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POLICY BRIEF

Regulating Carbon Emissions in Canada

Offsets and Canada's GHG Regulations: Reducing costs, improving competitiveness and lowering emissions

Policy Brief for the Industry Provincial Offsets Group (IPOG)

IISD's Climate Change and Energy Program

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Abbreviations

BAU	Business-As-Usual
CDM	Clean Development Mechanism
CPRS	Carbon Pollution Reduction Scheme (Australia)
EPA	Environmental Protection Agency (United States)
ETS	Emission Trading System
EU	European Union
GGRTA	Greenhouse Gas Reductions Targets Act
GHG	Greenhouse Gas
HFC	Hydrofluorocarbon
JI	Joint Implementation
NSW GGAS	New South Wales Greenhouse Gas Reduction Scheme
RGGI	Regional Greenhouse Gas Initiative
SGER	Specified Gas Emitters Regulation
UNFCCC	United Nations Framework Convention on Climate Change
WCI	Western Climate Initiative

1.0 GHG Offsets as a Complement to GHG Performance Regulations

Canada's federal government is moving to regulate carbon through sector-by-sector greenhouse gas (GHG) performance regulations. This action complements provincial initiatives that are already underway or planned. In IISD's recent paper *Mind the Gap: The State-of-Play in GHG Mitigation in Canada*, current and planned federal and provincial mitigation actions were estimated to likely deliver about 46 per cent of the 2020 national target, or about 103 Mt of the 223 Mt needed.[1] While there is uncertainty about the type of GHG policy to close this gap or its stringency to reduce emissions, if additional mitigation is to occur, there will be a need for cost-effective mitigation policy to keep costs down and minimize adverse competiveness impacts.

Globally and within Canada offsets have been used to cost-effectively complement mitigation actions. These offset systems provide additional compliance flexibility for regulated emitters as well as through stand-alone carbon funds. Offsets are particularly attractive in the absence of economy-wide carbon pricing, where the first-best efficient policy is not implemented. There is substantial evidence from existing offset programs that targeting emitters outside of the regulated community can significantly reduce mitigation costs while increasing available reductions. Of course, there are concerns over whether these reductions are additional, with a need for governance to ensure reduction effectiveness.

Given that Canada is on track to implement sector-by-sector GHG performance regulations for industrial sectors, this policy brief examines how an offset system might complement the regulatory approach. More specifically:

- Research on international and Canadian offset systems informs how offsets might in practice complement GHG performance regulations in Canada and reveals the cost and emission impacts that might be expected;
- Original modelling estimates the cost and emission impacts of an offset system when used to complement GHG performance regulations; and,
- Alternative offset systems are assessed with respect to their ability to complement performance GHG regulations.

We conclude that offsets need to be considered an integral element of a forward-looking climate policy. Given offset systems take time to develop, as do offset projects, there is a need to start policy development sooner rather than later to ensure emission reductions can be obtained at reasonable costs. As Canada moves forward on climate policy, and greater reductions are sought, the case for offsets increases. With a clear case for offsets established, the government should consider whether offsets are a compliance mechanism for industrial emitters or a stand-alone and independent source of reductions or both.

[1] Sawyer, Dave, 2011. *Mind the Gap: The State-of-Play in GHG Mitigation in Canada*. IISD, Winnipeg.

2.0 International and Canadian Lessons to Inform Canadian Offset Policy

Offsets are monetary investments in a project or activity that abates, avoids or reduces GHG emissions or sequesters them from the atmosphere, used to compensate for GHG emissions. Offsets provide for an expanded scope of GHG coverage for a number of different regulatory GHG reduction schemes around the world including legislated cap-and-trade systems, as well as GHG performance standards.

This section presents observations relevant for the Government of Canada as it develops its GHG policy. Attention is placed on how both domestic and international offset systems have been designed to complement a range of market based and regulatory approaches to reduce GHG emissions. In total, eight systems are reviewed, plus Canada's proposed offset system (2005) for greenhouse gases.[2] Seven of the eight carbon policies that enable offsets are currently active, with the New South Wales Greenhouse Gas Reduction Scheme (NSW GGAS) being the longest-operating system (2003).

