada's Kyoto Protocol commitments: 6% below 1990 by 2014 (166Mt); 15% below 1990 by 2020 (150Mt) and 80% below 1990 by 2050 (35Mt). A major catalyst for this new approach was the release of the Federal Conservative *Turning the Corner* plan that was perceived to unfairly target Ontario's automotive industry rather than the fast growing emissions in Alberta's oil sands sector (Rice, 2009).

With the Federal Conservative government in power the federal-provincial negotiation process - that had produced six agreements between the federal and provincial governments - broke down. Prior to 2007 Ontario's climate regime was criticized for its informal apportionment of responsibility, for its lack of a formal strategy, for not having institutionalized sufficiently stringent commitments, and for weak or non-existent public participation processes (Environmental Commissioner of Ontario, 2005: 59). With the release of the *Climate Change Action Plan* in 2007, the Government appeared to be setting itself on a different evolutionary course for its climate governance regime. The Climate Change

Secretariat was created to coordinate and implement the plan and the Environmental Commissioner of Ontario was given the responsibility of reviewing the government's progress at achieving GHG reduction targets. With ambitious policies enacted for the electricity sector (coal phase-out, green energy act) the Ontario government had set itself on a trajectory for achieving significant economy-wide reductions. But, in the years since this institutional arrangement has floundered. The Secretariat has lacked the financial and human resources to coordinate a pan-government response to climate change, and the institutional authority to require government ministries to enact policy measures. As an indicator of the CCS's institutional weakness, it is no longer mentioned in the government's annual climate change mitigation report (Government of Ontario, 2011). The ECO has consistently criticized the transparency and ambitiousness of climate change governance in Ontario (see e.g. Environmental Commissioner of Ontario, 2010: 30), but recommended institutional reforms have not resulted.

1.5. Climate Change Action Plan – Progress to Date

While Ontario's GHG emissions plummeted 13% in 2009 to 165Mt – appearing to reach the 2014 target 5 years early - these emissions declines were coincident with a global economic recession that slowed production at the province's emissions-intensive industrial facilities. With economic growth having returned to Ontario (the Provincial economy grew by 3.2% in 2010) GHG emissions are certain to have risen again. Absent policy measures beyond the electricity sector, the Province is not likely to achieve its GHG reduction targets. The Province admits this itself, pegging the gap between projected GHG emissions in 2014 and the target at 4Mt although some estimates have put this gap much higher at 13Mt given the historical rate of improvement in GHG emissions intensity and projected economic growth (Environmental Commissioner of Ontario, 2011).

Thus *Climate Change Action Plan* initiatives announced to date leave a significant gap in achieving the Province's climate change goals. Policy measures are desperately needed for the two largest contributors to GHGs in the Province: transportation (35%) and industry (33%). The Province has suggested that the introduction of a cap-and-trade system could be a significant factor in helping to close or eliminate the shortfall (*ibid:* 13). If implemented in collaboration with Western Climate Initiative jurisdictions as proposed (Government of Ontario, 2009), cap-and-trade would target electricity and large industrial emitters (>25k tons/annum) initially (Ontario's start date for cap-and-trade was initially to be 2012, but has since been delayed to an unknown future date) and transportation emissions from 2015.

2. Research Question and Methodology

The question thus becomes: **given the political context of stalled international negotiations, and uncertain national and continental policy, how can Ontario's proposed cap-and-trade program be designed so that it makes an effective contribution to climate change mitigation**? While there are legitimate concerns over whether cap-and-trade as opposed to a carbon tax is an appropriate policy for Ontario (see e.g. Environmental Commissioner of Ontario, 2010: 22), these will not be addressed in this research paper. Assuming that Ontario's decision to develop a cap-and-trade program is final, this paper will address the question above by examining five core design elements of a cap-and-trade program:

1. Cap-setting
2. Allowance allocation
3. Offsets
4. Interaction effects with complementary regulation
5. Managing carbon leakage and competitiveness concerns

Each of these elements will be the subject of a separate chapter. The analysis will compare the proposed design of Ontario's cap-and-trade program, which is modeled on the WCI design recommendations (Western Climate Initiative, 2010c), with the design and implementation of the European Emissions Trading Scheme (EU ETS) - the only other economy-wide cap-and-trade program in existence globally. The EU ETS has recently undergone significant reforms in its third phase (2013-2020) which build upon the lessons learned in the first two phases to increase the stringency of the overall program (Skjaerseth, 2009). This new design will figure heavily in making recommendations to Ontario on the design of its program that will appear at the end of each chapter.

Information to support the analysis and recommendations has been gathered through a variety of sources. Primary research in the form of a review of policy documents and participation in conference calls from the Province of Ontario, the Western Climate Initiative, and the European Union was used to develop an understanding of the cap-and trade policy architectures proposed (for Ontario, WCI and EU ETS phase III) and in operation (EU ETS phase II). This primary literature review was complemented by an analysis of secondary literature from academic and NGO sources that has assessed proposed and operational cap-and-trade systems from a political-economy and environmental integrity perspective. Finally, because significant design details of Ontario's cap-and-trade program remain unknown at this time in areas such as allocation, offsets, and market oversight, interviews with individuals involved in the development of Ontario's cap-and-trade system have been used to fill the information gaps that exist in the public sphere and to understand the policy options being considered by the province. Three interviews were conducted with Ontario government officials from the Ministry of Environment, the Ministry of Economic Development and Trade and the Office of the Environmental Commissioner of Ontario. Informal conversations were also conducted with individuals from non-governmental organizations (Environmental Defence) and the private sector (the International Emissions Trading Association, the Cement Association of Canada and Offsetters Inc.) that are close to the cap-and-trade policy development process in Ontario.

3. Cap-Setting

International consensus has emerged around a target of limiting temperature increase to 2°C above pre-industrial values. This target was incorporated into the UNFCCC at the Copenhagen accord in December 2009 (UNFCCC, 2009), and has been endorsed by the G-8 as a goal of international climate policy (Reuters, 2009). While translating this temperature target into a corresponding GHG concentration and emissions reduction pathway entails significant uncertainty, IPCC climate models indicate that a GHG concentration of 450ppm is consistent with a 2°C warming by the end of the century. Achieving this concentration requires a reduction of somewhere between 50% and 85% of 2000 global GHG emissions by 2020, with CO_2 emissions peaking between 2010 and 2015 (IPCC, 2007).

Given that developed Western nations have emitted proportionately more GHGs into the atmosphere than other nations, the contested but established concept of *common but differentiated responsibilities* suggest that, while all nations bear responsibility for climate change mitigation, those with a greater historical contribution and relative wealth should take on more aggressive emission reduction targets. Thus, while some developing nations may increase their emissions over the decades to 2050, OECD nations have agreed to make aggressive cuts of somewhere between 80% and 95% of 2000 levels in order to prevent global temperature from rising more than 2°C (Tilford, 2008). Furthermore, the timing of emission reductions has important implications for the overall efficiency of achieving the 2050 target. This is because, by delaying emission reductions until later in the 2010-2050 period, the learning-by-doing effects and induced innovation that reduce the costs and improve the effectiveness of new technologies are not sufficiently realized (Wing, 2003). The development and adoption of new technologies is slowed due to policy delay which results in increased overall costs. The increased costs attributable to policy delay have been highlighted both at the global level by Nicholas Stern (2006) and the national level by the National Roundtables on the Environment and the Economy (NRTEE, 2011).

Thus the question for Ontario becomes, are the targets set out in the *Climate Change Action Plan* consistent with the current state of knowledge on emission reduction pathways for limiting temperature rise to 2°C by 2100, and have these been incorporated into the cap-and-trade system design (i.e. is the system likely to be environmentally effective)? This necessarily must include an assessment of the *scope* of the cap (i.e. does it cover enough emissions sources to be effective?). Secondly, is the timing of emission reductions over the 2010-2050 period likely to induce the early adoption of new technologies and thus increase the efficiency of the system over time? This section will start by examining cap-setting in the EU ETS system in order to provide a context for the analysis of the environmental effectiveness and dynamic efficiency of Ontario's proposed emissions caps.

3.1. Cap-setting in the EU

Cap-setting in the EU ETS is guided by the European Community's overall emission reduction commitments. The original EU-15 members[1] adopted a common Kyoto Protocol GHG reduction target of 8% below 1990 levels by 2012 with varying contributions ranging from -28% (in the case of Luxembourg) to +27% (in the case of Portugal). While the EU expanded after ratification of the Kyoto Protocol, new members were required to participate in the EU ETS as a condition of joining the EU and most are Kyoto signatories with reduction targets ranging from 6-8% (EU Commission, 2011).

For the post-Kyoto period, the EU Commission's *2020 flagship initiative for a resource-efficient Europe* commits members to reducing GHGs by 20%, increasing the share of renewable electricity in the EU's energy mix to 20%, and achieving a 20% improvement in energy efficiency by 2020 (European Commission, 2011). Because emission reductions are considered more cost effective in ETS sectors than

1 EU-15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.

in those outside the cap, they will face a more stringent reduction of approximately 27% over 1990 levels. The EU Commission has also stated that it would increase to 30% its GHG reductions over 1990 levels by 2020 if other developed nations adopt comparable targets. With respect to 2050, the EU Commission has adopted a target of reducing domestic GHGs by 80% over 1990 levels.

During the first compliance period (2005-2007) cap-setting and allocation in the EU ETS was a bottom-up process whereby each member state developed a National Allocation Plan (NAP) using guidance criteria from the EU Commission (Ellerman, Convery, & de Perthuis, 2010:32). These plans, which articulated the number of emissions that the member state would allocate, were then submitted to the Commission who had the right to reject an NAP if it was determined to be incompatible with criteria set out in the Directive. Given that the objective for the first period was to establish market infrastructure and institutions and not explicitly to reduce emissions, the cap was closely tied to expected business-as-usual (BAU) emissions (*ibid:*36). It is important to note here the role of the EU Commission in reviewing member-state NAPs. The Commission required reductions totaling 4.3% of what would have been the EU cap (*ibid:* 42), thus decreasing the surplus in allowances to 4% above actual emissions.

In the second compliance phase (2008-2012) the EU ETS became the primary instrument for achieving Europe's Kyoto Protocol commitments, and thus the Commission took a more assertive approach in its negotiations with member states on their NAPs. The Commission rejected nine Eastern European member state NAPs in the second round, reducing the aggregate cap proposed by member states by 10% to 2083mt. In spite of the more assertive approach taken by the European Commission, preliminary analyses suggest that phase II of the EU ETS will not deliver domestic European emissions abatement (Morris & Worthington, 2010). While the second phase cap was set at 6% below 2005 emissions, the recession that hit Europe in 2009 reduced emissions significantly. Thus, even with economic recovery over the final years of phase II (2010-2012), the European Commission has estimated that between 5-8% (500-800 million EUA's) of phase II allowances will be banked for use in phase III. This excess in EUA's, when coupled with a carry-over of nearly 800m unused offset credits from phase II to phase III (D'Oultremont, 2010) and an additional 300 million offset credits to be made available in phase III, means that carbon emissions in the EU could continue to grow with no need for domestic abatement until late in phase III (Sandbag Consultancy, 2010).

For the third phase of the EU ETS (2013-2020), the EU Commission has set an initial cap of 2.039 billion allowances for 2013 which will decline linearly by 1.74% over the period so that the 2020 cap will be consistent with the EU 20% reduction target. This amount includes the additional sectors (i.e. aluminum) and gases (e.g. nitrous oxide) to which the cap will apply in the third phase which extends the coverage of the scheme from 40% to 43% of total EU GHG emissions (D'Oultremont, 2010). Emissions from civil aviation will also be included in the EU ETS from 2012, and the EU will consider including maritime shipping emissions if no international agreement is reached (EU Commission, 2010b). Aside from the wider cap, one of the main changes to cap-setting in the EU ETS is the replacement of the decentralized process of aggregated member state NAPs that characterized the first and second rounds to a centralized EU-wide cap determined by the EU Commission. This harmonized approach to cap-setting is expected to avoid the problems encountered in the first and second rounds where member states were able to submit cap proposals in their NAPs that, when aggregated to form an EU cap, led to over-allocation and thus an insufficient carbon price to incentivize emission reductions.

3.2. Cap-Setting in Ontario/Western Climate Initiative

As described in the introductory section, Ontario has set a set of three targets over the period to 2050, all based on the 1990 baseline adopted for the Kyoto Protocol:

Year	**Change (% of 1990 baseline)**	**Overall emissions (mt CO2e)**
1990	N/A)	176
2014	-6%	166
2020	-15%	150
2050	-80%	35

Source: Government of Ontario (2007)

In harmonizing its approach to cap-and-trade with the Western Climate Initiative, from 2012-2015 Ontario's cap-and-trade system will cover emissions from electricity generation and industrial sources (downstream) that emit more than 25 kt of CO_2e. In the second phase (2015-2020), Ontario's cap-and-trade system will expand to cover suppliers of fuels for transportation, residential, commercial, institutional and small industries (T-RCI). Thus, in the first phase the cap-and-trade system will cover approximately 40% of Ontario's, and in the second phase it would expand to capture approximately 90% (based on Canada's 2009 National Inventory Report Data). The overall emission limit for the WCI is the sum of each partner jurisdiction's allowance budget and will decline annually to meet the regional goal of reducing emissions by 15% of 2005 levels by 2020. In this regard, the WCI design is similar to that of the EU ETS in the first and second phases in that cap-setting is decentralized to the sub-regional level.

With respect to consistency with the overall goal of limiting global temperature rise to 2ºC, Ontario's GHG reduction targets fall short of what is required. Its long-term target (80% by 2050) is on the low-end of what IPCC modeling indicates is necessary for a developed jurisdiction (i.e. 80-95%). Complicating this picture, the Government has not specified the proportion of these emission reductions that will occur domestically. Access to international carbon markets for capped sectors would make domestic reductions less than 80%, supplanted by potentially dubious international offsets. In order to increase the stringency of the cap, the government could increase the stringency of the long-term cap to a 95% reduction and specify that at least 80% of those reductions be met domestically.

