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Russia—The Dark Horse of Kyoto Protocol Negotiation?

Sutandra Singha

Introduction

The modern world is struggling with the complex and dynamic problem of greenhouse gas emissions and resultant climate change due to manifold increase in anthropogenic activities. The past century experienced dramatic changes in this respect. Climate change has become a major threat to the world. With the increase in global temperature, there is an increasing tendency of the rising frequency of drought or flood, erratic rainfall, submergence of coastal areas, and overall destruction of ecological balance. Global carbon dioxide (CO_2) emissions are currently at their highest levels. According to the Global Carbon Project's Carbon Atlas released in 2015, Russia ranks fourth among the top carbon-emitting countries in the world. It can be assumed that Russia would always be a major CO_2 emitting country due to significant production of fossil fuels, cement, gas flaring and forest fires.

Aiming to combat global climate change, the Russian Federation joined the Rio Convention on climate change (1992) and contributed in framing the famous "AGENDA 21" – a comprehensive action plan for sustainable development. Later on the World Summit on Sustainable Development (Earth Summit) took place in Johannesburg, South Africa, from August 26 to September 4, 2002, i.e., ten years after the first Earth Summit in Rio de Janeiro. Therefore, it was called "Rio+10". This summit was a turning point in Russia's history as it agreed to sign the Kyoto Protocol. In the context of controlling CO_2 and other GHG emissions, the most important and historic landmark step by Russia was to sign the Kyoto Protocol which started in 1997 and came into effect on February 16, 2005. The act asked for a collective reduction of GHGs by the signatory nations to 5.2 percent of the 1990 levels.

It's been thirteen years since the ratification of the Kyoto Protocol that set the stage for global efforts to address climate change. In fact, it was the first international effort to cut down the emission of GHGs and to slow down the pace of anthropogenic climate change. The Kyoto Protocol took the world one step closer to an international plan of action on climate change. As a successor of the Kyoto Protocol, the UN Convention on Climate Change (UNCCC) landed on the Paris Agreement in 2015, which builds off the intentions of the Kyoto Protocol but with a new approach – developing countries are included – but there are no binding emission-reduction targets that countries must commit. Instead, it's up to each government to decide what is feasible for them, and up to the international community to hold their governments accountable. It's true that the Kyoto Protocol had neither dramatically reduced global CO_2 emissions nor caused any noticeable change in the composition of Earth's warming atmosphere. Still, this treaty is one of the most interesting and appreciated topics in the era of the Paris Agreement; taking concrete steps to reduce anthropogenic CO_2 emissions at such a time when there was less scientific evidence for human-induced climate change. In this context, this article highlights the aspects of Kyoto Agreement and the stand of the Russian Federation regarding ratifying this protocol.

About the Kyoto Protocol

The Kyoto Protocol was adopted on December 11, 1997 in Kyoto, Japan. (UNFCCC 2014 b). Although it was adopted in 1997, it was ratified in February 2005 when Russia adopted the protocol and operationalized the Convention. There are two types of countries in the protocol – Annexure 1 (consisting of 42 countries and the European Union – all of which are developed) and Annexure 2 (consisting of 23 countries and European Communities) (MFA, Turkey 2011). Russia is included in the list of Annexure 1. This protocol aimed to reduce emissions of six major greenhouse gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and sulfur hexafluoride (SF_6). In the convention, Russia committed to stabilizing greenhouse gas emissions to 1990 levels. For carbon dioxide, methane and nitrous oxide, the base year was taken as 1990. For the rest of the gases, the base year was 1995. Under the Kyoto Protocol, industrialized or developed

countries were required to reduce the emissions of greenhouse gases (especially CO_2) on average by 5.2 percent below 1990 levels during the first commitment period, i.e., from 2008 to 2012 (European Commission 2003). Developing countries were exempted from emission targets.

The Kyoto Protocol set binding emissions targets for developed countries only, predominantly responsible for high levels of emissions since the industrial revolution (Hashemi 2014). Under the principle of 'common but differential responsibility' (CBDR), the Kyoto Protocol assigned heavier binding emission cuts to developed countries. This recognizes the fact that all the countries have a common responsibility for emissions, but advanced countries will have to take the lead as they are more responsible and capable of reducing GHGs in comparison to the poor, weak and underdeveloped and developing countries (Kågeson 2011). The core structure of Kyoto Protocol consists of:

1. Reporting and verification processes
2. Flexible market-based mechanism
3. A compliance system

The first is to make emissions reduction commitments mandatory for developed Annexure 1 countries. This meant that each country has a limited scope to pollute. GHG emissions (mostly CO_2) have now become a tradable commodity. This set the base for the flexible market mechanisms. Countries under the Kyoto Protocol are bound to meet the emission targets mainly through domestic action – by reducing their emissions within their country (Snell and Haq, 2014, pp.86, 87). Failing this, they can meet part of their targets through "market-based mechanisms" allowed by the protocol. It promotes emissions reduction through cost-effective methods as well as stimulating green investment in developing countries and including the private sector in this endeavor (UNFCCC 2014c). The Kyoto Protocol has encouraged governments to make policies and set up legislation to meet their commitments; to set up a green technology market of investment, and the formation of a carbon market. It is among the most widespread and meticulous systems with a strong and effective mechanism of compliance with a multilateral environmental agreement.

The Role of Russia in Ratifying the Kyoto Protocol

Russia's position has evolved from skeptic to a critical player in the regime of climate change, whose support for the Kyoto Protocol became a prerequisite for the treaty's enforcement and implementation. Russia has an important role in the global platform. However, after the end of the communist system, Russia experienced a severe economic crisis which culminated in the financial crisis of 1998 when the real GDP dropped by 5 percent as compared to the previous year (Thomas White International 2015). By the end of 1998, total population below the poverty line rose to almost 40 percent; 7.7 percent were jobless, and the stock market lost 90 percent of its value (FAS 1999). As a result, Russia had to prioritize rapid economic growth. However, the economy started growing in the third quarter of 2009. High oil prices accelerated Russia's growth in 2011-12 (Nation Master 2016). Eventually, Russia became an important player in the regime of climate change, whose support for the Kyoto Protocol became a vital and necessary condition for the treaty's implementation. Russia was one of the first countries to ratify the 1992 Climate Change Convention, which established a general framework and principles for cooperation regarding mitigation of climate change.