Programs currently operational and reviewed below include:

- **British Columbia Greenhouse Gas Reductions Targets Act (B.C. GGRTA).** Provincial compliance program for the B.C. public sector with offsets as a compliance mechanism.
- **Certified Emission Reductions (international offsets).** In 2010, Canada's government took possession of 216,750 Certified Emission Reductions (CERs) under the Kyoto Protocol from various countries, including Brazil, China, Columbia, Guatemala, Honduras, Indonesia, India, Peru and the Philippines.[3] These CERs are from historical investments made prior to 2010. Specifically, they are from an investment of $22.5 million dollars (all dollar amounts in CAD$) from Budget 2000 and Action Plan 2000 that the Government of Canada made to three World Bank Carbon funds: the Prototype Carbon Fund, the Community Development Carbon Fund and the Biocarbon Fund. In return for this investment, the Government of Canada receives a share of the credits generated by the funds.[4]
- **Alberta Specified Gas Emitter Regulation (SGER).** Provincial regulation of emission intensity with offsets as a compliance mechanism.[5]
- **Oregon and Washington State Power Plant Rules.** Mandatory emission standards with offsets as compliance mechanism, electricity generation only.
- **European Union Emissions Trading Scheme (EU ETS).** Cap-and-trade program with offsets as a limited compliance mechanism.
- **New South Wales Greenhouse Gas Reduction Scheme (NSW GGAS).** Regional trading program where regulated entities can reduce their emission intensity, purchase offsets or pay penalties for failing to meet target ($15 per tonne CO_2e in 2011).
- **Regional Greenhouse Gas Initiative (RGGI).** Regional cap-and-trade program with offsets as a compliance mechanism.

[2] Environment Canada, 2005.
[3] http://www.ec.gc.ca/rncpk-ckpnr/default.asp?lang=En&n=1F96522D-1
[4] Personal Communication with Environment Canada
[5] Provincial regulation of large industrial facilities that require an emissions intensity reduction of 12 per cent below baseline levels. Facilities can reduce their emissions intensity, purchase offsets, pay into a tech fund or trade Emission Performance Credits, generated by facilities that exceeded the 12 per cent reduction in intensity.

Programs under development include:

- **Western Climate Initiative (WCI).** Cap-and-trade with offsets as a compliance mechanism.
- **Australia Carbon Pollution Reduction Scheme (CPRS).** Domestic cap-and-trade scheme with offsets as a compliance mechanism

The Appendix provides additional detail on the programs.

2.1 Offsets Systems are a Core Element of Operational GHG Policies

Major GHG policies in operation both internationally and in Canada include an offsets component, whether as a compliance option for regulated emitters or as a complement to an overall strategy through the use of a carbon fund as in British Columbia's Pacific Carbon Trust.

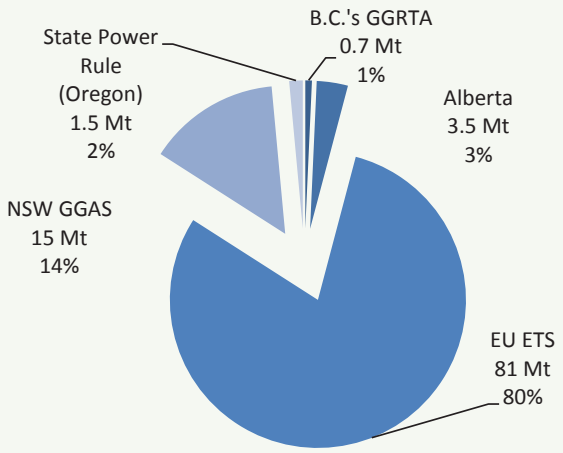

FIGURE 1: GLOBAL OFFSET PROGRAM VOLUMES

In total, these carbon regulations contract and purchase over 100 Mt of offsets annually:[6]

- The EU ETS dominates the mandatory offset market with an estimated 80 per cent market share, primarily due to access to the largest pool of international offsets through Clean Development Mechanism (CDM) and Joint Implementation (JI) projects under the Kyoto Protocol. The EU ETS is expected to contract and purchase over 750 million additional emission credits from CDM and JI projects between 2008 and 2012.[7]
- The NSW GGAS is the second largest offset market globally, with an estimated 15 per cent market share.
- The remaining carbon regulations that include offset systems currently comprise less than 5 per cent of the total offset market. Of this, Alberta's system includes 3.5 per cent of all transactions. B.C.'s GGRTA is obligated to purchase annually an average in the order of 0.7 Mt to offset government emissions. The RGGI currently has an excess of allowances, as such offsets have not yet been employed.

Within the programs, offsets are afforded a high degree of potential limit as a share of compliance. Most programs provide either unlimited access to offsets (three of eight programs) or a 50 per cent limit (three of eight programs). Of course, the actual use of offsets relative to other compliance mechanisms varies considerably and does not approach the limits set. Figure 1 provides the contributions offsets have made to the total market under the programs reviewed. The evidence points to significant flexibility in terms of the quantity of reductions offsets can contribute (Figure 2).