With regards to Ontario's near and mid-term caps, there is a fundamental disconnect between them and IPCC recommendations for mid-term targets (-25% to -40% of 1990 levels by 2020) (IPCC, 2007: 776). Given that the majority of Ontario's 2020 target will be met by one policy (the phase-out of coal electricity) and that offset credits will be available for up to 49% of overall reductions, Ontario appears to be effectively delaying aggressive cross-sectoral emission reductions until after the 2020 period. This picture is made worse still by the fact that the overall WCI target is for a GHG reduction of 15% over 2005 levels as opposed to the 1990 levels upon which Ontario's cap is set. Thus while Ontario may succeed in reducing its domestic emissions by 15% over 1990 levels, its relatively more ambitious targets will provide extra space under the overall WCI-cap for other jurisdictions to increase their emissions, or to not reduce them as much. Futhermore, with the WCI regional goal being less ambitious than Ontario's the carbon price will be lower which reduces the incentive to deploy low-carbon technology early in the climate mitigation effort, and thus also the reduces the dynamic efficiency of the program over time.

Another potential problem with cap-setting in the ON/WCI ETS is its decentralized nature and the lack of a central authoritative institution. In the EU ETS phases 1 and 2 the decentralized approach to cap-setting proved to be a problem as individual jurisdictions had an incentive to increase their estimates of business-as-usual emissions in order to inflate their own cap. This has resulted in absolute over-allocation in the first phase (Ellerman & Buchner, 2008) and early over-allocation for subsequent phases as banked emissions are carried from the second to third phases (McAllister, 2009). This problem was partially mitigated by the EU Commission who acted to reduce the emissions allocations proposed by several member states in both the first and second rounds, and has been fully mitigated for the third phase due to the centralization of cap-setting at the EU-level. The WCI takes a similar decentralized approach as the EU ETS phase 1&2, but without having a central authority invested with the power to revise down allocation budgets to ensure consistency with the regional target. Reputational sanctions are the only ones available to member jurisdictions who feel that another has compromised the environmental effectiveness of the scheme by setting their emissions caps to high and over-allocating to domestic industries (personal communication, February 2011). Indeed, with the WCI based on a rather informal set of memorandums of understanding (MOUs) between partner jurisdictions, it is hard to envision what measures beyond naming-and-shaming the WCI can use to sanction over-generous jurisdictions.

3.3. Conclusions & Recommendations

In conclusion, Ontario's GHG emission caps are not set sufficiently stringent enough to have a fair chance of avoiding a greater than 2^{0}C warming by 2100 and are not sufficiently aggressive enough in the near/mid-term to incentivize the rapid deployment of low carbon technologies that would make the emissions trading scheme dynamically efficient over the period to 2050. As the Environmental Commissioner of Ontario recommends in its 2010 Annual Greenhouse Gas report, "the Ontario government undertake a formal public review of its CCAP GHG targets in light of scientific evidence indicating concentrations of GHGs in the atmosphere are unacceptably high" (Environmental Commissioner of Ontario, 2010a: 11).

In addition to increasing the stringency of its own GHG emissions caps, the Ontario government should also engage in negotiations with its WCI partners to enhance the centralized authority of the regional program. A centralized authority vested with the power to revise the emissions caps of member jurisdictions, much like the role played by the European Commission in Europe's ETS, would help to ensure that Ontario's more ambitious targets and reductions do not result in GHG emissions increases elsewhere. Absent such an authority, reputational sanctions are the only enforcement measures available. Given that policymakers across the WCI region will face pressure to relax their emission caps to protect domestic industrial interests, the environmental effectiveness of Ontario's actions would be compromised, and as such the Province should reconsider its participation in the program.

Recommendations

- Ontario should revise its 2020 and 2050 caps to be consistent with IPCC recommendations for emissions reductions from developed economies. These revised caps should stipulate that a significant majority (i.e. >80%) of emissions reductions occur domestically
- Ontario should negotiate with its WCI partners to develop a centralized institution with the authority to review and revise proposed partner jurisdiction allowance budgets so that over-allocation in one part of the region doesn't compromise the efforts of others.

4. Allowance Allocation

Once a cap has been set for an emissions trading system (ETS) a pool of allowances are created that correspond to the total amount of emissions permitted in a given period. In order to meet the environmental goals of the ETS, the number of allowances should decline over time to reduce the emissions at industries covered by the cap to the desired level. While this seems rather straightforward, there is a fundamentally important question to be resolved by the regulator: how to allocate emissions allowances? Given that they are effectively property rights that can have considerable value to society, the question of how and to whom emissions allowances should be allocated has significant implications. This section will evaluate Ontario's options for allocating emissions allowances with a view to ensuring the environmental effectiveness and fairness of the cap-and-trade scheme.

4.1. Approaches to allowance allocation

In cap-and-trade programs there are a number of different approaches to allocating emissions permits. The most common approach used to date is to provide permits for free to industrial installations covered by the scheme on the basis of prior use (Woerdman et al., 2008). This method, referred to as "grandfathering" emissions permits, is common in the areas of land use regulation, natural resource management (i.e. fisheries quotas) as well as cap-and-trade systems (e.g. US Acid Rain program). There are several reasons that might explain a government's decision to resort to such a system; with the most important being the desire to enhance political acceptability of an ETS among politically-powerful regulated firms (Tietenberg et al., 1999). While there are many good reasons why a regulator may want to distribute allowances in such a fashion, the incentives it provides for regulated entities to increase their use of the resource in question (in the case of climate policy GHG emissions in the atmosphere) in advance of the program so that they are awarded greater access contributes to a "locking-in" of emissions intensive infrastructure rather than incentivizing a shift towards low-carbon technologies that is the putative goal of an ETS (Egenhofer & Fujiwara, 2005).

Another major reason why policy-makers may wish to provide emission allowances freely to regulated sectors is to avoid a decline in domestic competitiveness relative to international jurisdictions that lack a commensurate carbon pricing policy. In order to avoid the perverse incentives described above while maintaining the competitiveness of domestic industries, free allocation on the basis of performance benchmarks has emerged as a preferred method for policy-makers (Egenhofer & Georgiev, 2010). Performance benchmarks are established at the sectoral or sub sectoral-level and are used to achieve a 'fair' distribution of allowances. When benchmarks are output-based, two facilities with a given level of production will receive the same amount of allowances based on a GHG efficiency benchmark. In this scenario, the more efficient producer will receive a proportionally greater amount of allowances relative to their demand. Given that the ETS establishes a price for emissions allowances, allocation on the basis of performance benchmarks incentivizes lower carbon production. These benchmarks are updated over time to reflect changes in the average emissions intensities across a given sector or sub-sector.

If a cap-and-trade system is designed around a public ownership perspective where the "atmospheric commons" is considered a global public good then emissions allowances can be auctioned and thus generate government revenue that can be used for publicly desirable aims (Raymond, 2010). Such a design perspective is also more congruent with the "polluter pays" principle than free allocation (either by grandfathering or performance benchmarks) and thus satisfies an important international environmental norm (Egenhofer & Fujiwara, 2006: 26).

Recent experience in the EU ETS has led to extensive analysis and evidence that has demonstrated the superiority of auctioning over free allocation due to better performance of the former on considerations of efficiency, equity and innovation which typically are central goals of a cap-and-trade program (Hepburn, 2006). With respect to efficiency, free allocation of valuable emissions rights doesn't allow the Government to collect revenue that can be used to reduce other taxes (i.e. labour and/or income taxes) thereby recycling the value of the carbon permits back into the economy. Equity considerations represent another weakness of free allocation relative to auctioning because providing large profitable companies with a free asset (emissions permit) increases their share prices which in turn benefits wealthy shareholding households.

In contrast, if emissions permits are auctioned public funds are generated that can be used to compensate poor households for increases in energy prices or to reduce distortionary taxes on labour and corporations that discourage productivity enhancing investments (Sustainable Prosperity, 2011). With respect to innovation incentives, if future allocation decisions are to be made on the basis of present emission levels, firms have the perverse incentive to increase emissions now in order to qualify for more free permits in the future. Similarly if allocation to existing installations is more generous than new entrants to a particular industry, incentives are created to extend the lifetime of carbon-intensive infrastructure in order to maintain free permit allocations.

4.2. *Allocation in the EU ETS*

4.2.1. EU Phase I & II – Grandfathered free allocation

While auctioning has been shown to be superior to free allocation as a method of distributing allowances, and performance benchmarking superior to grandfathering if free allocation is chosen, the use of these methods in cap-and-trade programs to date is the exception. This is largely the result of political economic realities, namely the strength of carbon-intensive corporate lobbies in the environmental policy process (Hepburn, 2006).

In the EU ETS member states were given the option of auctioning up to 5% of total allowances in the first round and 10% in the second but few member states took advantage of it (only 0.13% of allowances were auctioned in the first phase, rising to 3% in the second phase) (Ellerman, Convery, & de Perthuis, 2010: 62). While there were some powerful reasons for member states to freely allocate allowances in the initial stages of the program, namely building political acceptance among regulated industries and providing compensation to those who had made prior investments in CO2 intensive infrastructure, it's consequences that have created problems for the political acceptability of the program among EU citizens (*ibid*: 86).

The most prominent consequence of free allocation emerged in the liberalized European electricity sector where private generators were able to pass on the value of freely allocated carbon permits to consumers. This financial effect allowed electricity generators to reap windfall profits from their free allocations, particularly in Germany and the UK. While both Germany and the UK increased their use of auctioning from 0% in the first phase to 8.8% and 7% respectively in the second phase, significant windfall profits are still predicted to accrue to electricity generators in the 2008-2012 period (Point Carbon, 2008). Indeed given an average phase II carbon price of €21, analysis by Point Carbon suggests that UK generators would reap a windfall profit of between 6-10€bn while German electricity generators would reap 14-20€bn (phase II EUA prices have thus far fluctuated between €30 and €10).

4.2.2. EU Phase III - Increased Auctioning and Performance Benchmarks

Given the EU's experience with the first and second phases of its ETS, a revised ETS directive was approved in December 2008 that made fundamental changes to the cap-setting and allocation procedures for the 2013-2020 period (European Union, 2008). With respect to allocation, the new directive will move towards full auctioning of allowances by 2020. The electricity sector will be subject to full auctioning by 2013, while non-power sectors will see their free allocations phased out over the period (note that sectors considered at risk of carbon leakage could continue to receive free allowances) (Ellerman, Convery, & de Perthuis, 2010: 76). In addition, the Directive strongly encourages the use of auction revenues for climate-related purposes without imposing a requirement on member states. Another important change relates to the method of determining free allocations. While in the first and second phases free allocations were determined on the basis of historical emission rates (i.e. grandfathering), in the third phase they will be made on the basis of *ex ante* performance benchmarks set at the 10% most carbon-efficient installations in sectors or sub-sectors (Egenhofer & Georgiev, 2010).

Performance benchmarking offers the prospect of enhanced fairness, effectiveness and efficiency relative to grandfathering. Fairness is enhanced because performance benchmarking is more consistent with the polluter pays principle, an important norm in environmental law and policy (Cameron and Abouchar, 1991). Performance benchmarking is also more efficient and effective because it incentivizes the deployment of low carbon technology and thus can reduce overall costs over a longer period and thus make greater emissions reductions more feasible.

While benchmarking does have notable benefits compared with grandfathered free allocations, it is administratively and technically complex which can create challenges for policy makers. Indeed, benchmarked allocation requires regulators to develop an emissions standard and gather data on past or expected production. The heterogeneity of production processes within sectors means that emission rates can vary widely between competitors. Within the cement sector for example, several different production processes (i.e. dry-kiln, wet-kiln) result in different emissions intensities which makes the development of performance benchmarks a technically complex process. Complicating the process is the need to update the performance benchmarks over time as the emissions intensity of the sector declines.

The principle challenges in developing emissions benchmarks include: data collection and availability, acceptance by industry, and independent verification. In the EU these challenges have largely been overcome. Data collection and availability has been enhanced significantly by industry experience with the EU ETS over the past five years and by extensive stakeholder consultations between government and industrial associations in setting benchmarks. Furthermore, the EU has been able to build on the experience of existing schemes at the member state level in the Netherlands and Belgium in developing its benchmarks. With respect to industry acceptance, alternatives (i.e. grandfathering) to benchmarking are far less acceptable to governments and other stakeholders given the experience in phase I&II with over-allocation and windfall profits. Thus, given the alternative of procuring all emissions permits through auctions, industrial actors have accepted performance benchmarking as the basis for free allocations. Monitoring, reporting and verification methodologies are well established, and a highly experienced verification industry has developed alongside the EU ETS. For all of these reasons, the EU is well-positioned to develop performance benchmarks for the industrial sectors covered by the ETS.

Other major changes to the EU ETS allocation procedures involve the harmonization of allocation processes at the community rather than state-level. Whereas in EU ETS phases I&II each member state determined how it would freely allocate allowances and conduct auctions, in phase III free allocation will be determined on a community-wide basis and auctions will be conducted on a community-wide platform. This harmonization of allocation will help meet the objectives of cost-efficiency, transparency, and non-discrimination between companies in the same industry but located in different member states.

4.3. Allocation in ON/WCI ETS

The initial design recommendations for the WCI released in September 2008 stated:

> "Consistent with applicable state and provincial law, the WCI Partner jurisdictions will auction a minimum of 10% of the allowance budget in the first compliance period beginning in 2012. This minimum percentage will increase to 25% in 2020. The WCI Partner jurisdictions aspire to a higher auction percentage over time, possibly to 100%." (Western Climate Initiative, 2008)

This recommendation is not found in the final WCI design document released in July 2010 which instead states that the method of allowance distribution will be left to each partner jurisdiction to decide (Western Climate Initiative, 2010). This represents a significant back-pedaling on the stringency of the WCI scheme, which was presumably necessary in order to maintain political support for it among member jurisdictions and affected stakeholders. With respect to the method of determining free allocations, the WCI recommends that partner jurisdictions establish performance benchmarks that are harmonized across the WCI region to avoid negative competitiveness effects on energy intensive trade exposed (EITI) industries (Western Climate Initiative, 2010: 14).

Ontario has yet to specify publicly the approach that it will take to allocating emission permits. Nonetheless, interviews undertaken as part of the research for this report suggest that Ontario will auction the 10% minimum recommended in the initial WCI design recommendations to the electricity sector with the remaining 90% allocated freely to industrial emitters on the basis of performance benchmarks (personal communication, February 2011). The Province hosted a joint GHG benchmarking workshop with officials from Quebec in September 2009 that included representatives from the aluminum, steel, cement, pulp & paper and petroleum refining industries, none of which were *prima facie* against performance benchmarking as an allocation method (see table below).