In Kyoto, Russia had significant bargaining power because of two factors. First, Russia's participation was of great importance as the country was one of utmost significance and industrialized emitters of CO_2, but domestic interest in climate cooperation was almost non-existent. "The country's economy and GHG emissions shrunk by 39 percent and 34 percent, respectively between 1990 and 1997. The national priority to boost the economy gave negotiators substantial bargaining leverage at the international table" (Andonova, 2008, pp.498). As a result, Russia achieved the most favourable terms of all industrialized states. The Kyoto Protocol set Russia's emissions ceiling at the level of 1990, allowing it to increase its 1997 emissions by about 35 percent. The agreement adopted three flexible instruments – Joint Implementation (JI), Clean Development Mechanism and Emissions Trading (UNFCCC Newsroom 2014). Sensing ambiguity in

the United States (US) position, the EU continued to create diplomatic pressure on Russia to ratify, which ultimately brought the Protocol into legal effect, since it pushed Kyoto over the necessary threshold of 55 percent of the world's greenhouse gas emissions (Newsmax 2017). As the US commitment to the climate regime receded, Russia's bargaining power grew (Yeatman 2004). At the 2001 Marrakech Conference of Parties, Russia received further concessions regarding the use of carbon sinks and selling of surplus emission credits which increased its GHG emissions (Kolk, 2008, pp.4).

In 2004, Russia formally recognized the growing problem of climate change by signing the Kyoto treaty. Russia's current CO_2 emission levels are much below the quota set for the country in the Kyoto treaty. The main reason behind Russia's ability to keep its emissions targets is its economic collapse in the 1990s which led to a 30 percent decline in the use of energy and therefore a decline of 40 percent in emissions by the year 2000 (McKinsey 2009). However, the country's domestic fuel consumption is showing a steady increase with the rise in GDP, and it is predicted that 2.4 billion tons of CO_2 will be emitted by 2025 as 50 percent of industrial machinery and equipment installed are old and inefficient and therefore produce more CO_2 than normal (Billing 2008).

The Kyoto Protocol benefitted Russia by providing a generous cap of excess CO_2 emissions, but the President's close group of policy makers were concerned about issues such as the absence of US participation and what Russia could receive as economic benefits from the flexible mechanisms, etc. Putin's chief economic advisor Andrei Illarionov promoted an anti-Kyoto opinion (RIA Novosti 2005). He described it as an "economic Auschwitz" for Russia (Walsh N.P. 2008). Also, the National Agency for Direct Investments and the Russian Chamber of Trade and Industry developed an interest in the ratification and implementation of the Kyoto Protocol through participation in a range of workshops. RAO USER and Gazprom (oil and gas companies) were the biggest players that supported the Kyoto ratification in Russia in order to improve energy efficiency and technology exchange through Joint Implementation (JI) along with some voluntary actions for GHG accounting, e.g., development of a Corporate Greenhouse Gas Information System by RAO USER and an emissions register by Kaspiygazprom (Taplin and Firsova, 2008, pp.487). The main Russian bodies dealing with the Protocol's implementation were the Ministry of Economic Development and Trade of Russia, Roshydromet and the Ministry of Natural Resources (Global Issues rtd. 2009). "About the institutional frameworks, the National System for estimation of GHG emissions and sinks has been established, and with regard to policy and measures, the Program of Socio-Economic Development for the Medium-Term Perspective meets the requirements of the Kyoto Protocol" (Taplin and Firsova, 2008, pp.488).

The lower house of the Russian parliament, the Duma, voted to ratify the Kyoto treaty, bringing the international climate change protocol to within months of coming into effect. The treaty required developed nations, representing 55 percent of the world's GHG emissions, to sign and make effective. The US, responsible for 36 percent of emissions in 1990, and Australia had already refused to sign up. Russia had to ratify the treaty to save it from collapse.

Russia is now actively taking part in the formulation of a new agreement related to climate regime for the 'post-Kyoto' period, i.e., the period after 2012. However, international cooperation on this issue is essential, and all commitments should be taken on by the biggest emitters of greenhouse gases – the US, Russia, China, India, and Brazil – at the same time, otherwise they would be meaningless (Zinenko 2009). By addressing the immediate action to human-induced climate warming issues, Russia made a major change to its climate-related domestic policy in late April of 2009 (SRAS 2011).

As per the policy analysts, this new energy efficiency policy marks a "historic turning point" as "it outlines a checklist of key climate actions, which could provide a wonderful starting point for negotiations at Copenhagen climate talks" (Schiermeier 2009). Although Russia recognizes the usefulness of enhancing energy efficiency, very little effective action is being undertaken

(Billing 2008). Russia has participated in international projects to implement the flexible mechanism of the Kyoto Protocol and the Climate Change Convention. International agencies have supported introducing regulations regarding controlling the emissions of GHGs at local, regional and national levels. Denmark, Germany, The Netherlands, Japan, Sweden, Switzerland, the EU and the UK have financially supported capacity building which has interplayed with the restructuring of the Russian federal bureaucracy to encourage a power shift in the management and regulation of climate policies towards the Ministry of Economic Development and Trade. If history is any indication, Russia remains a dark horse in the process, the power of which should not be underestimated to assess Kyoto's success.

Why Did Russia Ratify the Kyoto Protocol?

Russia's ratification was a clever deal with the EU to secure its support for Russia's membership in the World Trade Organisation (WTO). Thus, observing Russia from the outside makes it difficult to assume at which point its national interest would accept the objectives of the climate treaty, and whether the Kyoto Protocol has influenced the country's interest in important and lasting ways. To regain pre-1990 economic strength, Russia didn't seem interested in committing to any target beyond stabilization at 1990 levels. Secondly, Russia was a mediator between the US and the EU. Like the US, Russia was in support of the unrestricted use of the flexible economic mechanisms, e.g., cap and trade and JI, which would help a country to fulfill its emissions reduction commitment by earning (ERUs) from an emissions removal or reduction project. Russia was expected to be an emissions trader due to its already large reductions of CO_2 emissions compared to that of 1990 – the base year. Later, Russia became a party with the member countries of Oil and (OPEC) to oppose quantitative emission limits, as Russia was itself a major source and exporter of energy. Eventually, Russia left the OPEC camp at the 1997 Conference of Parties in Kyoto, joined with the US, Australia and Japan and, together, asked for more lenient targets for industrialized states than the 15 percent emission reduction from 1990 levels proposed by the EU (Andonova, 2008, pp.498).