[6] Based on data available from 2009 and 2010 from World Bank, 2011, and Karbone Carbon and Renewable Research, 2011.
[7] World Bank, 2011.

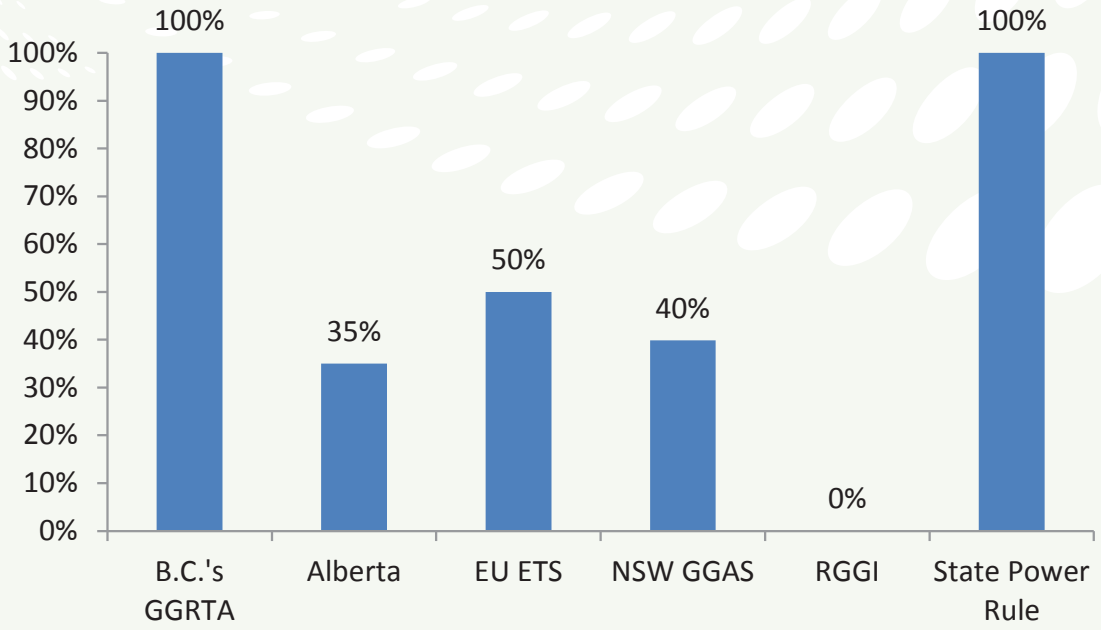

FIGURE 2: USE OF OFFSETS TOWARDS COMPLIANCE, 2009

2.2 Offsets Complement Regulations and Market-Based Systems

Offsets are not the exclusive domain of voluntary and cap-and-trade markets. Two of the eight programs complement offsets with regulatory standards (Figure 3). Oregon and Washington's State Power Plant rules combine performance standards with offset systems while B.C.'s GGRTA mandates carbon neutrality but enables offsets. There are also examples of hybrids, where intensity standards set performance expectations but offsets enable compliance. The NSW GGAS and the Alberta SGER are examples of hybrid systems that adopt both elements of performance standards (i.e., baseline and intensity improvement) and offsets flexibility.