Sector	**Summary of Input**
Cement	Uniform Canadian cement performance benchmark, initially for ON, BC, QC.
Steel	Recommend performance-based benchmarks, removing impacts of feedstock choice and sale/purchase of intermediate products
Aluminum	N/A – no recommended approach
Pulp & Paper	Site-specific benchmarks preferred, second-order preference for harmonized benchmarks to achieve equivalency across Canada
Petroleum refining	Supports benchmarking, but complexity of refining industry processes needs to be taken into account (i.e. multiple performance benchmarks for the sector)

Source: (Ontario Ministry of Environment, 2008)

The Ontario government is negotiating with industry officials to determine the level of free allocations to each respective installation (*ibid*).

4.4. Conclusions and Recommendations

While full auctioning of emissions allowances is the most environmentally effective, cost efficient, fair and transparent method of allocating scarce rights to emit carbon, the political economy of climate change in a world of uneven policy makes this option unpalatable for politicians, particularly in the early stages of a cap-and-trade program when the impacts on employment and domestic competitiveness are unclear. The strength of the industrial lobby combined with real fears over negative economic impacts has meant that in almost every jurisdiction that has embarked on a cap-and-trade program free allocation has been the primary method of distributing the economic rents that accrue. However, this has begun to change recently as the Regional Greenhouse Gas Initiative in the U.S. Northeast has introduced full auctioning, albeit only for the electricity sector, and the European Union is phasing in greater levels of full auctioning for its economy-wide cap-and-trade program over the next decade.

Auctioning of the right to pollute is consistent with public ownership over the atmospheric commons. Its acceptance in extant cap-and-trade programs provides an opportunity for Ontario to do the same with its proposed program. The revenue generated from full auctioning of emissions permits in the first phase of Ontario's proposed program would be close to $2 billion dollars/year at an allowance price of $30 (rising to more than $4 billion in the second phase from 2015-2020). Given the severe budget constraints facing the province over the next decade, this significant new source of revenue could make an important contribution to maintaining public services and supporting the transition to a low-carbon economy.

Recommendations:

- Ontario should strive to auction 100% of allowances, particularly in phase II of its cap-and-trade program when industrial facilities will have had time to adapt to a carbon price
- Stringent performance benchmarks (i.e. 10% best in a given sector) set at the national or WCI-regional scale should be used in the interim until full auctioning of emission allowances is politically/economically feasible

5. Offsets

As Ontario moves forward with the development of its cap-and-trade system, a key piece of missing regulation is that defining the types of GHG offset projects able to generate credits, and the criteria that determine their eligibility. Offset projects originate in sectors that are not subject to mandatory emission reductions under a cap-and-trade regime and generate credits when they reduce or sequester GHG emissions beyond a predetermined baseline. These credits can then be sold to firms with a compliance obligation under the cap-and-trade regime in order to satisfy their emissions reduction requirements. Offset credits are attractive to firms subject to cap-and-trade regulation because they offer an opportunity to comply by paying for lower cost reductions/sequestrations in other sectors in lieu of pursuing typically higher cost internal abatement opportunities.

The reduced costs and widened constituency of participants make an offset program attractive for policymakers designing a cap-and-trade system because it helps to build political acceptance among affected stakeholders and lower near-term economic costs. But, while offsets are important in this regard, there are legitimate credibility concerns that arise when one tonne of offset credits do not translate into a tonne of real reductions, either intentionally because of fraud or unintentionally because of measurement errors. Further legitimacy concerns arise with offset credits because their availability reduces the incentive for capped sectors to invest in low carbon reduction opportunities. In the former (i.e. a tonne doesn't equal a tonne) environmental integrity of the system is compromised, and in the latter (reduced incentives for low carbon investment) dynamic efficiency of the system is compromised and long-run costs are increased. Mitigating these concerns requires astute attention to the design of the offset program. Key elements to consider in this regard include: limits on offset use for compliance, potential offset project types and sources, geographic limits, credit for early action, and the discounting of offset credits.

This chapter will examine offset program design in cap-and-trade systems in order to provide recommendations to the Province of Ontario as it goes about developing its domestic scheme. The recommendations will be focused on design elements that can help maintain environmental integrity of the overall cap-and-trade program. While the Province has yet to release a proposed regulation on offsets, it will likely follow the proposed design of the Western Climate Initiative (WCI) of which it is a partner. The chapter will start with a general description of carbon offsets and the role they have played in the EU ETS to date. From there a description of the proposed offset system design released by the WCI in July 2010 and the more recent proposals by California and B.C. for their domestic offset systems will be presented. This will lead into a discussion of the potential for offsets in Ontario, and the role that they might play as a compliance instrument. Critical to this discussion will be an assessment of the effect that offsets might have on the amount of domestic abatement pursued by the industrial and electricity sectors in Ontario. Another critical element will be a discussion of the sustainability implications of Ontario offsets derived from two sectors likely to be major suppliers: agriculture and forestry. The concluding section will provide recommendations to Ontario policymakers working to develop the Province's offset program.

5.1. What are greenhouse gas offsets?

Greenhouse gas (GHG) or "carbon" offsets are created when a project or activity reduces, avoids, or sequesters emissions. These offsets can then be sold to another party to satisfy an emission reduction requirement under a compliance cap-and-trade regime, or to meet voluntary emission reduction commitments. Under a cap-and-trade regime, covered entities may wish to purchase carbon offsets if they are less expensive than internal abatement and thus reduce overall compliance costs. While the criteria for generating a carbon offset varies depending on the standard used, there are five commonly agreed upon criteria that an offset credit must meet to ensure environmental integrity (Goodward & Kelly, 2010):

- **Real**: In order to qualify as "real" an offset certificate must represent the removal or reduction in GHGs from a clearly defined action or decision, and quantified using accurate and conservative methodologies that account for GHG sources and sinks and leakage risks. Accurate emissions reduction accounting needs to consider increases in emissions that could occur outside the project scope as a result of the activity, for instance when increased production costs decrease the relative market share of a producer implementing an offset project and thus increase production at relatively more carbon-intensive operations (an effect referred to as "market leakage").

- **Permanent**: Offset credits must be sourced from projects that result in permanent emission reductions or sequestrations. This is most often a consideration in land-use change and forestry projects where there is a risk that sequestered carbon could be reversed unintentionally by natural causes or intentionally by human activities. In order to ensure that offset credits from such projects do represent permanent emission sequestrations, programs typically require annual monitoring, reporting and verification (MRV) of carbon stocks at the project site. In the event of a carbon reversal (i.e. a reduction in the project's carbon stock) mechanisms to replace credits, such as a buffer account, pro-rating and discounting of credits, and replacement could be employed to maintain the atmospheric effect of sequestration projects.

- **Additional**: In order to be additional, the offset must be in response to the incentives provided by the carbon market. Activities that would have happened without such incentives because they were legislated, or were financially beneficial without additional carbon market revenue, are not considered "additional" to a business-as-usual (BAU) scenario. This criterion is one of the most contentious in offset discussions, because of the subjectivity used in its judgment. If lax additionality standards are in place and BAU activities are awarded offset credits then their use allows a net increase in GHG emissions, thus compromising the environmental effectiveness of the program. Additionality can be determined on a project-specific basis or on a performance standard basis. Project-specific additionality tests the proposed project against a BAU scenario and credits additional emissions reductions while standardized additionality tests projects of a particular type against a consistent set of criteria including whether the project-type is already common practice in the jurisdiction ("common practice test"), or whether the project-type would be financially-sound without the extra revenue from the carbon market ("investment test"). Regulatory additionality is another important criterion to satisfy, and essentially means that offsets cannot be generated by activities that are already proscribed by law. Failure to pass either of these tests disqualifies the project from being eligible to generate offset credits.

- **Verifiable**: A GHG reduction or removal must be objectively reviewed by an independent accredited third-party.

- **Enforceable**: To ensure against double-counting of emissions reductions, offsets are usually tracked on a registry that allows program regulators to enforce offset ownership and protect against double-counting of emissions reductions.

5.2. *Carbon Offsets in the EU ETS*

The EU Commission did not develop a complementary offset program for domestic non-capped sources of GHGs but instead issued a “linking directive” that made it possible to use credits issued under the Kyoto Protocol Flexibility mechanisms (EU Commission, 2004):

- Clean Development Mechanism (CDM) – The CDM allows industrialized countries to invest in emission reductions in developing countries. Once a project is approved by the CDM executive board, it generates certified emissions reductions (CERs) that can be imported into the EU for compliance purposes in the ETS. To date more than 440 million CERs have been generated.
- Joint Implementation (JI) – JI allows developed countries to invest in emissions reductions in Annex B countries (i.e. those with an emissions reduction requirement under the Kyoto protocol). Most of the projects under this program have been located in Russia, the Ukraine and other so-called economies in transition and have generated 28.3 million credits to date. The use of this mechanism is becoming more prevalent due to growing demand from facilities covered by the EU ETS JI and the pipeline for JI projects contains nearly 300 million credits to be delivered by the end of 2012 however (UNEP Risoe, 2011). JI credits are known as Emission Reduction Units (ERUs).

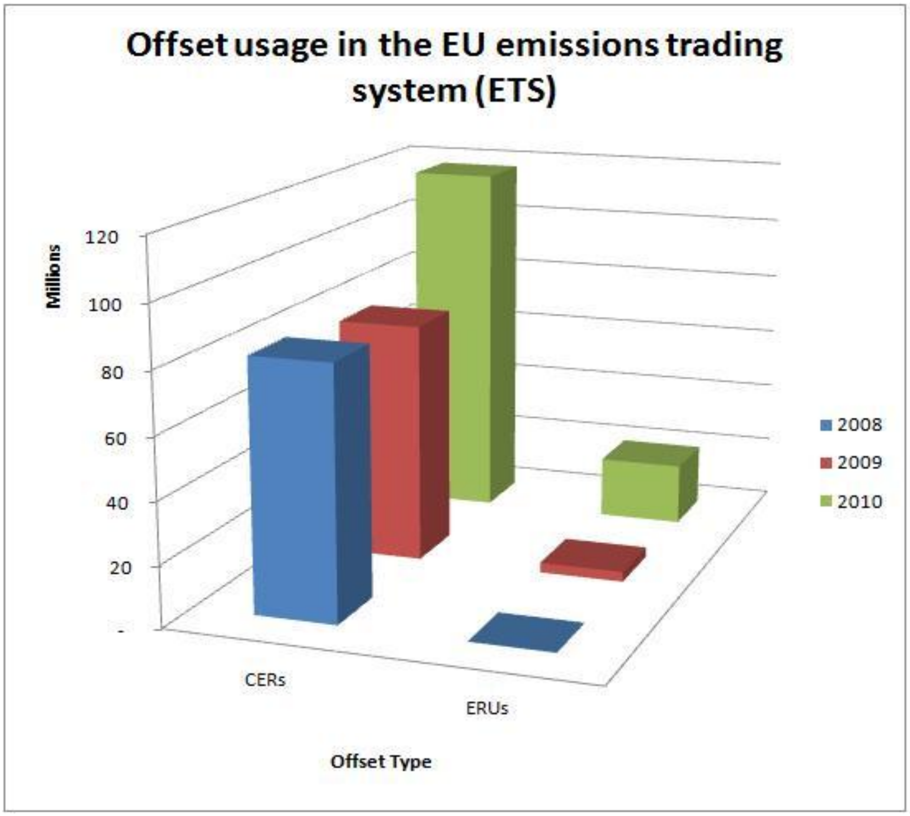
The availability and use of CDM & JI credits in the first phase of the EU ETS (2005-2007) was quite limited due to a lack of capacity at the CDM’s Executive Board to assess and approve projects, and over-allocation of allowances that obviated the need to purchase additional credits (Wettesad, 2008). However with the second phase of the EU ETS (2008-2012) in which EU member states were subject to Kyoto Protocol reduction targets, the use of CDM and JI credits became much more prevalent (Ellerman, Convery, & de Perthuis, 2010:272). Limits on the use of Kyoto flexibility mechanisms were set at 10% of the total phase II cap with a view to ensuring at least 50% of the abatement effort remained in the EU (CORE, 2011). Such limits correspond with the ‘supplementarity’ criterion in the Kyoto Protocol, whereby the use of foreign credits is to be supplementary to domestic reduction efforts. While never defined precisely, the European Union’s position was that no more than half a signatory’s reduction effort could be performed outside of the country (Ellerman, Convery, & de Perthuis, 2010: 50). In spite of this position, the economic recession of 2008-2009 reduced European domestic emissions and the need for facilities to purchase additional credits. With the aggregate EU offset limit based as a percentage of the total cap rather than of required reductions, facilities were able to use cheaper Kyoto credits to meet a larger portion of their targets (Sandbag, 2010).

Access to CDM/JI credits in the second phase had the effect of lowering the cost of compliance with the EU ETS because of the cheaper abatement options available through Kyoto credits and because of the price spread between EUAs (European Union Allowances) and CER/ERU's. The price spread, which emerged because of the risk associated with international projects and because of usage limits which decreased their demand, created the opportunity for firms to sell EUAs that they would otherwise have used for compliance and replace them with cheaper CDM/JI credits up to their proscribed limit (Ellerman, Convery, & de Perthuis, 2010:60). This outcome, referred to as CER swaps, reduced the domestic abatement that would otherwise have occurred and thus the overall environmental ambitiousness of the EU ETS can be called into question.

The notion that access to CDM/JI credits reduced the environmental integrity of the EU ETS is supported by a number of studies that show a significant number of projects certified by the CDM credits were not additional (see above for a definition of this criterion). Indeed, a report prepared for the WWF found that 40% of the projects accounting for 20% of the certified reductions were not actually additional (Schneider, 2007). Furthermore, with more than 40% of CDM credits coming from the destruction of industrial gases (HFC-23 & N_2O) that have been shown to provide perverse incentives to increase production in order to generate windfall CDM revenues (Wara, 2007), offset use in the EU ETS phase II compromised the environmental effectiveness of the cap-and-trade scheme.