The level of CO_2 emissions is well below 1990 levels, which Russia presents as proof of their leadership role in climate change mitigation forum. But, the global community is not at all impressed by this. Russia's emission reductions were not the result of climate centered policies. Rather, the decrease in CO_2 emissions was the result of the economic crisis that followed Russia's transition from a centrally-controlled economy to a market-based economy after the collapse of the USSR. By 1998, when the Russian economy touched the bottom, energy use was much lower than ten years earlier. Despite Russia's chief role in causing global warming and its vulnerability of increasing temperature, Moscow has often maintained a passive and indifferent role in the discussion of the international climate talks and carefully avoided commitments that would force it to take steps to reduce CO_2 emissions. Russia's major contribution, i.e., the ratification of the Kyoto Protocol when its participation was highly needed to make the treaty effective was driven chiefly by political will. It is assumed that Putin signed the Kyoto Protocol in return for the EU's granting of a special concession in its negotiations with Russia on its bilateral WTO accession protocol. Moreover, Russia's target was limited to keeping emissions to 1990 levels, rather than making an actual and honest effort to reduce its emissions. Russia's behaviour in this period showed that its participation in Kyoto had not transformed it into a leader in the international effort to address climate change.

"In its submission to the UNFCCC prior to the Poznan Conference of Parties (COP) in December 2008, Russia declared the goal of a 25 to 40 percent reduction from 1990 levels by 2020 unreasonable and asserted that legally binding commitments must be interpreted as non-enforceable, non-punitive as well as flexible" (Charap 2010). During the meetings of the parties to the UNFCCC and other climate-related gatherings, Russia maintained its silence. Russian policy makers consider Russia's stance on emissions reduction as an obstacle to domestic economic growth. A scan of the Russian press since 2007, however, indicates that Russians are now more concerned about environmental issues, including climate change, than at the time of the debate about whether to ratify Kyoto. Russian companies are now showing considerable commitment to the introduction of "environmental management systems and standards such as ISO

14001" (Nissler 2004). Meanwhile Pravda, which referred to the 'myth of global warming' in 2005, recently reported that 'two-thirds of Russians believe in global warming' (Tipton 2008).

Closing Comments

Russia situates itself on the peripheries of the international climate policy forum – an important element of foreign policy in this decade – until and unless Russia changes its perception on "climate change diplomacy". The level of CO_2 emissions of Russia is well below 1990 levels, which Russia shows as proof of their leadership role in climate change mitigation forum. But the country's high-intensity CO_2 emissions undermine Russia's role as a global climate management actor. Russia's emission reductions were not the result of climate-centered policies. It was the result of the economic crisis (post-USSR disintegration) followed by Russia's transition from a centrally-controlled economy to a market-based economy. By 1998, Russia's economy touched the bottom and energy use was much lower than ten years earlier. After the US withdrew from the Kyoto forum, Russia's participation was necessary not only to make the treaty effective but also because Russia was, at that time, the third largest carbon emitter in the world.

In 2015, Russia was the fifth largest country regarding total fossil fuel CO_2 emissions and the eleventh largest country regarding per capita fossil fuel CO_2 emissions in the world. Despite the steep decline in emissions during Russia's economic reconstruction phase, per capita carbon emissions in recent times have increased. Russia argues that CO_2 emissions cannot be cut enough without the participation and cooperation of the emerging economies as they also have a large portion of global CO_2 emissions. The Kyoto agreement was never part of the Russian foreign policy, and mitigation policies were inspired by economic interests only. Delays in establishing JI projects hampered Russia's ability to create economic benefits and thereby further endangered its participation in the second phase of the Kyoto Protocol.

Despite the delays in the implementation of mitigation policies, the country's earlier image of being merely a potential seller of carbon credits is gradually changing into an image of a nation that is a more serious player in carbon emissions and climate change mitigation. Some political problems interfere with climate-related policy implementation; otherwise, the measures are an admirable starting point as a climate mitigation effort. In the context of the transition phase of the Russian economy, the expectations of the country's mitigation target are less than other industrialized countries and thus easier to fulfill. Despite the various issues related to implementation, Russia's efforts have been appreciated. Based on these actions, Russia can gain benefits by being more active and being a genuine participant in the global climate change forum. Therefore, Russian climate policy must be more comprehensive and action-oriented. Although Russia has stayed outside Kyoto's second commitment period, it played a decisive role in making the first phase of Kyoto negotiations, an opportunity to portray itself as a serious climate protector by adopting an emissions limitation target – as proposed at the Copenhagen Agreement in 2009 by Dmitri Medvedev (he announced a commitment to limit emissions growth to 25 percent below the 1990 level by the year 2020 which has been widely considered as economically safe for Russia since present CO_2 emissions are 34 percent below the 1990 level). This would send a message to the world that the Russian Federation has walked out of its post-Soviet legacy of emissions decline to a new global climate agreement.

Since the inception of the UNFCCC, two protocols or agreements have been produced – the Kyoto Protocol and the recently concluded Paris Agreement. Russia has been cooperative in the climate negotiations for the most part but at times uncooperative. Russia was initially refusing to join the Kyoto Protocol and did not sign the agreement until 2004. When it became evident that the United States would not ratify the Kyoto Protocol, Russia's ratification became crucial for the Protocol's entry into force. Contrasting the situation under the Kyoto Protocol, the United States ratified the Paris Agreement without delay. Also, there was no more risk for the entry to come into effect as two of the largest emitters – China and the United States – both ratified the treaty in September 2016. Hence, Russia lost its bargaining power. Now, the

relevant emerging powers in the international climate negotiations are China, Brazil and most notably, India.

Russia is still an important player. The world's fifth-largest greenhouse gas emitter announced that it would not "artificially speed up the ratification process". Rather, Russia wanted to evaluate the effects of the Paris Agreement on its fossil fuel-based economy and stated that it would draft a low-carbon development strategy before deciding to ratify, with a final decision no earlier than January 2019. In June 2017, Russia noted that wider use of natural gas is economical and environmentally-friendly, with the potential to assist it in fulfilling the provisions of both the Kyoto Protocol and its successor, the Paris Agreement. Its long-term role in combatting climate change is yet to be known.