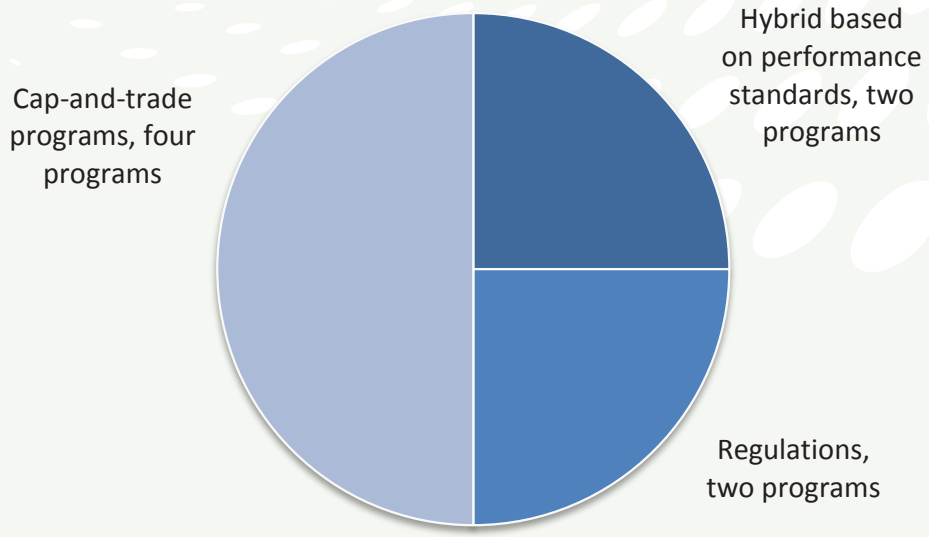

FIGURE 3: OFFSETS COMPLEMENT BOTH REGULATIONS AND CAP-AND-TRADE SYSTEMS

2.3 Offset Systems Extend Coverage Outside of the Regulated Emitters

By enabling broad participation in sectors uncovered by the policy, offset systems have demonstrated an ability to obtain significant GHG reductions from uncovered sectors. Most programs provide a broad inclusion for offsets. Table 1 indicates that contrary to the common view that offsets are about land-use practices in agriculture and forestry, operating offsets programs include reductions from a wide swathe of emission sources including industry, the electrical sector, waste, transport and buildings.

TABLE 1: SECTORS CONTRIBUTING OFFSETS TO EMISSION REDUCTIONS TO VARIOUS CARBON REGULATIONS

CARBON REGULATION WITH OFFSET COMPLIANCE MECHANISM	MAIN SECTORS CONTRIBUTING OFFSETS TO EMISSION REDUCTIONS
British Columbia Greenhouse Gas Reductions Targets Act (B.C. GGRTA)	Forestry, power generation, commercial, oil and gas, cement
Alberta Specified Gas Emitter Regulation (SGER)	Oil and gas, waste, commercial, agriculture, forestry, transportation, power generation and fertilizer production
European Union Emissions Trading Scheme (EU ETS)	Power generation, power distribution, energy efficiency, energy industries, manufacturing, chemical industries, transport, mining, metal production, waste, forestry, agriculture
New South Wales Greenhouse Gas Reduction Scheme (NSW GGAS)	Power generation, commercial, residential, forestry
Oregon Power Rule	Agriculture, power generation, transportation forestry, cement

2.4 Offsets Can Significantly Reduce Costs Alleviating Competiveness Impacts

The overall societal cost of carbon policies can be significantly reduced with the use of offsets as a compliance mechanism. Average offset prices of existing systems reviewed were found to be in the range of 42 per cent to 89 per cent less expensive than other compliance options. Not only are compliance costs and transaction costs reduced for the regulated community, but in cases where carbon costs can be passed on (utilities, etc.), consumers and end users will benefit.

Offsets are generally purchased at prices well below compliance costs for regulated emitters. Evidence of cost savings include:

- **Regulated emitters in the EU saved at least $530 million annually over two years using offsets as a compliance mechanism versus trading alone.**[8] Offset prices are substantially higher in the EU ETS than in other carbon regulation offset systems. High average prices are driven by the large demand from the EU ETS by regulated emitters. In the period between 2008 and 2009 offset purchase prices varied from $14 and $25/tonne of CO_2e. This compares to allowance prices that varied between $19 and $32 for the same time period. However, these substantial savings amount to only 0.5 per cent of the total cost of purchasing allowances and offsets for the EU ETS.
- **With a ceiling price of $15 on carbon in Alberta's SGER, the maximum value likely saved by regulated emitters is in the order of $5.5 million in 2007 and $6.7 million in 2010.**[9] Offset prices under the Alberta SGER have reportedly risen over the last number of years as transaction volumes increase. Average mid-range prices were reported to have been approximately $9.50 in 2007 and $13.25 in 2010.[10] These savings are equal to between 5 per cent and 10 per cent of the total cost of purchasing allowances or offsets for compliance.
- **The United States Environmental Protection Agency (EPA) conducted extensive analysis of the American Clean Energy and Security Act (2009) estimating offsets could save 24 per cent.** The EPA estimated that the price of domestic and international offsets would range between $13 and $15 in 2015 and $16 and $19 in 2020. Modelling conducted by the EPA indicated that eliminating the opportunity to use international offsets from the cap-and-trade program would raise allowance prices by 89 per cent. Access to just over 1,000 Mt of international offsets annually was projected to reduce the total cost of abatement by $6.7 billion in 2020 compared to a cap-and-trade system with no access to international offsets. This represents a savings of 24 per cent compared to the cost of abatement from allowances and domestic offsets alone.

As purchase prices for offsets are not directly disclosed under most other carbon regulations that include offset systems, it is difficult to determine the total value of these carbon offset markets and what costs may have been if offsets were not available as a compliance mechanism. That said, other evidence suggests a potential for significant savings.