In phase III of the EU ETS the rules around use of CDM/JI credits have been changed to address some of the issues discussed above. Access to project credits under the Kyoto Protocol from outside the EU will be limited to no more than 50% of the reductions required in the EU ETS, and the EU is also considering a ban on controversial HFC and N_2O reduction projects that constituted the majority of credits in phase II (Skjærseth, 2009). Overall, the criteria for CDM/JI credit usage are broadly consistent with the "CDM Gold Standard" criteria developed by a group of NGOs led by the World Wildlife Fund (Dornau, 2011). Thus, while this standard was hitherto only applicable to the voluntary market, it has now been institutionalized in the EU ETS system and will also likely affect offset protocol development at the international level going forward.

While these changes will improve the environmental effectiveness of the program, the banking provisions available in phase II mean that installations will be able to carry forward CERs and ERUs into phase III and thus forestall domestic abatement until late in phase III of the EU ETS. The chart below shows an increasing use of CDM/JI credits in phase II which will allow installations to bank forward credits into phase III:



Source: http://www.sandbag.org.uk/blog/2011/may/2/surge-offsets-eu-ets-2010/

5.3. Carbon Offsets in the Western Climate Initiative Region

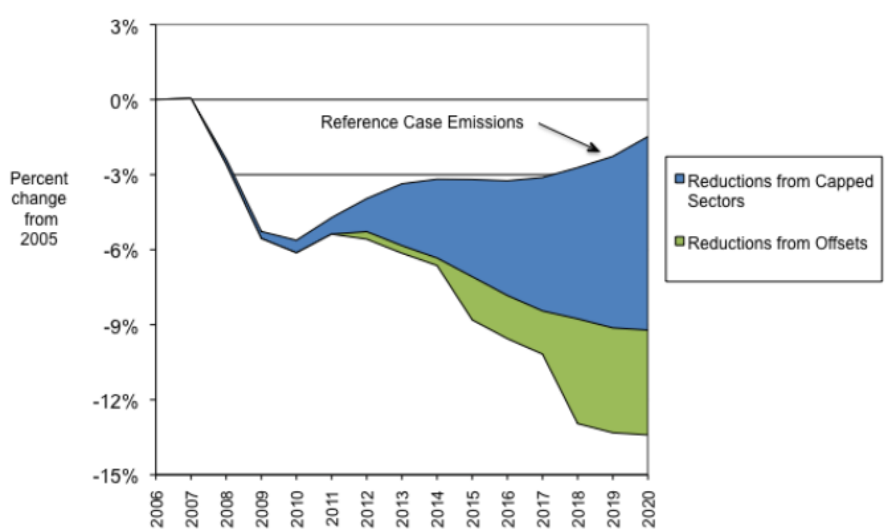
In July 2010 the Western Climate Initiative (WCI) released its final recommendations for an offset system that is intended to provide flexible compliance options for entities covered by the regional cap-and-trade program scheduled to commence in January of 2012. The operationalization of the offsets system will follow the same decentralized approach that the WCI has taken in other areas of the cap-and-trade system (i.e. cap-setting, allowance allocation, GHG reporting, etc.). Each individual partner jurisdiction will develop its own offset system, defining protocols and providing oversight to third-party actors (i.e. verifiers), and deciding which offsets from outside jurisdictions will be eligible for use in their domestic system (Western Climate Initiative, 2010).

Quantitatively it is recommended that compliance entities will be allowed to use offset certificates for up to 49% of their emissions reductions obligations, a limit that is estimated to represent approximately 5% of overall WCI emissions. Geographically it is recommended that only offsets from

North America be eligible initially, with international offsets being considered for addition later in the program. The WCI has identified projects in agriculture, forestry, and waste management as priorities for offset protocol development, although other project types outside the capped sectors in the cap-and-trade program may also participate subject to review by the WCI based on a set of criteria (*ibid)*.

The WCI offsetting system is considered a crucial flexibility and cost containment element of the overall cap-and-trade program (Western Climate Initiative, 2010c). By allowing capped entities to meet their compliance obligations through the purchase of offset credits from non-capped entities, market liquidity and cost effectiveness is enhanced. Furthermore, offset projects can have environmental co-benefits, such as is the case with afforestation projects that promote biodiversity conservation. Economic modeling conducted for the WCI in July 2010 demonstrated the role that offsets can play in reducing the overall costs of the program (Western Climate Initiative, 2010a). This modeling projected that offsets would contribute 32% of the overall emissions reductions (see figure below).

Figure 6: Greenhouse Gas Emission Reductions Under the WCI Program, 2006-2020



With this level of offset use a carbon price of US$33/ton, and overall cost savings totaling more than US$100 billion relative to a business-as-usual scenario, has been predicted. Were offsets to be excluded from the program, the regional goal of a 15% reduction in GHG emissions by 2020 would not be achieved without an allowance price of at least $50/tonne (*ibid*: 9). While the cost saving potential of offsets is important, there can be a trade-off with the environmental integrity of the cap-and-trade system if offset criteria are defined such that credits are granted for projects that don't result in real, additional, permanent and verifiable emissions reductions. As was discussed above, this has been the case with a significant number of Kyoto Protocol generated Clean Development Mechanism (CDM) credits, especially with respect to the additionality criterion.

Achieving a balance between adequate offset supply to contain costs, and environmental integrity of the offset system is crucial for the success of the WCI program from both an economic and environmental perspective. With respect to offset supply, there is a high risk that the program will lack adequate liquidity to achieve the regional GHG reduction targets at an acceptable cost, especially given that most member jurisdictions (including Ontario) are no longer in a position to participate at the program's inception in 2012 (Erickson et al., 2009). Thus as the California Air Resources Board (CARB) has proceeded with the development of its offset protocols (which will significantly influence the eventual shape of other WCI jurisdiction offset protocols); it has faced significant pressure to relax the offset eligibility criteria in order to reduce the overall costs of the program (and incidentally its environmental integrity). A discussion on this follows the WCI section.

5.3.1. Protocol Development

With respect to the development of offset protocols, WCI intends to build off existing work done on offset protocols in the voluntary market and adapt/modify them to satisfy WCI criteria where possible. In this regard the WCI commissioned a review of existing offset protocols in the priority project types (agriculture, forestry, and waste management) to determine how well they satisfy WCI criteria (real, additional, permanent and verifiable) (Western Climate Initiative, 2010). The evaluation of 31 protocols from 11 offset systems found none that correspond to all WCI criteria for offsets. For all project types crediting periods and project start dates fail to match up with the WCI criteria. While there are a number of protocols from the CDM (manure management, afforestation & reforestation, and compost), and the Climate Action Reserve (CAR) (afforestation & reforestation, forest management, forest preservation and conservation, and landfill gas) that were deemed likely to respond to WCI criteria without significant modification, a large number of protocols from the Alberta offset system, the Chicago Climate Exchange, RGGI, & US EPA Climate Leaders would require significant modification (particularly in the area of leakage assessment) to be eligible for inclusion.

The WCI has indicated that it will work with the protocols that have scored well in the assessment (i.e. CDM and CAR's forestry protocols) and make amendments where necessary. According to WCI officials working on protocol development, one option is to take the protocols that scored well and amend them or take components of different protocols and define a minimum to meet the regulatory standards (Washington Department of Ecology, 2010).

Another concern with respect to offset supply is the incompatibility of some Canadian protocols with WCI criteria. For example offset projects designed for Alberta's intensity-based carbon reduction scheme will not meet the WCI's criteria for permanence and leakage, and the Canadian Federal Government's draft offset system design from June 2008 includes several project types (i.e. wind power) that are not eligible under WCI's criteria for additionality. Furthermore, the Climate Action Reserve (CAR) protocols that form the basis of those being developed in California are not currently applicable to projects in Canada. CAR is planning to adapt three protocols for use in Canada within the next year (the Livestock Project Protocol, the Organic Waste Digestion Project Protocol, and the Organic Waste Composting Project Protocol) which will help address the lack of Canadian offset protocols, but a lack of experience with CAR offset project development and the potentially high transaction costs for proponents could pose significant barriers to the development of robust offset supply from Canada in the near term.

5.3.2. California Air Resources Board (CARB) Offset Program

In the proposed regulation to implement its cap-and-trade program, the California Air Resources Board (CARB) has defined four offset project types that are eligible to generate credits under AB-32, California's Global Warming solutions Act. These include:

1. **Ozone depleting substances (ODS) projects protocol**

This protocol (California Air Resources Board, 2010a) can be used to generate offset credits from the destruction of ODSs in building foam insulation (CFC-11) and refrigerants (CFC-12) which are powerful GHGs (3800 times CO2 for CFC-11 and 8100 times CO2 for CFC-12)[2]. While the use of these gasses in developed countries has been phased out under the Montreal Protocol, significant amounts still exist in older buildings and appliances (UNEP, 2009). Current practice is to landfill old refrigerators and insulation without destroying ODSs which can then leak into the atmosphere over time. With finance provided by the carbon market, the proper disposal of these materials contributes significantly

2

IPCC Fourth Assessment Report 2007. 2.10.2 Direct Warming Potentials. http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html#table-2-14.

to overall GHG reductions. In the case of California it is estimated that ODS offset projects will account for 30 million metric tons (MMT) of GHG reductions between 2012 and 2014 and 90 MMT between 2012 and 2020, amounts equal to 90% of total offset demand (Carbon control news, 2010).

The protocol does not cover the destruction of HFC-23 gasses (a by-product of HFC-22 production). Destruction of these gasses have been a controversial source of credits under the Clean Development Mechanism (CDM) because of the perverse incentive that exists to increase production of HFC-22 in order to have more HFC-23 to destroy (see EU section above for further discussion).

2. **Livestock Manure (digesters) projects protocol**

This protocol (California Air Resources Board, 2010d) allows projects that capture and destroy methane from anaerobic manure treatment to generate offset credits. Such projects must meet an additionality test that includes a performance standard and a regulatory additionality test. The performance standard is essentially a common-practice test. Because less than 1% of dairies in California have installed biogas systems to capture methane, this practice is assumed to be above and beyond common practice and thus eligible for offset crediting. Such projects must also meet the regulatory additionality requirement that installation of a biogas system is not mandated by law in the jurisdiction. With respect to permanence, the project must ultimately result in the destruction of captured methane whether it be done on site, or transported for off-site energy use.

3. **Urban Forest Projects Protocol**

This protocol (California Air Resources Board, 2010c) allows local governments and agencies, public institutions, utilities, and NGOs to generate offset credits from the management of urban tree populations in a way that increases their uptake of CO2. The protocol assesses additionality using a performance standard approach and a regulatory additionality requirement. The performance standard identifies a level of performance applicable to urban tree projects (i.e. tree survival rate or # of new trees planted per year) that is better than average, or business-as-usual. If this threshold is met or exceeded, then the project proponent satisfies the criterion of additionality. The performance standard is set based on a “net tree gain” calculator that measures the difference between trees planted and trees removed due to disturbance. With respect to regulatory additionality, project proponents must demonstrate that the trees weren’t planted to satisfy a regulatory requirement.

4. **Forest Projects Protocol**

The Forest Offset Protocol ((California Air Resources Board, 2010b) is designed to provide an incentive for landowners to undertake forest conservation, conservation-based management, and reforestation projects on their land that increases carbon stocks. Three types of projects are covered by the protocol:

- *Reforestation projects* – planting trees on land that has not been forested for at least 10 years or has been subject to a natural disturbance. Proving additionality requires a demonstration that reforestation of the project area would not be financially viable without carbon offset revenue.
- *Improved forest management (IFM) projects* – activities that increase carbon stocks on forest land. Determining additionality for such projects requires the proponent to set a baseline of carbon stocks that takes into account numerous factors. A common practice test that looks at carbon stocks on comparable lands is one such factor.
- *Avoided conversion projects* – activities that prevent the conversion of forestland that is at high-risk of being converted (i.e. development pressure) through a conservation easement or transfer to public ownership. Additionality for this project type requires a demonstration that conversion is legally permissible, and a real estate appraisal showing that an alternative use has significantly higher market value than maintaining the area as forest land.

Addressing permanence is one of the most important issues with forest carbon offsets because of the potential for “reversals” that can occur due to natural (i.e. forest fires, insects, wind storms) or human causes. CARB has addressed this risk by mandating all forest projects to maintain all credited emission reductions for 100 years following the issuance of an offset credit. Proponents must monitor carbon stocks and submit annual third-party verified GHG data reports and allow site visits every six years of the project’s life (100 years). In the case of intentional reversals (i.e. over-harvesting, land coversion), the project proponent is required to retire sufficient compliance instruments to compensate for the reversal. For unintentional reversals, CARB will maintain a forest buffer account that acts to insure proponents from GHG reversals caused by natural causes. Each project will be required to submit a percentage of offset credits to the forest buffer account throughout the project life.

5.3.3. Discussion of environmental integrity tradeoffs in the CARB offset program

Facing significant pressure to relax its cap-and-trade program in order to mitigate perceived economic harm from California's unilateral approach, CARB has taken steps to increase availability of offsets in order to reduce costs for covered entities. It has changed the eligibility date for early action offset credits from September 2008 which was proposed in the WCI design to January 1, 2005 under the proposed CARB design. This earlier date allows additional credits to be included in the program. Furthermore, CARB has doubled the number of offset credits that a covered entity can use to meet its compliance requirements from 4% to 8% of the overall compliance obligation. As discussed above, the original WCI recommendation was to limit offset use to 49% of emissions reductions which was estimated to translate into 5% of the overall compliance obligation.

In another effort to increase the supply of offsets in California's cap-and-trade program, CARB has expanded its offset program beyond the WCI recommendations to include projects that destroy ozone depleting substances (ODS) (see above for a description of such projects). These projects represent a large source of low cost offset projects that would significantly increase supply and lower the overall costs of the program.

The California Air Resources Board (CARB) is also considering linkage with the CDM market for select project-types, and with the emerging international REDD program (reducing emissions from deforestation and forest degradation) through an memorandum of understanding that California signed in 2008 with a group of 14 subnational states and provinces in Brazil, Indonesia, Mexico and the U.S. known as the Governor's Climate and Forests Task Force (GCF). There are significant monitoring, reporting, verification and enforcement challenges that would need to be dealt with before linkage with both the CDM and REDD can proceed, but this would provide a large potential supply of offset credits into California's (and ultimately the WCI's) cap-and-trade program.