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Carbon Policies and Potential Leakage: A Bridge-to-Cross in Canada's Journey to a Lower Carbon Economy

Sochi Iwuoha

Introduction

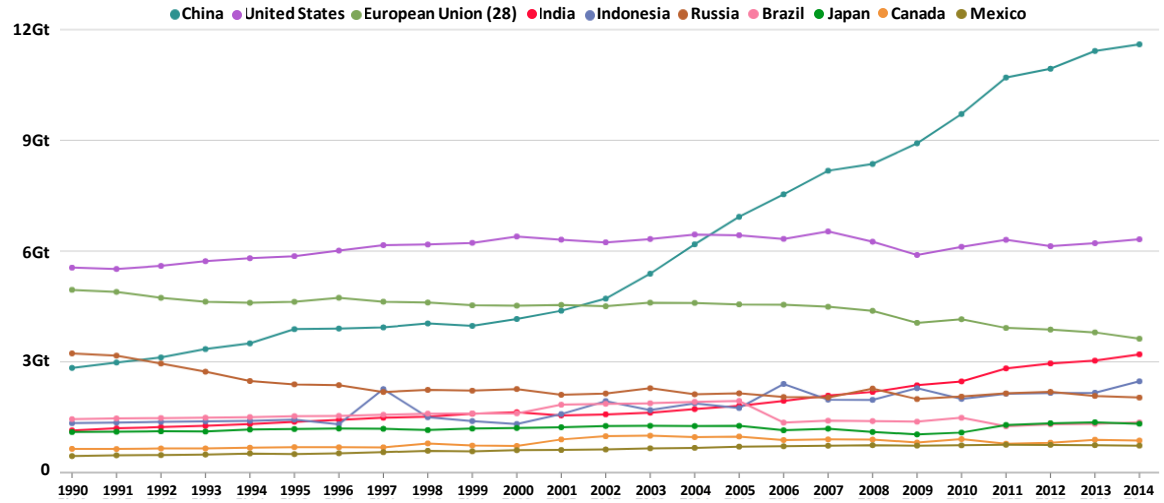
In the quest to achieve the Paris climate accord agreements of reducing greenhouse gas (GHG) emissions to 30% less than 2005 standards by 2030, carbon policies are being utilized by various jurisdictions (including Canada) as policy instruments to facilitate changes in the environmental behavior of economic agents (energy producers, consumers and governments). Carbon policies are expressed through two popular channels – carbon cap and trade (CAT) mechanisms and carbon pricing (CP) – both of which fundamentally differ in terms of scope, design, and implementation strategy. Published literature is replete with research on the challenges associated with carbon policy design and implementation. One of the developing areas of emissions policy-related challenges is carbon leakage. The objective of this article is to conduct a high-level exploration of potential issues surrounding carbon leakage within the Canadian context. The intent is to facilitate a continued conversation on carbon policies in Canada, notably the spillover effect of carbon leakage. Where relevant, parallels have also been drawn from selected international jurisdictions that are implementing CAT and/or CP practices.

Carbon Policy Mechanisms

Definitions, detailed descriptions of carbon policies, and the framework within which they are being implemented in various jurisdictions (in Canada and internationally) abound in published literature. Carbon CAT (also referred to as emissions trading) is a market-based system (typically government-mandated) that utilizes economic benefits to incentivize reduction in the release of greenhouse gases. CP is a tax mechanism that sends a price signal that should incentivize strategic choices for emissions reduction and lower-carbon alternatives among stakeholders. For a more in-depth review of CAT and CP in Canada, along with an overview of international jurisdictions implementing one or both forms of carbon policy, the reader is referred (amongst other articles) to the publications on pan-Canadian framework on clean growth and climate change,[1] pricing carbon pollution for clean growth,[2] the 2015 and 2016 energy and mines ministers conference reports,[3,4] and the Canadian working group report on carbon pricing.[5] Along with the implementation of decarbonization pathways,[6] CAT and CP are believed to have a significant potential for fostering the transition into lower-carbon economies.

Regardless of the policy mechanisms being implemented, the variation in emissions both within and across national boundaries highlights the potential for a variable market, economic and/or stakeholder response to CAT and CP mechanisms. These variable responses could lead to unintended or unforeseen spillover effects in the quest to achieve overall emissions reductions.

Figure 1: Historical GHG Emissions for the World's Top Emitters, 1990-2014 (CO_2 equivalent)



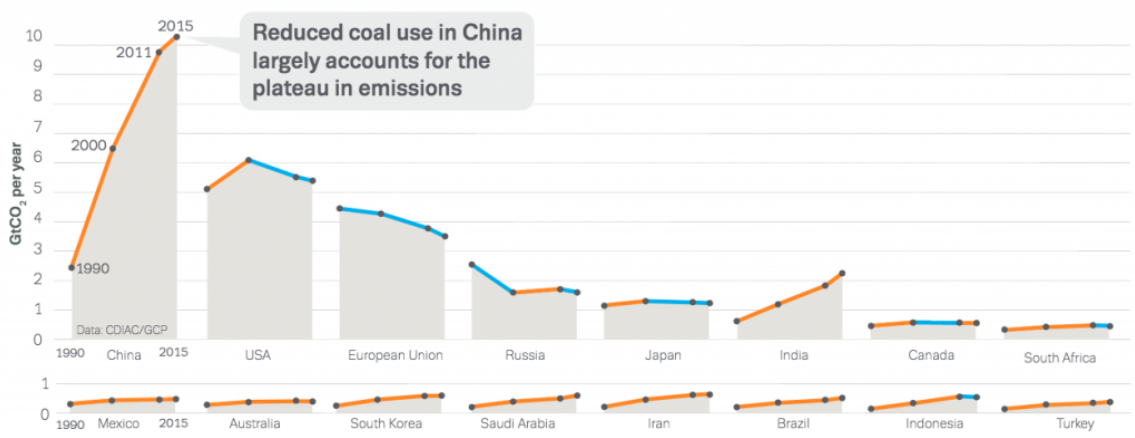
Source: World Resources Institute, 2018[7]

Carbon Leakage

Carbon leakage occurs when carbon policy (or emissions abatement activities, including the implementation of decarbonization pathways) in one country or jurisdiction leads to an increase in emissions in other countries or jurisdictions. Carbon leakage has been highlighted by previous researchers to occur in part because of loss of competitiveness (partly due to increased direct or indirect carbon costs[8,9]) and trade-related changes. Marcu et al. (2013[9]) opined that carbon leakage can have impacts at environmental as well as socio-economic levels. They argued on one hand that environmental impacts are related to emissions migration from a jurisdiction with emissions policies to one without (or with a less-constraining policy level). On the other hand, the authors link socio-economic impacts to competitive aspects such as investment avoidance, relocation of investment and production shifts to less carbon policy-constrained areas.