Closely related to cost containment is that offsets afford a safety value to reduce adverse competitiveness impacts on the regulated community. An additional benefit identified in many existing systems is the availability of offset projects

[8] Average prices over the period are employed for this calculation. Precise figures are not calculated as the timing between offset purchase and use is not known. Savings would also be higher than those states since costs of additional emission reductions would likely be higher than average allowance costs.
[9] This assumes that regulated entities would choose the least-cost option for compliance, and would purchase offsets rather than pay $15 under the technology management fund.
[10] Karbone Carbon and Renewable Research, 2011.

to begin achieving GHG reductions immediately. That is to say, offsets provide flexibility: regulated industry has the time to phase in new technology and capital investments while avoiding premature retirement of assets that could result in unnecessary costs to the emitter and avoidable environmental lifecycle costs. Further, some sectors have limited internal reduction opportunities and cannot reduce their carbon footprint beyond a certain amount and still continue to make the products they produce today (e.g., chemical plant or smelter). Therefore, other reductions in non-covered sectors need to be found in order to meet carbon reduction goals.

2.5 U.S. Carbon Policy has Tended Toward the use of Generous Offset Limits

Offset systems in the United States have always played a large role in reducing costs of proposed cap-and-trade systems. After the defeat of the American Clean Energy and Security Act in the Senate, which signalled that the U.S. would not be considering a cap-and-trade system for some time, the U.S. Environmental Protection Agency announced their intention to develop proposed performance standards for greenhouse gas emissions from industry. It was expected that at the end of 2012 the first performance standards for fossil fuel-fired power plants and refineries would be finalized; however, the EPA has recently announced delays on new climate-change rules. These two industrial sectors make up nearly 40 per cent of the nation's greenhouse gas emissions.

The U.S. EPA has also considerable experience with offset systems, in particular its voluntary Climate Leaders program. It is unclear at this point whether the U.S. EPA will consider offsets as a compliance mechanism with new performance standards for industry. On the one hand, there is considerable pressure to include innovative compliance mechanisms that have the ability to reduce costs, of which the EPA has clearly demonstrated in their analysis that domestic and international offsets could contribute very large potential savings. On the other hand, while the EPA has the basic legal authority to allow flexibility in compliance there may be political and legal objections.[11]

2.6 Additionality and Permanence are Concerns, Requiring a Strong Governance Framework

Offset system rules must balance the desire to achieve real, permanent and quantifiable emission reductions with the creation of an efficient system that generates large volumes of reasonably priced offsets. A GHG offset project is considered to be "additional" if the incentives created by the offset program help overcome key barriers to development. That is to say, the project activity creating the offsets would not have been implemented under a "business-as-usual" (BAU) scenario. While impossible to definitively prove, complex systems of monitoring and verification have been developed to address this issue.

While there is considerable evidence that different offset systems have established rules to ensure additionality, not all offsets are equivalent. The quantity of offsets generated by one project can vary by orders of magnitude depending on which offset system protocols and requirements are applied.

For example, offset projects under CDM (i.e., EU ETS) demonstrate their additionality using either an investment test or a barrier test and common practice test. An investment test demonstrates that if revenue created by the sale of offsets were not available, the project would not be financially feasible, or its rate of return would not be attractive. A barrier test considers whether there are significant barriers to implementing a project in the absence of revenue from GHG reductions, such as technology availability. A common practice test determines whether the practice is not widespread through the region.

[11] Resources for the Future, 2011.

Other programs have striven to establish more streamlined additionality tests than the CDM. For example, RGGI and NSW GGAS use performance standards and technology benchmarks to determine additionality. These performance standards and benchmarks seek to achieve a level of performance that is significantly better than business-as-usual.

The proposed Canadian offset system (2005) does not require proponents to demonstrate additionality; rather it sets out rules and requirements that satisfy the regulator that the project is truly additional often through the use of approved protocols and approved baselines. Each approved quantification protocol defines an appropriate baseline that must be used by a project. The baseline could be a performance standard or historical baseline that has been pre-accepted by the regulator.

While the WCI also prefers the use of performance standards, it has opted to allow use of project-specific baselines in cases where it is not possible to set a baseline using a performance standard.

It should be noted that existing offset protocols approved under different offset systems could still result in a wide range of offset volumes. A study conducted by the Stockholm Environmental Institute[12] found that volumes for an agriculture sector manure management project ranged from zero under CDM to 198 tonnes under EPA's Climate Leader program to as much as 466 tonnes under RGGI. Such non-equivalency of offsets can present a substantial barrier to developing linkages between offset systems that would otherwise help to reduce costs and create a more flexible market.