Overall, the environmental integrity of the cap-and-trade program can be called into question as a result of these recent changes. With respect to the change in eligibility date for early action credits, the additionality of offset projects undertaken before the WCI began in 2007 is highly questionable. This goes back to the idea that, for an offset project to be additional, it must be in response to the incentive provided by the cap-and-trade program. An argument can be made that a project undertaken in 2007-2011 was made in response to the program's expected start in 2012, but the same cannot be said for projects initiated before that.

The increase in the portion of a facility's compliance obligation that can be met by offsets (from 4% to 8%) similarly compromises the environmental integrity of the program. Much like in the EU ETS system, there remains a real risk that cautious regulators will over-allocate in the initial allowance budget which will allow facilities to utilize offsets for a much greater portion of their required reductions than intended. And, because of the banking provisions in California's program, surplus allowances can be carried forward into the second phase which will forestall domestic reductions if over-allocation is significant.

Finally, with respect to the inclusion of ODS offset credits, there is a legitimate question as to whether the carbon market is the best avenue to pursue these emission reduction opportunities. Indeed, while banks of ODS chemicals are significant sources of GHGs, feasible regulatory approaches outside the carbon market exist such as extended producer responsibility for appliances containing them. In May 2009 the UNEP Secretariat on Funding Opportunities for the Management and Destruction of Ozone-Depleting Substances issued a report that recommended against using the carbon market to fund ODS destruction because, "ODS would significantly increase the level of credits availability and thereby decrease their value…" (UNEP, 2009).

More recently the California Senate passed a bill that would allow the creation of offsets from the State's voluntary energy efficiency programs, distributed electricity generation programs, and programs administered by the Public Utilities Commission and the California Energy Commission. The bill passed the State Senate in May, but has since been challenged by environmentalists because it would double-count offsets from the electricity sector. The rule change has been put off for a year to provide time to negotiate amendments to the bill (Energy Washington Week, 2011).

5.3.4. B.C. Offset System

In November 2007 the British Columbia government passed its Greenhouse Gas Reduction Targets Act (Government of British Columbia, 2007) into law. Among other stipulations, it required that all B.C. Public sector operations (including schools, hospitals, universities, health authorities and government ministries) purchase carbon offsets representing the GHG emissions associated with travel by 2010 and with the whole of public sector operations from 2011 onwards. This latter target is estimated to result in public sector demand for offsets of 800,000 to 1,000,000 tonnes per year from 2011 onwards.

In order to support the development of offset projects in the Province, the B.C. Government created the Pacific Carbon Trust (PCT), a crown corporation charged with procuring offsets from private developers in the Province (Pacific Carbon Trust, 2010). Already in this early stage of the development of B.C.'s offset program there are estimates that the value of the PCT portfolio of validated projects is more than $1 billion CDN given a projected WCI offset value of $33/tonne (Hamilton, 2011). Most of these projects are forestry-related and will be developed in accordance with the Province's Forestry Carbon Offset Protocol (FCOP) which is expected to be finalized later this year (B.C. Ministry of Environment, 2011).

Already some controversy has emerged over B.C.'s carbon offset program. In May of 2011 Pacific Carbon Trust announced that it would be purchasing 114,000 tonnes of carbon offsets from Encana, a large natural gas producer active in the Province (Pacific Carbon Trust, 2011). The offsets were generated after Encana installed new technology at a natural gas formation near Fort Nelson that allowed for the elimination of routine natural gas flaring at the project site. This was the first time that the technology has been used in Canada, and is thought to be the first commercial-scale application in the world (*ibid*). This, along with the fact that natural gas flaring is not currently prohibited under B.C. Law, helps the project meet “common-practice” and regulatory additionality criteria. With respect to financial additionality (i.e. whether the project makes financially attractive without offset revenue because of reduced energy needs) the picture is unclear because PCT does not disclose what it has paid for offsets.

While these offsets may meet some if the common criteria for a quality offset, they have generated controversy because of the transfer of funds from the public sector to a profitable private corporation that occurred as a result of the transaction. This raises significant equity issues with offset projects, as it is likely that large corporations, whether they are in the energy, forestry or agriculture industries, will have significantly greater ability to generate offset credits. Thus, as the B.C. Public sector satisfies its climate change commitments by purchasing offset credits, and as energy prices rise in the Province as a result of carbon regulations, the controversy surrounding the program is likely to grow.

Forestry will undoubtedly be an important area for offset projects in the Province of British Columbia, which is reflected in the fact that a Forest Carbon Offset Protocol (pending final release in 2011) was the first undertaken by the Province as part of its emerging offset program. The Province has already engaged in collaborative efforts with industry and NGOs in the Province to conserve large forested areas and has recognized the value of carbon sequestration in its rationale for these undertakings. One prominent example is the Great Bear Rainforest project, covering 5.4m hectares, which will generate at least one million credits per year for a total value of up to $750m over 30 years. While the potential for forest carbon offset projects in British Columbia's forests is likely significant, a major barrier will be resolving carbon ownership given the extensive land claims that remain over large swaths of the Province.

5.4. Implications for Ontario

While carbon offsets represent a tool that can help achieve Ontario's Climate Change Action plan (CCAP) goals by incentivizing emissions reductions outside of the planned cap-and-trade system, the Province is far behind other WCI partners, including California and B.C. in creating the required market infrastructure and engaging public stakeholders in consultation on proposed offset systems. As offset systems in other WCI jurisdictions move forward independent of Ontario, the Province's power to influence the development of the overall WCI offset program will become increasingly limited. This is a particular concern given the emerging environmental integrity issues associated with offsets in both California and B.C.

Ontario is still in the process of developing its own protocols, having established an expert working group on Offsets in 2007, and implemented pilot projects in agriculture and forestry in 2008-09 (Government of Ontario, 2009). The Climate Action Reserve (CAR) has initiated efforts to extend the applicability of CAR protocols to Canada (Climate Action Reserve, 2010). Given that these protocols are forming the basis of California's offset protocols, and that WCI analysis has determined them to be most adaptable to its criteria, it appears wise for Ontario to consider adapting these to facilitate its participation in the WCI program.

The potential supply of Ontario offsets is unknown at this time, which makes it difficult to assess their contribution to achieving the Province's GHG reduction goals. The Province's 50 million tree program is projected to sequester 6.6 Mt C02e between now and 2050 which is a small amount given Ontario's annual GHG inventory of 165mt in 2009 (Gleeson, Nielsen, & Parker, 2009). The Environmental Commissioner of Ontario has recommended that the Province increase its afforestation program in Southern Ontario to 1 billion native trees (Environmental Commissioner of Ontario, 2010). This significantly more ambitious program would sequester more than 132mt CO2e between now and 2050 based on projections for the 50 million tree program, thus making a larger contribution to the

CCAP targets. The creation of a credible forest carbon offset program with strict criteria for permanence, additionality, and verification could help to direct finances to this effort.

The potential for land-use change and forestry offsets in Ontario's Far North is a potentially significant opportunity that has been recognized by the provincial government. The area covers the Boreal forest ecozone, and the Hudson Bay lowlands where peat bogs sequester significant stores of methane. The 2010 Far North Act that governs land use planning in the Northern half of the Province, sets aside some 225,000km^2 of the region for a network of connected protected areas (Government of Ontario, 2010). The carbon sequestration value of this land is explicitly referenced in the Act. There will no doubt be significant barriers to the development of offset projects in this region, most notably because the remoteness of the territory makes it difficult to prove that conservation activities are additional to business-as-usual. But, as resource development pressure in the region grows, opportunities for avoided conversion projects may become available. Before any such activity occurs however, a significant effort will need to be undertaken to enhance the monitoring capacity for land-based carbon in the region. The Province's recent announcement of two monitoring stations in the Hudson Bay Lowlands is a good step in this regard (Government of Ontario, 2011: 93). This monitoring capacity will become increasingly important in the future as warming and drying trends lead to more intense forest fires that may turn the region into a carbon source rather than a sink.

Further south in the Boreal ecozone and the Great Lakes-St Lawrence Forest region, resource development, in particular forestry, is much more established. This makes the potential for offset credits more significant because it becomes easier to demonstrate that conservation, afforestation, or improved forest management activities are not business-as-usual and are thus resulting in additional carbon removals. Efforts to enhance the carbon sequestration in Ontario timberland will no doubt come into conflict with plans to convert the Province's existing coal-fired power plants into biomass combustion facilities. The estimated demand from OPG for forest biomass to fuel these plants is approximately 2 million oven-dried tonnes (ODT)/year and will be sourced primarily from road side slash and unmarketable timber from the Boreal region (Ontario Power Generation, 2011). The sustainability of this approach to Ontario's forestland is highly questionable, especially considering the near term carbon surge that will occur under these scenarios (Mckechnie et al., 2011). It is in this context that the value of forest carbon sequestration through offset project development becomes more salient. If the OPG biomass combustion scenario is considered as a baseline for forest carbon in the region, then the value of carbon sequestered by avoiding this electricity pathway could be realized through the offset market.

Another offset initiative that poses environmental integrity concerns is the Ontario Power Authority's (OPA) planned pilot sale of environmental attributes (EAs) that was recently directed by the Minister of Energy (Ontario Power Authority, 2011). The OPA has retained EAs through power purchase agreements with renewable energy facilities through the FiT and previous Renewable Energy Supply (RESOP) program. These EAs could have value because renewable electricity displaces carbon-producing fossil fuel electricity generation on the grid and thus reduces overall GHGs in the Province. The OPA has recognized limitations on the usage of EAs because of the Province's s pre-existing renewable energy and GHG goals which mean that renewable energy offsets do not meet the regulatory additionality test (see pg 29 for a discussion on regulatory additionality). Hence the pilot program will be of limited duration (18-months) and only allow the sale of EAs within the Province for voluntary GHG reductions. However, given the recent attempts by regulators in California to make the State's energy efficiency and renewable energy programs eligible for offset credit creation in its cap-and-trade program (see pg39-40), there remains the possibility that Ontario may attempt the same in order to expand offset supply. Opening the door to offset sales from initiatives in the electricity sector could lead to further initiatives to grant offsets for the Province's demand-side management (DSM) programs and even presumably the Province's coal phase-out. The resulting increase in offset supply would significantly reduce the need for industrial facilities subject to the cap-and-trade program to reduce their own GHG emissions and thus compromise the overall environmental integrity of Ontario's climate change action plan.

5.5. Conclusions & Recommendations

In sum, there is potential for land-use and forestry offsets in Ontario, but a significant amount of work needs to be done to develop offset protocols that are relevant for the Province's diverse regions. For example, a forestry offset protocol developed for the slow-growing Boreal zone may not be relevant for the Great Lakes St. Lawrence forest region where development pressures are much more significant and where the tree growth rate is much faster. Furthermore, enhanced monitoring of remote forest and peatland in the Far North is a necessary first step before such offset projects can begin, as is the consultation and consent of First Nations peoples who inhabit the land.

The broader question of whether an offset program in Ontario will compromise the environmental effectiveness of the Province's climate change program remains salient. With the

Province's 2009 GHG emissions already reaching the 2014 target (although they are likely have rebounded in 2010 because of a return to economic growth and a colder winter), the overall ambitiousness of Ontario's GHG reduction targets comes into question. If the targets remain the same for 2014 and 2020, then the level of emissions reductions required by Ontario's cap-and-trade system is not likely to be significant. With offsets as a compliance option for up to 50% of a regulated entity's emission reduction requirements, the goal of incentivizing investment in low carbon technologies in high carbon emitting sectors will not be achieved. Furthermore, if the Province grants early action credits to Ontario Power Generation for having phased-out coal fired power from the electricity mix, the Provincial carbon market could be flooded with cheap credits that will further depress the carbon price and hence reduce further the incentive for low carbon investments in the industrial and transportation sectors. A link with WCI partner carbon markets will provide further access to cheap offset credits (i.e. ODS offsets from California), further depressing the carbon price signal. Thus, if the CCAP targets remain the same, the Province should consider lowering the number of offset credits that a regulated entity can use and retiring any potential credits from the phase-out of coal in order to maintain the price incentive to invest in low-carbon technologies. Furthermore, the Province should consider disallowing offset credits from ODS projects given that feasible regulatory options exist outside the carbon market to address this stock of GHGs.

Recommendations:

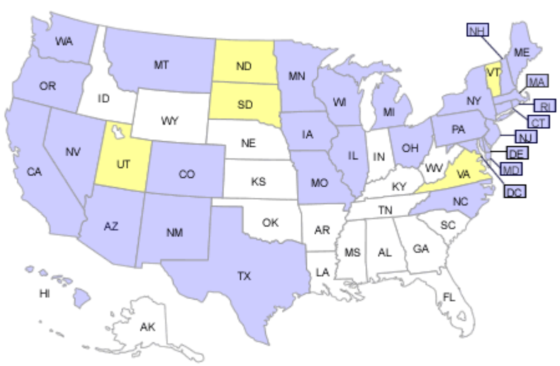
- Ontario should not allow offset credits generated from the destruction of Ozone Depleting Substances (ODS) for use in its cap-and-trade system. Restrictions on the import of such credits from WCI partner jurisdiction should be enacted.
- Ontario should forward with the development of offset protocols, prioritizing ones that have a high potential for environmental co-benefits (i.e. biodiversity) in the forestry and agriculture sectors.
- Ontario should consider limiting the ability to bank forward offset credits to avoid having an oversupply in future compliance periods that reduces domestic GHG abatement.
- Ontario should not allow the creation of offset credits from renewable energy or energy efficiency programs or the coal phase-out in its cap-and-trade program. Furthermore, it should direct Provincially-owned entities holding environmental attributes from such programs to immediately retire them.

6. Policy Interaction: Renewable Energy Support

Jurisdictions participating in an emissions trading system (ETS) have also enacted complementary climate policies that seek to promote electricity from renewable energy sources (RES-E). While such policies only indirectly affect GHG emissions, they are rationalized because of the significant share of total GHG emissions that come from fossil fuel combustion in the electricity sector (representing ~25% of global emissions from all sources) (IEA, 2010). Thus it is considered that an effective response to climate change will require limiting the production of fossil fuel electricity and correspondingly increasing the share of renewable energy (IPCC, 2007). RES-E policies have additional rationales beyond the fight against climate change which include the mitigation of local health externalities associated with fossil fuel combustion (e.g. smog) and the promotion of local economic development in jurisdictions without domestic sources of fossil energy (Philibert, 2011).