Within the framework of a global strategy to reduce GHG emissions (Figure 2), carbon leakage (if unchecked) has the potential to reduce the effectiveness of CAT and CP policies. What is certain is that the imposition of emissions policies is a catalyst for micro to macroeconomic-scale changes in value and supply chains within and across countries and jurisdictions. Hence, carbon leakage research is expected to attract further attention; more notably as global, national, and local jurisdictions approach lower carbon economy or emissions abatement milestones over the coming years.

Figure 2: Emissions Trends in Various Countries, 1990-2015



Source: Pidcock, 2016[10]
Blue lines represent a decrease while orange lines represent increasing emissions trends.

Carbon Leakage Metrics

The various levels at which leakage can potentially occur can be assigned (but not limited) to the following contexts:

- **Intra-jurisdictional level**: At this level, emissions leakage would be related to complexities associated with variations in cost, levels of competitiveness, and trade in industries and across sectors that are within provincial, territorial or national boundaries. Further, intra-jurisdictional leakage could be comprised of:
  - ◊ ***Intra-industry leakage***: Variations in emissions that are linked to processes and activities within a specific industry. Firms that are operating within the same industry, in response to CAT and CP policies, may implement organizational-level changes which could result in an imbalance or shift in economic activity within the same industry; relative to the situation at the inception of the emissions policy.
  - ◊ ***Inter-sectoral leakage***: This would be influenced by cross-sectoral elasticities which could lead to certain socio-economic or environmental shifts in activities from one sector to another. At the scale of a single enterprise, a company which conducts business in more than one sector may decide in consideration of emissions policy constraints to reassign organizational resources to a less-constrained sector which may or may not result in an overall emissions reduction in the economy.

- **Inter-jurisdictional level**: A situation where emissions increase in other provinces, territories or countries because of CAT and/or CP initiatives in one jurisdiction. Note that intra-industry and inter-sectoral leakage can also occur across jurisdictional boundaries, hence, potentially complicating the matrix of relationships that affect the degree and extent of carbon leakage.

Economic blocks (such as the European Union (EU) where an Emissions Trading Scheme (ETS) is being implemented) add an additional component to the complex jurisdictional relationships that can facilitate or mitigate carbon leakage. Such complexities could become compounded, for example, in the European Economic Area (EEA), depending on the trade and economic agreements established with Britain should "Brexit" come to fruition.

Due to the nature of variables (goods, services, stakeholders) involved and the complex relationships at play, effectively measuring carbon leakage can be potentially challenging. An expression of carbon leakage as the increase in C02 emissions in non-abating or differentially-abating countries (or jurisdictions) divided by the decrease in emissions in abating countries has been proposed.[11] The reader is referred to theoretical and empirical studies presented in the intergovernmental panel on climate change working group report[11] which demonstrates different approaches for estimating the rate of carbon leakage. These measures involve utilizing equilibrium economic models to evaluate carbon policy impacts and leakage effects in developed (Annex I[12]) countries, developing (non-Annex I) countries, and industrial sectors (such as emissions-intensive heavy industry).

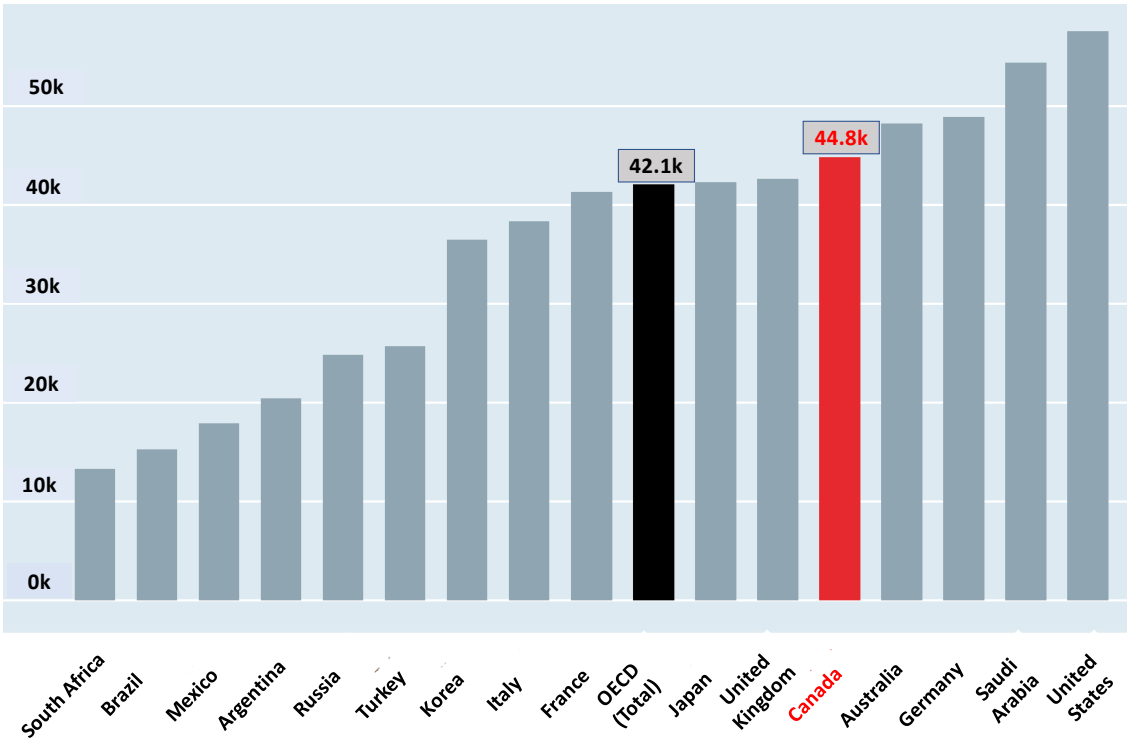
Competitiveness is also a notable variable in the equilibrium model studies as tradeable energy-intensive production could shift to non/differentially abating jurisdictions due to GHG mitigation constraints in abating regions.