2.7 Effective Offset Systems Have High Start-Up Administrative Costs, but Lower Costs in Operation

Offset systems that are more prescriptive and centralized in administration (e.g., Canada's proposed offset system, RGGI and NSW GGAS) were found to lower costs and barriers to participation for both project developers and offset buyers. However, this advantage is counterbalanced by the fact that it imposes higher costs on regulators to develop protocols and register offsets.

Less prescriptive offset systems (e.g., EU ETS and Alberta SGER) were found to have higher transaction costs for developers and offset buyers but offer greater access to potential offsets through many different project types and protocol choices.

Most offset systems are administered by a central authority that also registers and issues offset credits. In Canada, Alberta Environment, B.C. Environment and Environment Canada have the overall authority for their respective offset systems. In the United States and Australia, state environmental protection agencies assume this responsibility. The EU ETS approves national allocation plans but leaves implementation of the emission-trading scheme to each of the 27 member states.

The major difference between offset systems is whether third parties are used to validate and verify offsets or if the program authority conducts verification and validation. In the RGGI, the proposed Canada offset system and state power rules, it is the program authority that is responsible. In the Alberta SGER, NSW GGAS, EU ETS, proposed WCI and Australia CPRS, third party verifiers and validators are employed. In Alberta, validation is not required as the regulator is highly involved in the protocol development and approval process.

In British Columbia, a provincial crown corporation (Pacific Carbon Trust) is the designated organization from which regulated entities must acquire emission offsets to meet their compliance obligations. This corporation purchases offsets that have been validated and verified by accredited third parties.

[12] Stockholm Environment Institute, 2009b.

Offset systems can be complex but do not necessarily require significant resources to operate once established. Only three full-time staff at Alberta Environment operate the Alberta offset system that generates more than 3.8 Mt of offsets annually. While considerable effort has been expended by the government to put the program in place and approve quantification protocols, day-to-day operations do not impose significant costs on the program. The government of Alberta uses independent third party verifiers to prepare verification reports and allows offset project developers to submit baseline quantification protocols through a rigorous process involving a technical review, stakeholder review and public posting with "no sustained objections" required for approval.

3.0 Costs and Emission Impacts When Offsets Complement GHG Performance Regulations

In this section, we conduct a modelling assessment of costs and emission potentials to determine how an appropriately designed Canadian Offset System could contribute to achieving the Government of Canada's GHG mitigation objectives.

We use CIMS, an energy, emissions and economic model, to assess carbon prices and offset values under different GHG regulatory regimes. Recent applications of the model with relevance to this assessment include research for the CD Howe Institute,[13] National Round Table on the Environment and Economy (NRTEE)[14] and the Federation of Canadian Municipalities (FCM).[15]

Building on this previous work, our baseline model[16] was updated to reflect the most recent available forecasts of energy prices, energy supply and demand, as well as measures and policies to reduce GHG emissions that are currently in place or expected to come into force nationally and regionally in Canada. Our methodology, assessment scenarios and results are provided in the following sub-sections. Our approach is straightforward:

1. We use the model to determine the costs and potential reductions for various sectors nationally;
2. We develop scenarios to explore alternative views on cost and emission outcomes under performance regulations with and without offsets; and,
3. We report on emissions and cost outcomes for the scenarios, including system-wide savings.

3.1 Costs and Emission Reductions Potentials under Performance Regulations

Cost curves were developed from the CIMS baseline model for emission reductions from each of the 18 different economic sectors included in the model, representing the vast majority of Canada's economic activity. A range of different economy-wide carbon prices were inputted in the model, allowing the identification of various economic sectors' responses in terms of emission reductions. The costs and emission reductions of the industrial economic sectors that may be regulated in the future (i.e., chemical products, industrial minerals, iron and steel, metal smelting, mineral mining, mining, oil extraction, fertilizer production, pulp and paper manufacturing, electricity, petroleum refining, natural gas extraction and processing) were then combined to develop a marginal abatement curve, indicating total emission reductions possible or achievable in the industrial sector for a given average carbon cost. In this way, average costs to industry for achieving overall emission reductions if they were subject to an efficient regulation (i.e., industrial emission reductions were made in the most efficient manner) were identified.