While a technology-neutral emissions trading system can indirectly incentivize the development of RES-E by making GHG-emitting competitors relatively more expensive, jurisdictions wishing to directly promote RES-E sources have enacted a range of market-based incentives and quantity based mandates. Renewable portfolio standards (RPS) are a popular form of RES-E policy that mandates electricity utilities to generate a certain percentage of electricity production from renewable sources. Electricity utilities within the jurisdiction then solicit bids for a quantity of RES-E from third-parties that corresponds with the RPS mandate. In jurisdictions with a competitive electricity market, tradable green certificates provide utilities with flexible compliance options under the RPS mandate. Such quantity-based policies are popular at the sub-national level in the United States as figure 1 demonstrates.

Figure 6.1: U.S. States with RPS Requirements



States with RPS
States with RPS Goals
Source: (Database of Incentives for Renewables and Efficiency, 2011) www.dsireusa.org

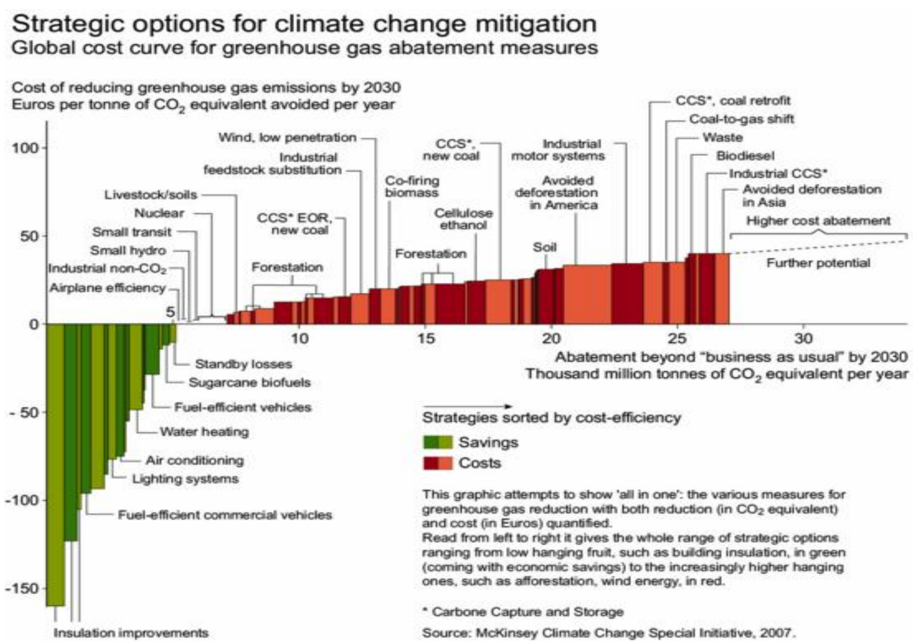
Another popular form of RES-E deployment support policy is a feed-in tariff (FiT) that combines a mandate to electricity utilities to purchase renewable electricity sources with an elevated tariff for such sources. RES-E generators are favoured through the availability of long-term contracts that guarantee access to the electricity grid and a price higher than that paid to traditional sources of electricity (i.e. fossil, nuclear, hydro). Typically regulators differentiate the tariff between RES-E sources in order to incentivize more expensive technologies whose costs are expected to fall due to the learning effects associated with increased deployment (i.e. PV solar). FiTs have proven popular in Europe, and have also been implemented in Australia, Canada (Ontario), and some U.S. states. Beyond these quantity-mandates and market incentives for the deployment of near-market technologies, R&D support for unproven technologies represents another important component of RES-E policy portfolios (Fischer & Newell, 2008)

6.1. Criticism of RE Incentives

While RES-E deployment policies such as RPSs and FiTs have proven popular as part of a suite of climate policies centred on an emissions trading system, there are theoretical arguments suggesting that their interaction with an ETS can have negative unintended consequences. For example, given the fixed emissions cap mandated by the cap-and-trade policy, the separate promotion of RES-E deployment will not lead to additional emissions reductions in the economy unless policy-makers revise the cap downwards to account for the introduction of an RPS or FiT (Fischer, C. & Preonas, L., 2010). Worse, Bohringer & Rosendahl (2010) claim that “green promotes the dirtiest” because RES-E support policies implemented in conjunction with an ETS lower the carbon price and thus reduce the advantage given to efficient natural gas turbines over coal plants. This occurs because, while RES-E policies work as intended to reduce the relative profitability of fossil-fuel generated power and thus reduce the output of all fossil-fuel producers, the resulting decrease in the carbon price leads to a second-order effect of increased electricity production at the dirtiest sources (i.e. coal).

A depressed carbon price has effects beyond the electricity sector as the incentive to invest in low carbon technologies is diminished across the economy and thus it is argued that RES-E support policies increase the overall cost of GHG mitigation over the long-term (Morris, 2009). Further criticisms regarding the cost-effectiveness of achieving an emissions cap when overlapping GHG and RE policy instruments are in place relate to the relatively high cost of abatement through RES-E deployment when compared with other options (i.e. energy efficiency) (Dachis and Carr, 2011). The cost curve chart presented in figure 2 below demonstrates that RES-E from wind, biomass and CCS-coal are far along the cost curve (solar PV is even further along the curve and thus doesn't appear) while energy efficiency investments like insulation, lighting and air-conditioning can have negative costs (i.e. they are economically-beneficial given current policies and energy costs).

Figure 6.2: Global Cost Curve for GHG abatement measures



Source: (Enkvist, Naucler, & Rosander, 2007)

Thus a jurisdiction covered by an ETS that also implements RES-E support policies might not achieve low/negative cost emission reductions as relatively expensive abatement from RES-E deployment displaces such opportunities under the cap. In the case where RES-E would be incentivized by a carbon price alone, the presence of additional RE incentives only creates windfall profits for electricity generators.

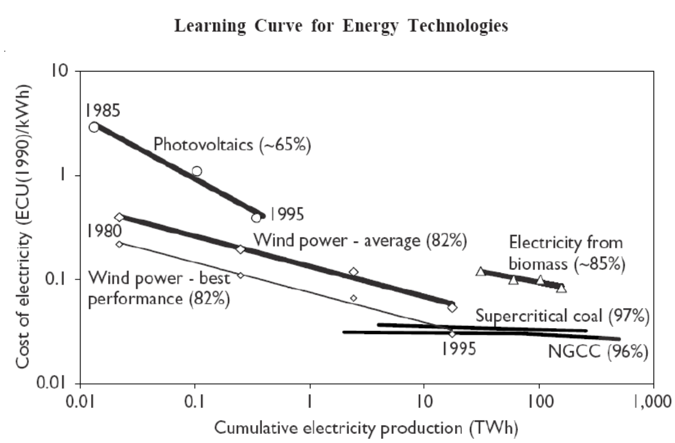
6.2. Support for RE Incentives

While the criticisms of RES-E support relate to their interaction with an ETS and the carbon price distortions that result, policy-makers often have multiple motives for promoting RES-E which often include: energy security and price stability, other environmental and health benefits, and local economic development (Philibert, 2011). When these multiple objectives are in place, the inefficient achievement of the GHG cap can be justified as a cost of achieving the other objectives. While these objectives are valid, policymakers should assess other options, such as promoting energy efficiency, which are likely to be more effective at realizing all the aforementioned objectives (Philibert, 2011: 9).

Stronger support for RE support policy comes from the long-term nature of the climate change problem and the technological revolution required facilitating the achievement of ambitious global emissions reduction targets. A target of limiting global mean temperature to a level below 2 degrees C (compared to pre-industrial levels) has become an internationally-accepted goal which, in light of the recognized responsibility attributed to industrialized countries for present GHG-concentrations, requires them to reduce their GHG emissions 80-95% by 2050 with the main share achieved by 2030 (IPCC, 2007).

Achieving climate stabilization requires an ambitious and broad portfolio of mitigation options that includes a significant increase in the global share of renewable energy in the global electricity mix. Indeed, the IEA *Energy Technology Perspectives 2010* shows that by 2050 renewable energy will need to account for 50-75% of global electricity in order for GHG emission targets to be met (IEA, 2010). Deploying renewable energy on this scale will require their costs to fall dramatically in order to limit overall cost increases and maintain affordability of electricity for the world's poor. Early deployment of renewable energy, supported by RES-E policies, is necessary to drive cost reductions. Indeed, technological development is a cyclical process whereby new technologies deployed in a competitive marketplace benefit from "learning-by-doing" effects that can dramatically reduce their costs over time. Figure 3 demonstrates this learning effect for all conventional RES-E technologies over the past several decades.

Figure 6.3: Learning Curve for Energy Technologies



Source: IEA (2000).

With a perspective that acknowledges the long-term challenge of transitioning to a low-carbon electricity system the additional costs to achieving near-term GHG caps imposed by RES-E policies can be justified by the dynamic efficiency that such policies provide over time through learning-by-doing effects. Supporting the notion that a mix of policies is required, Fisher and Newell (2008) have developed a framework to assess different policy options for reducing GHG emissions. They find that, "an emissions price, although the least costly of policy levers, is significantly more expensive alone than when used in combination with optimal knowledge subsidy policies." Their optimal mix has three distinct policy instruments: support to R&D, a carbon price, and RE deployment support.

Another related element of the long-term view supporting RES-E deployment policies is the structural lock-in of fossil-fuel technologies that has developed over the past century. Under the logic of path dependency (Arthur, 1989) the short-term cost advantages of fossil energy over RES-E over the past century have locked industrial societies onto a fossil-energy intensive technological path that is now proving to have less long-term advantages than the locked-out RES-E technologies. Neuhoff (2005) identifies three characteristics of the electricity sector that make it particularly susceptible to technological lock-in. The first is that new technologies produce the same basic product: electricity, and hence they have to compete mainly on price. This contrasts to other sectors where product differentiation is a prime area of distinction. The second characteristic compounding lock-in is the large-scale and long-time horizon of electricity investments which creates sunk-costs that make alternative investments less attractive in the future. The third characteristic identified is the difficulty that individual private firms have at appropriating the full benefits of learning and R&D. Innovating firms are susceptible to a technology "spillover" that allows competitors to free-ride and capture benefits from the innovating firm's investments. The most obvious example of the lock-in of fossil fuels is direct and indirect subsidies. It is estimated that existing subsidies for fossil fuels total $150-250 billion each year, compared with a $33 billion annual investment in renewable energies (Stern, 2006). In addition to subsidies, the market price for fossil fuels does not "internalize" the environmental impacts associated with them, creating another "subsidy" that makes investments in renewable energy innovation more challenging.

Incredibly large investments in electricity infrastructure are required to facilitate the development of new climate friendly RES-E sources. Smart grids, which incorporate digital technology with traditional transmission infrastructure to better manage demand and incorporate distributed renewable sources of electricity, are one of the main areas of such investment. In the U.S. the roll-out of a smart grid is predicted to cost approximately US$400 billion between now and 2030 and result in benefits of approximately US$1.6 trillion, mainly attributable to a reduction in energy consumption (Electric Power Research Institute, 2011). The challenge for governments is thus to initiate a change in the path that our energy system develops in over the next few decades through the early deployment of RES-E technologies, investments in electricity infrastructure, and R&D efforts that can potentially open new technological options (Roehrl & Riahi, 2000). Because an ETS operates as a series of relatively short temporal phases (typically 3-5 years), it is not well suited to generating the long-term scarcity signals necessary to overcoming the structural lock-in of fossil-energy where investment cycles are several decades long.

6.3. Interaction RES-E policies in the EU ETS

In the first (2005-2007) and second (2008-2012) phases of the EU ETS, electricity producers were awarded the majority of their required allowances free of charge on the basis of historical emissions (i.e. grandfathered allocation). Thus low-emission renewable electricity technologies (hydro, nuclear) did not receive any permits which provided a perverse incentive to maintain electricity production at carbon intensive facilities in order to continue to qualify for valuable emissions allowances. With respect to the interaction between cap-and-trade and RES-E policies in phase I&II, the carbon price was insufficient to promote deployment of RES-E. Indeed, even when EU ETS carbon prices reached a zenith of €30 (C$40) in 2008, the increase in electricity prices that it engendered was still insufficient to mobilize the deployment of renewable energy technologies or power plants with CCS, the latter of which is expected to require a carbon price of at least $40-80US to be economical (Kuuskraa, 2007). Thus the EU ETS acts as a short to medium-term clearing mechanism for abatement options that are close to the market and does not constitute an effective approach to incentivizing RES-E R&D and deployment. Such an finding is corroborated by interviews with German electricity generators conducted in Rogge & Hoffman (2009: 12), one of whom stated: "The EU ETS...only causes a power price increase, but it does not guide investments...In this regard, for example, feed-in-tariffs or the (German) cogeneration law are much more successful."

For the third phase (2013-2020) the ETS has been revised and strengthened by the introduction of an EU-wide cap to replace the disaggregated national-level cap setting of previous phases and the immediate phase out of free allowances for the electricity sector (free allowances for other ETS sectors will be phased-out over the 2013-2020 period) (Ellerman, Convery, & Perthuis, 2010: 76). This new approach to cap-setting and allocation should help resolve the perverse incentives to continue operating carbon-intensive facilities and thus provide more indirect support to renewables.

The revised ETS is one component of the European Commission's ‘climate and energy’ directive that came into force in 2009. Linked to the revised ETS is a set low carbon energy policies which collectively will lift the average renewable share across the EU to 20% by 2020 (more than double the 2006 level of 9.2%). Renewable energy is expected to constitute 30% of total electricity consumption which will be achieved through RES-E support policies at the member state level. EU member states operate a wide range of RES-E support schemes including most prominently: feed-in tariffs (Germany, Denmark and Spain) and quotas/tradable green permit sytems (Belgium, Italy, Poland, Sweden and the U.K.) (Haas, et al., 2011). Additionally, a network of coal-fired carbon capture and storage (CCS) demonstration plants will be setup by 2015, with the aim of a commercial update of CCS by around 2020.