An alternative strategy for assessing carbon leakage is the assessment and recognition of carbon leakage risk. In the EU where climate policy is governed by a regional ETS, a carbon leakage (CL) list is determined following quantitative assessments of emissions and trade intensity of industries. The resulting CL list is comprised of sectors and subsectors that are exposed to a significant risk of carbon leakage.[13]

Carbon Leakage in Canada

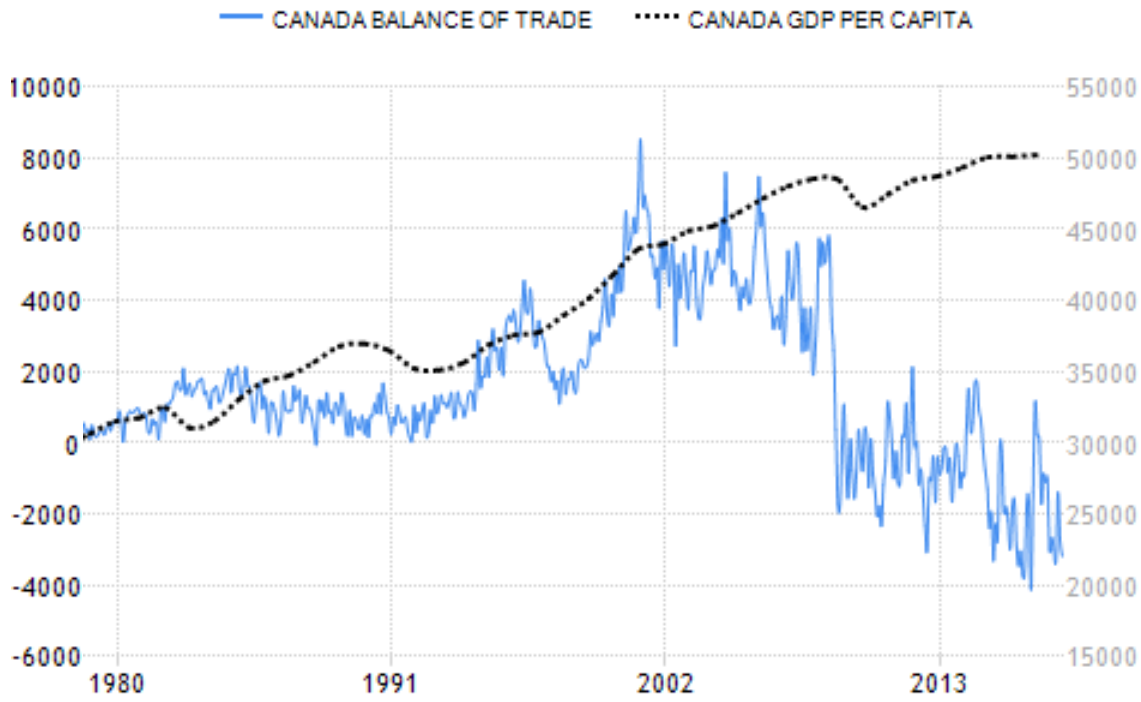
At national levels, such as in Canada, the carbon leakage challenge lies in the nation's ability to sustain the transition to a lower carbon economy while maintaining levels of competitiveness and trade, within and across Canadian jurisdictions, as well as, with international trade partners (Figures 3 and 4**)**. The evolution of Canadian gross domestic product (GDP) and GHG emissions per sector and jurisdiction demonstrate the dynamic nature of socio-economic (and environmental) development in the country (Figures 3-7). Hence, a critical evaluation of how emissions policies may affect the existing socio-economic and environmental dynamics, potentially resulting in carbon leakage within and across Canadian jurisdictions, is required. The changes in trade balance, GDP and GHG emissions structure underscore that a certain degree of nimbleness (or agility) in abatement policies may be required to ensure their long-term effectiveness in attaining the Paris accord goal by 2030.

Figure 3: 2016 GDP Total ($US per capita for selected G20 countries)



Source: OECD, 2018[14]