Similarly, costs of emission reductions for non-regulated sectors of the economy were subsequently identified. In theory, such non-regulated sectors could provide offsets to regulated industrial entities. For the purpose of this analysis, non-regulated sectors include the renewable power, commercial, residential, waste, agriculture, forestry and transportation

[13] Sawyer, D. & Fischer, C., 2010, August. *Better Together? The Implications of Linking Canada–U.S. Greenhouse Gas Policies.* C.D. Howe Institute Commentary.
[14] National Round Table on the Environment and Economy, 2011. *Parallel Paths: Canada–U.S. Climate Policy Choices*. Climate Prosperity. Report 03.
[15] Federation of Canadian Municipalities, 2010. *Implementing Landfill Gas Capture in Canada*. Report prepared by EnviroEconomics.
[16] The baseline model employs CIMS, an integrated set of economic, energy and materials models designed to provide information to policy-makers on the likely response of firms and households to policies and changes in prices that influence their technology acquisition and use decisions. It is based on energy flows through a country's economic system and tracks the flow of energy, beginning with production processes through to eventual end-use by individual technologies. CIMS includes price-driven energy and goods and services supply and demand equilibrium, energy trade as well as a rich profile of technologies that compete to fill new service demand. CIMS is maintained by researchers at Simon Fraser University.

sectors. These sectors may be partially covered by existing or proposed regulations to reduce GHG emission reductions (e.g., vehicle fuel efficiency standards); however, they remain sectors that could potentially provide offsets to regulated industrial entities were emission reductions go beyond regulatory requirements.

In order to account for the fact that not all potential emission reductions are accessible to offset projects, discount factors were applied, reducing the availability of offsets in the commercial, residential and transportation sectors. In addition, a cost premium of 15 per cent was applied to offsets to account for transaction costs of the development of offset projects. Cost curves were then developed to identify the supply and cost of emission reductions from these offset provision sectors.

Finally, the regulated sector cost curve and the offset cost curve were combined to identify the cost of emission reductions that can be achieved when offsets are accessible to regulated industrial emitters.

3.2 Offset Scenarios under Performance Based Regulations

To conduct the modelling we set a benchmark as the basis to compare scenarios. We can either choose a quantity reduction benchmark, such as the Government of Canada's 17 per cent below 2005 target, or a price target, such as a maximum compliance cost set on a dollar per tonne figure. We choose a price benchmark because we know the anticipated compliance costs of the proposed coal power regulations and we question the validity of a scenario to achieve the government's quantity targets. We therefore assume below that the performance regulations to come will impose a cost on all industrial emitters aligned with the coal power regulations.

Previous work by IISD estimated that these coal power regulations would cost on average approximately $25 per tonne of emission reduction achieved.[17] Four scenarios use this "price benchmark" to determine the level of GHG reductions that could be supplied from the industrial emitters or offsets. In a fifth scenario, we relax this assumption and test a higher cost of $60 per tonne to reflect uncertainty in the stringency of regulations to come.

Each of the seven scenarios examines a future in 2020 where industrial GHG performance standard regulations have been implemented (Table 2). The regulatory cost assumption of $25 sets the technologies that are used under the performance regulation, which in turn fixes emission reductions (called the "industry alone" scenario). Then offsets are enabled under two types of scenarios:

- The first introduces compliance flexibility for regulated emitters (industry flexibility). The scenarios determine cost savings for a given emission reduction where emitters either buy offsets or reduce facility emissions while maintaining overall compliance equivalent to the performance standard; and,
- The second seeks more reductions beyond those supplied by the regulated emitters (expanded coverage). Regulated emitters face the performance requirement and must comply from their operations, but then more reductions are sought through offsets. We do not differentiate who buys these additional offsets—whether it is a compliance obligation for emitters in addition to the performance regulations or if government establishes a carbon management fund to make the purchases. This assumption has no bearing on the emission outcomes but obviously has significant distributional implications.

[17] See: Sawyer, Dave, 2011. *Mind the Gap: The State-of-Play in GHG Mitigation in Canada.* IISD, Winnipeg.

The "industry flexibility" scenarios include:

- **Scenario 1: Industry alone at $25, no offsets** considers a future where regulated industrial emitters have no access to offsets and a performance regulation set at $25. Scenarios 1 and 4 adopt an average technology cost of $25 per tonne of CO_2 consistent with the proposed electricity coal performance standard regulations;
- **Scenario 2: Industry alone, unlimited offsets** sets a target reduction equivalent to the "industry alone" scenario but then adds unlimited access to offsets. A simple least-cost optimization determines the combination of regulated emitter reductions and offsets to hit the "industry alone" compliance target;
- **Scenario 3 Industry alone 25 per cent, offset limit** builds off Scenario 1 "industry alone" but adds compliance flexibility restricted to 25 per cent of the total emission reductions;
- **Scenario 4: Industry alone at $60, no offsets** reflecting uncertainty in the cost of yet to be proposed performance regulations. This carbon cost represents a "higher cost" view of the stringency placed on emitters that will be subject to federal performance standards. This scenario represents the reality that abatement costs are higher in some sectors for similar levels of reductions sought by the proposed electricity coal performance standard regulation; and,
- **Scenario 5: Industry alone at $60 plus unlimited offsets** are allowed in compliance. This scenario shows that as costs rise, there are likely greater savings to be had with offsets included.