The revised ETS will also support the deployment of advanced RES-E technologies and CCS for coal plants through an innovative financing instrument managed jointly by the European Commission, European Investment Bank and Member States. 300 million allowances in the EU ETS New Entrants’ Reserve (NER) will be set aside for subsidizing installations of innovative renewable energy technology and carbon capture and storage (CCS). The allowances will be auctioned on the carbon market generating approximately €4bn for an anticipated 20 CCS and 90 RES-E projects across the EU region. In linking the ETS with the development of next-generation RES-E technologies, the “NER300” program represents an important innovation in cap-and-trade design that reinforces the adoption of ambitious climate mitigation targets.

6.4. Interaction RES-E policies in ON/WCI

In 2009 Ontario's Green Energy and Green Economy Act (GEGEA) was passed which enabled a feed-in-tariff (FiT) program for RES-E sources. Ontario's FiT program is the first of its kind in North America and will help facilitate the Province's phase-out of coal-fired electricity by 2014. Ontario's FiT has been made contingent on a minimum domestic content of 25% for wind turbines (increasing to 50% after 2012) and 50% for solar panels (increasing to 60% in 2011). It is hoped that these requirements will spur the development of a local manufacturing industry for RES-E components that will generate thousands of jobs to offset the decline of Ontario's traditional manufacturing sectors. Thus the GEGEA is consistent with RES-E policies in other jurisdictions in that there are overlapping objectives of climate mitigation, local environmental and health issues, and economic development.

Ontario's FiT program is very close in design to that of Germany and Spain, except for that the latter two jurisdictions have included a "degression" provision to adjust rates downwards over time to reflect on-going improvements in technology. Figure 4 presents a comparison of Ontario's FiT program with those of European countries (Germany, Denmark & Spain):

Figure 6.4: Comparison of FiT policies between select jurisdictions

	ONTARIO	GERMANY	DENMARK	SPAIN
Feed-in tariff[a]				
• Wind onshore	13.5[g]	12.7[b]	8.0[c]	10.4[d]
• Wind offshore	19.0[g]	17.9[b]	–[c]	20.8[d]
Tariff type	Fixed rate	Fixed rate	Premium	Fixed rate or premium[f]
Funding source	Ratepayers[e]	Ratepayers	Taxpayers	Ratepayers
Time-differentiated	No	No	Yes (spot price plus premium)	No
Automatic rate updating	–	-1-2%/yr onshore -5%/yr offshore	–	Indexed to consumer price index
Policy review	Scheduled review every 2 years	Scheduled review every 2 years	–	Scheduled review every 4 years
Tariff period	20 years	20 years	22,000 full-load hours (~10 years)	20 years
Manufacturing support	Domestic content requirements	Soft loans; subsidies; favourable customs duties; export credit assistance	Soft loans; favourable customs duties; export credit assistance	Domestic content requirements; subsidy

a. Rates are current as of 2010, and are expressed in Canadian cents per kWh by converting Euros to dollars at a market exchange rate of 1.38 EUR/CAD.
b. The rate is reduced by 1% per year for onshore wind and by 5% per year (after 2015) for offshore wind.
c. Denmark's FiT consists of a premium added to the wholesale price of electricity of 4.64 ¢/ kWh. The value reported here is the wholesale electricity price plus the premium. Denmark has used a tendering process for offshore development in recent years.
d. Onshore wind in Spain is supported by either a premium above the wholesale price of electricity or by a fixed rate tariff (the latter is shown here). Offshore wind is supported only by a premium above the market electricity price of 12.2 ¢/ kWh.
e. The Ontario FiT is funded by the Ontario Power Authority; OPA revenues are derived mostly from fees levied on ratepayers.
f. For onshore turbines, project proponents choose between a fixed rate and a premium. For offshore turbines, just a premium exists.
g. Ontario's FiT provides up to an additional 1.5 ¢/ kWh and 1.0 ¢/ kWh for projects with significant aboriginal and community participation, respectively.

Source: (Sustainable Prosperity, 2010)

With Ontario phasing-out its substantial coal-fired electricity capacity (currently 13% of fuel mix at time of writing) as part of the GEGEA, an increase in emissions from dirty domestic sources as modeled in Bohringer & Rosendahl (2010) will not materialize. But, given that Ontario can import a significant amount of electricity from coal-intensive US states like New York and Minnesota, there remains the possibility that the interaction of Ontario's ETS and the FiT could cause some carbon leakage to other jurisdictions. Under the Western Climate Initiative's *First Jurisdictional Deliverer* (FJD) approach to applying the ETS to electricity emissions, imports from non-WCI jurisdictions like New York and Minnesota would be subjected to the carbon price through a requirement that importing entities (i.e. OPA) hold sufficient allowances to cover the emissions from imported sources. But, given that FiT induced RES-E deployment will put downward pressure on the WCI carbon price, it is still possible that the "green promotes the dirtiest" effect could take place as emissions leak outside of Ontario to non-WCI jurisdictions. This effect could be mitigated if imports from hydropower sources in Manitoba and Quebec, both of whom are WCI members, were facilitated through investments in grid interconnection capacity. Recent investments in Ontario-Quebec electricity interconnections are a positive step in this regard (Ministry of Energy, 2011).

6.5. Conclusions & Recommendations

Given the strategic importance of RES-E in addressing climate change over the next few decades, an attempt should be made to adjust Ontario's cap-and-trade policy to take the FiT into account. This could be done by quantifying and reducing from the cap the emissions reductions that result from RES-E displacing fossil-energy thus ensuring that the ETS brings about emissions reductions additional to that incentivized by the FiT scheme. Under Ontario's Climate Change Action Plan the vast majority of emission reductions are expected to come from the electricity sector as a result of the coal phase-out and no reductions are anticipated in industrial sectors as a result of current CCAP initiatives (Environmental Commissioner of Ontario, 2010). A tightening of the cap, facilitated by FiT-induced RES-E deployment, would result in a stronger carbon price signal to incentivize low-cost energy efficiency investments in Ontario's industrial sectors .

Another option would be to adopt a more flexible design that includes a price floor for emissions allowances. The price floor would constitute a de facto carbon tax were the price of emissions allowances to fall below the threshold set by regulators. While they are likely to be challenged by politically-powerful industrial groups, price floors are used in both the U.K. and California which suggests that such resistance can be overcome. In California the price floor will be applied as a $10 reserve price on auctioned allowances. This reserve price will increase by the rate of inflation + %5 which, if inflation averages 2% over 2012-2020, will result in a ~$17 floor price in 2020. In the U.K. an auction reserve price of £16 (~C$25) will be applied for the electricity sector in 2013 which will increase to £30 (~C$46) by 2020. Such an approach will also likely apply in the case of British Columbia's carbon tax, which is currently C$20/tonne and applies to fossil fuels purchased in the province. Under such a hybrid carbon tax/cap-and-trade approach, an incentive to invest in RES-E technologies would remain even if permit prices under the ETS were to collapse (as has occurred in the EU ETS scheme).

Furthermore, the price floor would generate revenues that could be used by the Government to finance the FiT scheme, or invest in electricity grid infrastructure to facilitate the inclusion of distributed renewable sources. Yet another option available to support the development and deployment of RES-E through Ontario's ETS is to set-aside allowances for voluntary RES-E purchases. Such a voluntary RES-E set-aside has been contemplated as part of the WCI design, but has been left to the discretion of individual partner jurisdictions (Western Climate Initiative, 2010). By maintaining a bank of allowances that can be retired based on the demand for voluntary RES-E purchases, the Government maintains an incentive for individuals and businesses to purchase renewable power voluntarily (i.e. bullfrog power).

Recommendations:

- Ontario should reduce its emissions cap to account for the GHG reductions that are induced by the FiT program. The Province's Long-term electricity Plan (LTEP) projects 10,000MW of new RES-E by 2018 which translates into a GHG reduction of approximately 10Mt.
- Ontario should institute a price floor as part of its cap-and-trade program set at $10/tonne and rising over time faster than the rate of inflation.
- Ontario should introduce a set-aside of allowances to maintain the incentive for individuals and businesses to voluntarily purchase renewable energy

7. Emissions-Intensive Trade-Exposed Industries: Managing Carbon Leakage

In announcing that it would not follow WCI partners in implementing a cap-and-trade program in 2012, the Ontario government signaled its concern over the industrial competitiveness impacts that such a policy could entail (Ontario Ministry of the Environment, 2011). The concern is that the implementation of a cap-and-trade scheme in a world of fragmented or non-existent carbon markets will expose Ontario's emissions-intensive and trade-exposed (EITE) industrial sectors to higher costs. In a globalized economy, trade-exposed sectors in Ontario could see their market share reduced relative to international competitors that are not subject to carbon constraints. And, even in the case where a competing jurisdiction has implemented a carbon price, key differences in program design will result in different cost structures for industries. Such will be the case with Regional Greenhouse Gas Initiative (RGGI) member states where a carbon cap-and-trade program applies to the electricity sector only. Because Ontario's proposed program applies more broadly to cover industrial sectors, compliance costs are likely to be higher and thus these sectors could be put at a competitive disadvantage.

Beyond the purely economic concerns about reduced competitiveness lie environmental effectiveness concerns. If EITE facilities located in Ontario move to jurisdictions that impose a less onerous carbon constraint then the effect of a provincial carbon price is neutralized. If the production processes used in the other jurisdiction result in more GHG emissions then the effect of Ontario's cap-and-trade program would be to increase overall global GHG emissions. This effect is known as carbon leakage and provides a powerful argument that the design of a cap-and-trade program should account for such unintended consequences on emissions intensive activities.

While these concerns are important, the overall objective of reducing greenhouse gases should not be compromised in responding to them. Given the privileged position of industrial actors within the environmental policy process (Macdonald, 2007), regulators designing a cap-and-trade system will face significant pressure from emissions-intensive sectors to reduce their costs through measures such as free allocations and/or import duties on carbon-intensive products. While such policy options can mitigate the risk of carbon leakage and negative economic impacts, decisions on how to respond should be preceded by analysis that determines which sectors are most likely to suffer competitiveness impacts and to what degree. This chapter will attempt to do this. It will start by reviewing the literature to understand the extent of the risk of leakage and the sectors that are particularly prone and in need of transitional support. This empirical description will facilitate an understanding of the sectors that might be significantly impacted by a cap-and-trade program in Ontario. Having identified the sectors in Ontario potentially at risk of negative economic impacts from a carbon price, the chapter will then describe policy approaches utilized to mitigate economic harm in the EU ETS and those proposed in the 2010 American Clean Energy and Security Act and the Australian Carbon Reduction Scheme. With the breadth of policy options in mind, the chapter will conclude by making some specific recommendations for the Government of Ontario to manage competitiveness and leakage impacts as it designs its cap-and-trade program. The recommendations provided will focus on mitigating the short-run economic harm while still providing the medium and long-term incentive for these industries to invest in low carbon energy solutions.

7.1. Assessing the extent of the risk of carbon leakage

A significant amount of analysis has been conducted on the issue of how greenhouse gas reduction policies could affect industrial competitiveness and employment in a region moving unilaterally without corresponding effort from trading partners. Recognizing that a firm's adaptation to a carbon price occurs over time, the literature on industrial competitiveness effects of carbon pricing differentiates between four different timescales: the very short run, the short run, the medium run, and the long run (Ho, Morgenstern, & Shih, 2008). Over time, firms are able to respond to a carbon pricing policy in the short-run by raising prices, substituting inputs (i.e. labour for capital), and in the long run by replacing capital with more energy-efficient technology. Thus, over time, the carbon intensity of a firm should decline along with competitiveness impacts.

Broadly speaking, studies assessing competitiveness and leakage impacts of a carbon pricing regime have found that the likelihood of carbon leakage has largely been exaggerated in the political debate. These impacts are concentrated in a limited number of industries that account for a small portion of gross domestic product (GDP) and employment and become less sever over time. For example, Hourcade, et al. (2007) studied the competitiveness impacts on the UK economy of the EU ETS using a CO_2 price of €20/t and an electricity price of €10/MWh. Their analysis identified cement, iron and steel, aluminium, pulp and paper, and chemicals as sectors at risk of competitiveness impacts from the EU ETS which combined represent 1.1% of UK GDP and 0.5% of employment. A German study (Graichen, et al. 2008) reached similar conclusions. The European Commission in May 2010 released a paper analyzing the costs, benefits and options of moving the EU reduction target to 30% below 1990 levels by 2020. The paper included an assessment of the risk of carbon leakage in the EU ETS that estimated production losses in the EU would be less than 1% under the 20% target, and less than 2% with the 30% reduction target (European Commission, 2010). Another EU study released by the UK Carbon Trust found the risk of carbon leakage in Phase III of the EU ETS to be less than 2% of total EU emissions (30Mt CO_2eq). The report did note that for a few specific sectors - such as steel, cement and aluminum – the risk of leakage is greater (Carbon Trust, 2010).

Studies conducted in the U.S. on the competitiveness impacts of cap-and-trade proposals have also found small negative impacts. For example, Morgenstern et al. (2008) examine the impacts on U.S. industry of a $10/t CO_2 charge and find adverse effects on output and employment of less than 1% in the near-term. Over time as these industries adapt by becoming more energy efficient, or substituting capital for labour, these adverse effects are largely reversed and some industries actually see employment gains (i.e. electric utilities). Negative effects persist for fossil fuel extraction industries and petroleum refining. Aldy and Pizer (2009) model the effects of a $15/t CO_2 charge and find an average production decline of 1.3% across U.S. manufacturing, of which 0.6% is attributable to a decline in consumption. Thus such a carbon charge only results in a 0.7% shift in production overseas, and doesn't result in any discernible impact on employment for the manufacturing sector as a whole. The U.S. EPA in December 2009 analyzed the effect of a US$20 carbon price on emissions intensive trade exposed industries. At that time the House of Representatives had passed the Waxman-Markey bill (H.R. 2454) and thus the prospects of a domestic cap-and-trade scheme in the U.S. appeared high. The study found that, without industry assistance provisions, the increase in production costs for EITE industries would range from less than 0.5% to a little more than 2.5% depending on the sector (Environmental Protection Agency, 2009).

Finally, in Australia the Grattan Institute analyzed the impact of a $35 per tonne carbon price on eight emissions intensive industries and found that only two (steel and cement) were at risk of carbon leakage. Based on this finding, the report concluded that much of the protection proposed for EITE sectors under the Australian Carbon Pollution Reduction Scheme was unnecessary (Grattan Institute, 2010).