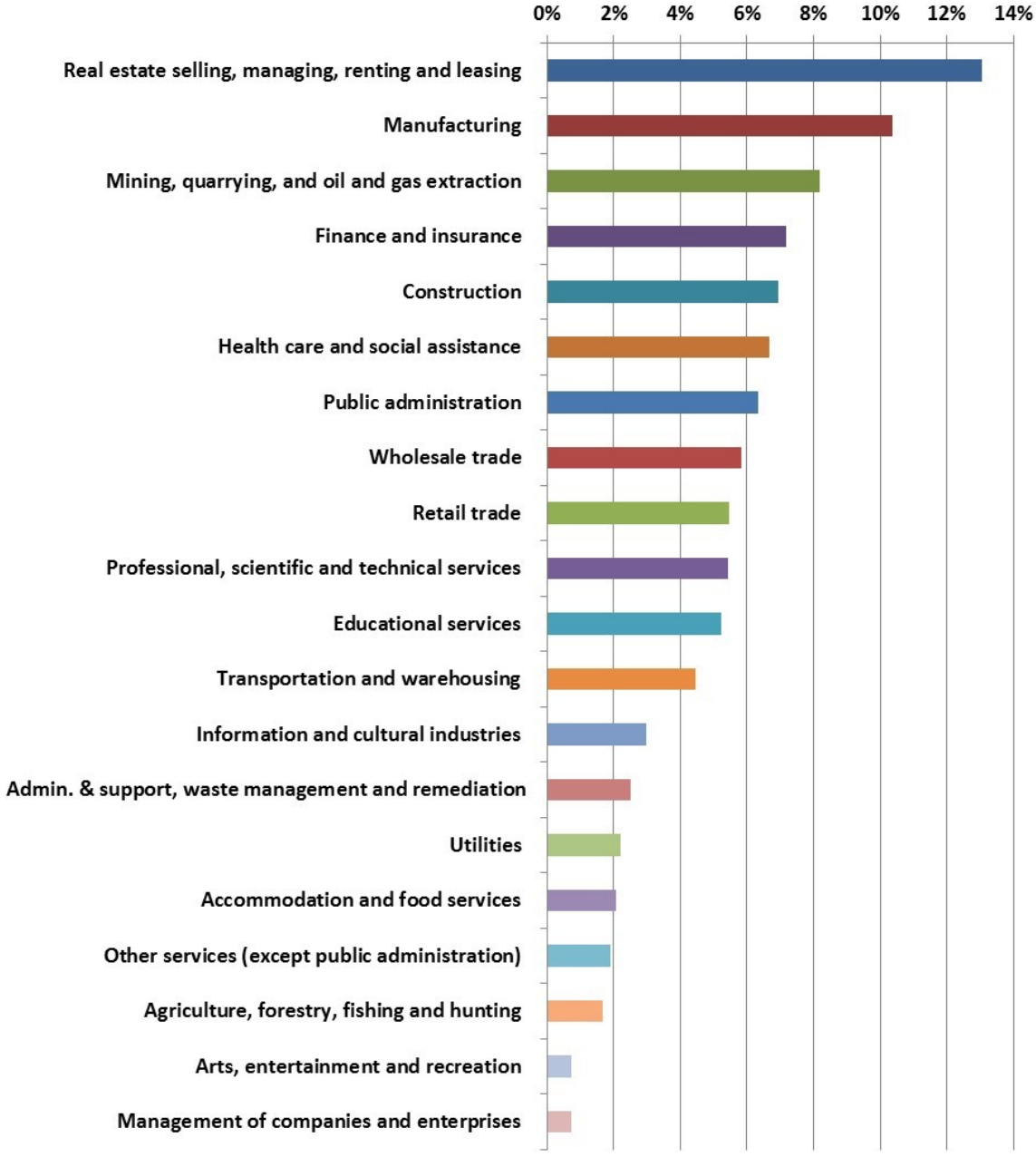
Figure 4: Canada's Balance of Trade and GDP per Capita ($CDN million)



Source: Carvalho, 2018[15]
Balance of trade is reported on the left vertical axis. GDP per capita is shown on the right vertical axis

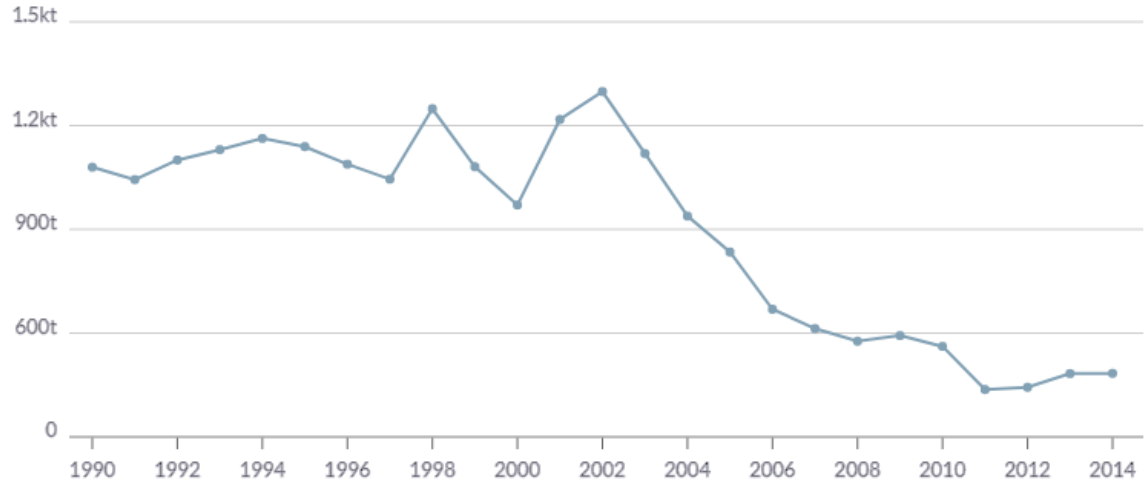
Coad (2017[16]) posited that Canada's CAT and CP policies pay little attention to the potential for carbon leakage. In the review, Coad underscored the implications of production and consumption -based methods of accounting for emissions. From the research findings, the author suggested that a key driver for carbon leakage (in Canada) is not necessarily the emissions accounting technique but rather the inherent design of abatement policies to focus on intra-jurisdictional emissions. The design of CAT and CP policies to ensure that each jurisdiction is held accountable for its emissions implies that when leakage occurs, emissions accounting that is not full life cycle-oriented will fall short of accurately capturing (most likely overestimating16) the actual emissions reduction. Considering trade-related impacts is therefore imperative if leakage effects are to be better understood and checked.

Figure 5: Canada's 2016 GDP Contribution per Sector "Chained 2007 Dollars" (%)



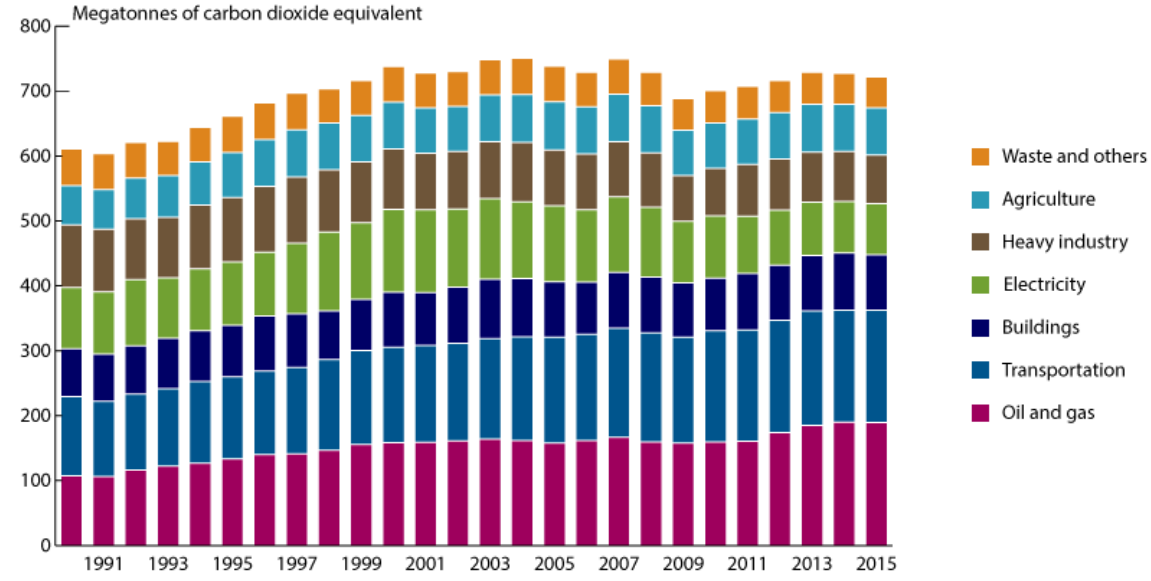
Source: Allen, 2017[17]
Note that "chained 2007 dollars" assumes that price has remained unchanged since 2007.