7.2. Defining Energy-Intensive and Trade-Exposed Industries in Ontario

Defining EITI sectors in order to provide transitional assistance under a cap-and-trade program is a policy decision that first requires setting thresholds for energy intensity and trade exposure. This has been done in the European Union for the third phase of the EU ETS, and in the U.S. as part of the American Clean Energy and Security Act of 2009. Using the definitions set out in the EU (European Union, 2008) and the U.S. proposal (HR2454m 11th Congress, 2009) the list of EITE sectors in Ontario could include: mining, pulp and paper, chemicals, cement, steel and petroleum refining. But the extent to which these sectors are vulnerable to competitiveness impacts varies widely, and economic value at risk likely represents a small percentage of Gross Provincial Product.

In the mining industry transitional assistance is likely not warranted. This is because, while Ontario's mining industry is highly trade-exposed with more than 40% of production exported internationally , energy costs represents a relatively small amount of the value of shipments (i.e. >5%) (Ministry of Natural Resources, 2011). This is particularly the case in the present period of high commodity prices. And with mining and smelting activities relying primarily on Ontario's soon-to-be coal free electricity grid for their energy needs, the effect of a carbon price is likely to be quite small on the industry's energy costs.

Pulp and paper is another example of an industry where the case is weak for transitional assistance. Like mining, Ontario's pulp and paper industry is trade-exposed with close to 40% of output sent abroad (Natural Resources Canada, 2010a) and nationally the forest sector is the largest industrial energy user (Natural Resources Canada, 2010b). But, the forest industry self-generates more than 50% of its energy needs by burning wood biomass in its facilities (Statistics Canada, 2010). While the net carbon emissions of this practice can vary widely depending on the source of forest bio-fibre (Pembina Institute, 2011), the Ontario government has amended its Greenhouse Gas Reporting Regulation (O.Reg 452/09) to exempt biomass emissions from the determination of whether a facility meets the 25,000 tonne threshold for coverage under the cap-and-trade program (Ontario, 2010). This amendment represents a de facto exemption for pulp and paper facilities in the Province from participation in the cap-and-trade program which is the most extreme policy option available for protecting a domestic industry.

The remaining sectors - chemicals, cement, steel and petroleum refining – remain on the list of energy intensive trade exposed industries. Of these four, only the cement and steel sector will be further analyzed. This is because neither the chemical or refining industries are major employers in

Ontario. The chemical industry employs just over 1000 people nationally, and only 30% of production capacity is located in Ontario (Industry Canada, 2011) and Ontario's four petroleum refineries employ less than 1000 people combined. The steel and cement sectors both employ a significant number of Ontarians (24,000 and 12,500 respectively) and have been consistently recognized in international studies as being deserving of transitional assistance under a carbon pricing regime (see the "Assessing the extent of the risk of carbon leakage" section above). Furthermore Ontario is home to a significant portion of national productive capacity in each of these sectors.

7.2.1. Cement

Ontario has seven cement plants that represent 46.5% of total national capacity. The Province's cement industry is relatively carbon inefficient with two of the seven facilities using a wet process kiln technology that consumes up to twice the energy per unit of production as compared to modern dry kiln technology (Cook, 2009). The use of out-dated technology, coupled with a relatively low rate of substitution of fossil fuels for alternative fuels (the rate of thermal substitution in Ontario is 5.3% compared to a national average of 11.3% and more than 34% in Quebec) (Cement Association of Canada, 2010) make Ontario's cement production more energy & carbon intensive than the Canadian and continental average. Thus as Ontario moves forward with a carbon pricing system, policy levers in complementary to cap-and-trade should be considered. This could include mandating the use of alternative energy sources in the clinker production process.

7.2.2. Steel

Ontario is home to six steel plants that represent approximately 80% of national capacity. Four of these are integrated operations with coke ovens, blast furnaces and basic oxygen furnaces, and two operate electric arc furnaces to reprocess scrap steel (Environment Canada, 2010). As a large energy consumer accounting for about 7.5% of Canada's industrial energy demand (Natural Resources Canada, 2009) selling an internationally-traded commodity (Canada imports 50% of domestic consumption) carbon leakage is an issue in the steel sector. This is particularly the case for Ontario's relatively emissions-intensive blast oxygen furnace plants.

7.3 Policy Options

There are two basic options for mitigating the risk of leakage within EITE sectors: leveling down carbon prices through free allocations or investment subsidies, or leveling up carbon costs through a border carbon adjustment (BCA) on imports (Carbon Trust, 2010). While free allocation is the favoured approach in the EU and the proposed WCI cap-and-trade design, it may not effectively deter leakage if a facility can economically reduce output and sell its surplus allowances. Reduced domestic output that results in greater imports from unregulated jurisdictions compromises the environmental effectiveness of a carbon pricing policy. In this situation the EITE facility would generate windfall profits from allowance sales while doing little to reduce the emissions leakage that policymakers were seeking to avoid.

A more effective solution from the perspective of economic and environmental efficiency is to level-up the carbon costs on imported products through a BCA. Such an approach is particularly suitable for the cement sector where the relative homogeneity of product allows for the application of a BCA benchmarked to the best-available-technology (e.g. dry kiln technology) that is likely consistent with World Trade Organization (WTO) rules of “non-discrimination” and “national treatment”. With respect to steel the heterogeneity of product and process along with the significant economic value of internationally traded steel make the establishment of a BCA technically and politically challenging. Thus output-based free allocation with a gradual transition towards a BCA or preferably a global sectoral agreement might be preferable (Carbon Trust, 2010: 54).

7.4. Conclusions and Recommendations

The practicality of the WCI region developing border carbon adjustments for internationally traded products is questionable because of constitutional restrictions in the U.S. that prevent sub-national entities from erecting barriers to interprovincial/state trade (Lawrence, 2009). Thus, given the sub-national regional approach that Ontario has embarked on for its cap-and-trade program, output-based free allocation appears to be a second best alternative. There are several design elements that should be considered when establishing free allocations in order to maintain environmental integrity of the overall program. First among these is that free allocations should be based on the best practice (i.e. lowest emissions) producers in the WCI region, much like the EU approach to benchmarking described in section four. Furthermore, the EU does not provide allowances for indirect emissions from electricity and limits assistance to the overall industrial sector emissions cap. As the overall cap declines throughout phase III (1.74% per annum 2013-2020) the level of free allocations will decline over time. These provisions maintain the incentive for EITE sectors to invest in emissions reductions even while receiving free allocations. This is because only the best performers will receive 100% of their allowance requirements for free, and even those will face declining free allocations over time.

Going forward, the Ontario government should engage Provincial governments through the Canadian Council of Ministers of the Environment, the Federal government and its North American trading partners through the Commission on Environmental Cooperation in an effort to develop national and continental sectoral emissions performance benchmarks for the cement and steel sectors. These performance benchmarks should be used to facilitate the development of border carbon adjustments at the national and continental levels.

Recommendations:

- Ontario should establish a sunset provision for the transitional assistance provided to industries in its cap-and-trade program. Preliminary analysis suggests that the steel and cement sectors are two likely candidates for transitional assistance, but more extensive economic modeling should be conducted to assess the risk in other sectors. Free allocations, based on a firm's level of output and benchmarked to the best performance within a given sector, should be provided on an interim basis until such time that Ontario's trading partners have developed comparable policies.
- Ontario should engage governments at the sub-national, national and continental level to begin the process of developing sectoral performance benchmarks for emissions-intensive trade-exposed industries. This effort should be directed towards the development of WTO-compliant border carbon adjustments.

8. Conclusions

Climate change is happening and Ontario is currently contributing a much larger share of global greenhouse gases than it should given its population and the size of its economy. In order to have a fair change of averting catastrophic impacts from climate change, the province will need to reduce its GHG emissions by at least 80%, and likely closer to 95%, over the next few decades. And, the sooner Ontario can set itself on a trajectory to reduce emissions the better because of tipping points that could be reached in the next several years that would turn provincial GHG sinks such as the Boreal forest in the North West and peat bogs in the Hudson Bay Lowlands into major sources of emissions. Thus emissions reductions made in the near-term will ease the transition to a low-carbon economy and reduce the risk of uncontrolled releases of GHGs and runaway global warming.

Pricing carbon is recognized as one of the most important policies for reducing GHGs. The Province has identified cap-and-trade as its favoured approach for pricing carbon, and is in the process of developing a system that will be linked with U.S. and Canadian sub-national jurisdictions as part of the Western Climate Initiative. This research paper was concerned with providing recommendations to the Province as it goes about developing its cap-and-trade program. Such an approach is complex, and there are significant risks that the program design could compromise the environmental effectiveness of Ontario's climate change mitigation efforts. In this regard the paper reviewed the European experience with emissions trading and found that such a program can be designed to make a contribution to climate change mitigation given appropriate attention to the design of key program elements. Key recommendations made on the various cap-and-trade program elements surveyed are as follows:

1. **Cap-setting**

- Ontario should revise its 2020 and 2050 caps to be consistent with IPCC recommendations for emissions reductions from developed economies. These revised caps should stipulate that a significant majority (i.e. >80%) of emissions reductions occur domestically
- Ontario should negotiate with its WCI partners to develop a centralized institution with the authority to review and revise proposed partner jurisdiction allowance budgets so that over-allocation in one part of the region doesn't compromise the efforts of others.

2. **Allowance allocation**

- Ontario should strive to auction 100% of allowances, particularly in phase II of its cap-and-trade program when industrial facilities will have had time to adapt to a carbon price
- Ontario should use stringent performance benchmarks (i.e. 10% best in a given sector) set at the national or WCI-regional scale in the interim until full auctioning of emission allowances is politically/economically feasible

3. Offsets

- Ontario should not allow offset credits generated from the destruction of Ozone Depleting Substances (ODS) for use in its cap-and-trade system. Restrictions on the import of such credits from WCI partner jurisdiction should be enacted.
- Ontario should forward with the development of offset protocols, prioritizing ones that have a high potential for environmental co-benefits (i.e. biodiversity) such as forestry and agriculture.
- Ontario should consider limiting the ability to bank forward offset credits to avoid having an oversupply in future compliance periods that reduces domestic GHG abatement.
- Ontario should not allow the creation of offset credits from renewable energy or energy efficiency programs or the coal phase-out in its cap-and-trade program. Furthermore, it should direct Provincially-owned entities holding environmental attributes from such programs to immediately retire them.

4. Interaction effects with complementary regulation

- Ontario should reduce its emissions cap to account for the GHG reductions that are induced by the feed-in-tariff. The Province's Long-term electricity Plan (LTEP) projects 10,000MW of new RES-E by 2018 which translates into a GHG reduction of approximately 10Mt.
- Ontario should institute a price floor as part of its cap-and-trade program set at $10/tonne and rising over time faster than the rate of inflation.
- Ontario should introduce a set-aside of allowances to maintain the incentive for individuals and businesses to voluntarily purchase renewable energy

5. Managing carbon leakage and competitiveness concerns

- Ontario should limit transitional assistance provided to industries in its cap-and-trade program. Preliminary analysis suggests that the steel and cement sectors are two likely candidates, but more extensive economic modeling should be conducted to assess the risk in other sectors. Free allocations, based on a firm's level of output and benchmarked to the best performance within a given sector, should be provided on an interim basis until such time that Ontario's trading partners have developed comparable policies.

- Ontario should engage governments at the sub-national, national and continental level to begin the process of developing sectoral performance benchmarks for emissions-intensive trade-exposed industries. This effort should be directed towards the development of WTO-compliant border carbon adjustments.

At the time of writing (July 2011) the prospects of Ontario moving forward with a cap-and-trade program are highly uncertain. The government has recently delayed the Province's participation in the WCI regional program citing concerns over the competitiveness impacts on Ontario's industrial sector. With the provincial economy challenged by rising energy costs, a high Canadian dollar and international competition from low-cost jurisdictions, it is unlikely that these concerns will recede any time soon. Furthermore, Ontario's WCI partners are facing problems of their own in implementing cap-and-trade and have responded by compromising the environmental effectiveness of their climate change efforts to reduce the potential economic downside. The California Air Resources Board has expanded offset supply beyond the WCI recommendations to ease concerns of negative economic impacts and has also delayed implementation of its emissions trading program. In British Columbia a carbon tax is already in operation and thus the rationale for an overlapping cap-and-trade program is less clear. Furthermore the province must reconcile the prospect of an emissions-intensive shale gas boom with its climate change policy development. As WCI partners become concerned about the impacts on their domestic economies the prospects for an environmentally effective cap-and-trade program premised on decentralized governance weaken.

In this regard Ontario must keep its policy options open if it hopes to achieve its GHG reduction targets in the near and long-term. Cost-effective near-term opportunities such as the reduction of black carbon in the freight transportation and residential heating sector, and the reduction of fugitive methane releases in the waste and natural gas distribution sectors must be seized upon immediately through regulatory action and strategic infrastructure investments. In the long term the provincial government must take a leadership role in addressing the transportation and land use patterns that have locked Ontarians in to expensive and carbon-intensive lifestyles. Ending the primacy of the automobile in the transportation sector and the suburban single-detached home in the residential building sector must be a driving focus of provincial policy development in spite of the political challenges that beset politicians embarking on that path. Achieving this will require policymakers and politicians to first overcome the denial that Ontario citizens feel around the impacts of their choices on the global climate. This will involve a greater effort to attribute current weather and natural disasters in Ontario to increased GHGs in the atmosphere. By making the link between personal actions and lifestyles and real natural disasters Ontarians will begin to accept the reality that GHGs need to decline rapidly and thus support politicians and policies that aim to do just that.

Furthermore, framing climate change policy as having benefits beyond a reduction in the risk of natural disasters in order to demonstrate the multiple environmental, economic and health benefits of climate change policy action is essential. Road tolls must be pitched as a method of reducing traffic congestion that is causing untold stress and health impacts; and carbon pricing as a way of reducing the vulnerability of Ontarians to swings in international energy prices. With the economy a top concern at the moment, climate change policies could be framed as helping to shift consumption away from imported fuels thus leaving more money in the pockets of Ontario's citizens to stimulate domestic economic activity that creates jobs for themselves and their families. The abstract goal of reducing GHGs to forestall uncertain future climate change impacts will not suffice when individuals are presently facing economic and health challenges that lead them to vote in ways that compromise their future.

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