Figure 6: Canada's Total GHG Emissions per GDP (kilotonnes CO2 equivalent)



Source: WRI's Climate Watch, 2017[18]

Figure 7: Canada's GHG Emissions per Sector, 1990-2015



Source: Government of Canada, 2018[19]

Total GHG emissions in 2015 were 722 megatonnes (Mt) of CO2 equivalent. The oil and gas and transportation sectors were the largest emitters with 180 Mt CO2 equivalent (26% of total emissions) and 173 Mt CO2 equivalent (24% of total emissions), respectively.

Challenge for the Great White North

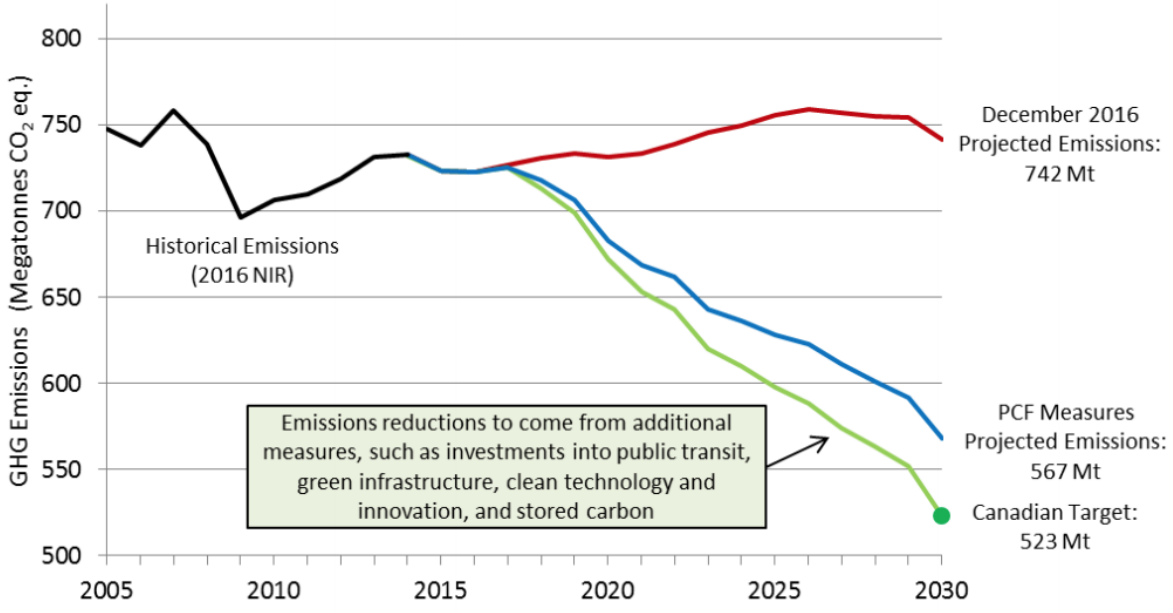
To stand a chance at meeting its Paris accord climate obligations and remaining globally competitive, Canada's provincial, territorial and federally-directed lower carbon policy initiatives merit both micro/macro-sector socio-environmental and economic research. Due to the inherent possibilities for leakage to occur (facilitated by the jurisdiction-focused nature of provincial, territorial and federal carbon policies) within and across the Canadian border, emissions leakage analysis that assumes a one-size fits all policy impact scenario in Canadian industrial, trade sectors, and jurisdictions may prove detrimental to the nation's (and very likely global) long-term emissions reduction strategy.

With the US being Canada's largest trading partner (total Canada-US trade totaled ~$752 billion CAD in 2016[20]), its withdrawal (intent announced in 2017[21]) from the Paris climate accord will likely open channels for emissions leakage to occur between Canada and US. Further, lower carbon economy initiatives such as the Western Climate Initiative (WCI) and Regional Greenhouse Gas Initiative (RGGI) which should incentivize regional co-operation in the pursuit of emissions abatement goals, may be revised to the detriment of the 2030 GHG reduction targets (Figure 8). The outcome of the ongoing North American Free Trade Agreement (NAFTA)

discussions may also have potential implications on competitiveness and ensuing trade balance in the North American region, with likely domino effects on sectoral and jurisdictional carbon leakage in Canada.

One question that needs to be answered is how will Canada strategically reposition itself to compensate for potential leakage due to recent and likely future developments south of the 49th parallel? It is certainly imperative that a holistic approach to evaluating carbon leakage (through full life cycle analysis[22] and economic modeling – likely general equilibrium (GE) methods[23,24,25]) be developed. Given the relative importance of trade exposure in the carbon leakage matrix, incorporating GE modeling with full life cycle analysis should provide an analytical framework where firm to national level (and potentially multi-country) dynamics can be evaluated. GE modeling (which is by no means without its challenges), should permit the incorporation and evaluation of intra- and inter-jurisdictional factors in Canada's CAT and CP policy framework, as well as internationally-sourced, trade-related effects that may impact the extent and rate of carbon leakage. A study demonstrating the robustness of GE modeling as a tool for abatement policy evaluation has already been conducted in Manitoba[26] with demonstrable potential to utilize similar evaluation techniques for assessing challenging emissions reduction-related issues, such as carbon leakage.

Figure 8: Pathway to Canada's 2030 Target



Source: WRI, 2018[27]
NIR = National Inventory Report. PCF = Pan-Canadian Framework on Clean Growth and Climate Change

About the Author

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