The "expanded coverage" scenarios include:

- **Scenario 6: Industry alone plus expanded offset coverage at $25** adds more reductions on top of the "industry alone" case at an average carbon cost of $25 per tonne. The case simply reveals the potential of offsets to add more reductions to the performance regulations; and,
- **Scenario 7: High cost industry alone plus expanded offset coverage at $60** considers the case where an average carbon cost of $60 is applied to both the industrial entities and to available offsets.

TABLE 2: ASSESSMENT SCENARIOS

#	SCENARIO DESCRIPTION
	Offsets for Industry Flexibility
1	Industry alone at $25, no offsets: Industry regulations equivalent to $25 average carbon cost with no access to offsets
2	Industry alone unlimited offsets: Industry regulations with unlimited offsets, optimization to achieve Scenario 1—35.4 Mt reduction
3	Industry alone 25 per cent offset limit: Industry regulations with limited offsets of 25 per cent of total emission reductions to achieve Scenario 1—35.4 Mt reduction
4	Industry alone at $60, no offsets: Industry regulations equivalent to $60 average carbon cost with no access to offsets
5	Industry alone at $60 plus unlimited offsets: Industry regulations with unlimited offsets, optimization to achieve Scenario 4—85 Mt reduction
	Offsets to Expand Coverage
6	Industry alone plus expanded offset coverage at $25: Industry regulations equivalent to $25 average carbon cost (35.4 Mt) plus unlimited access to offsets
7	High cost industry alone plus expanded offset coverage at $60: Industry regulations equivalent to $60 average carbon cost (85 Mt) plus unlimited access to offsets

3.3 Costs and Emission Impacts of Offsets as a Complement to Performance Regulations

This section compares the scenarios using common indicators: emissions reduced from regulated entities as well as offset providers; average carbon costs on a per tonne basis; and total costs, which are the societal costs of the scenario. The results of the modelling are presented graphically in Figure 4 and summarized in Table 3. A discussion of each scenario follows.

Figure 4 illustrates the impact that offsets have on both prices (horizontal axis) and quantities of emissions reduced (vertical axis). The bottom blue line indicates the emission reductions and costs achievable for the regulated industrial emitters under the "industry alone" scenario (1). The top red line indicates the price and quantity combinations achievable when offsets are added to the industrial emitters. As can be seen, with more flexibility through offsets, more reductions can be achieved at lower prices. Savings are largest with higher carbon costs (Scenario 4 versus 7) and with higher offset limits (Scenario 2 versus 3).

It is important to note that estimated domestic offset cost and emission potentials assume extensive and broad access to emission reductions from all non-regulated sectors, including renewable power, commercial, residential, waste, agriculture, forestry and transportation sectors. To the extent these sectors are regulated beyond current provincial and federal actions, the pool of offset reductions would fall and offset costs would rise.

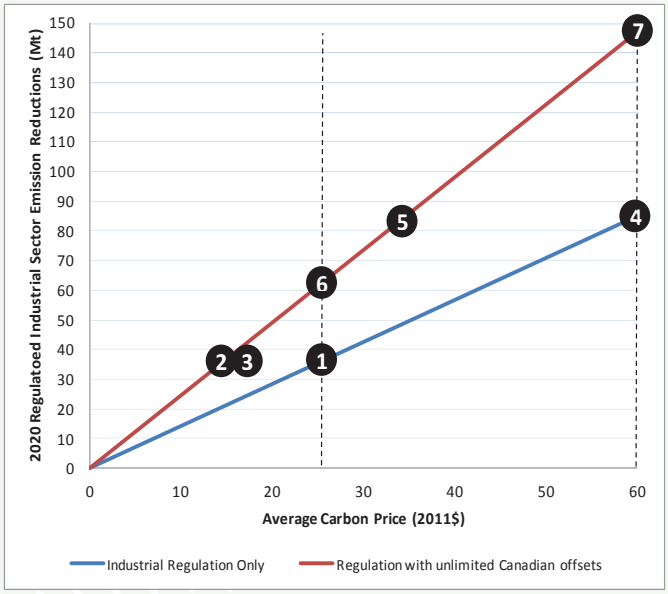

FIGURE 4: 2020 EMISSION REDUCTION SCENARIOS AT VARIOUS AVERAGE CARBON PRICES WITH AND WITHOUT ACCESS TO OFFSETS (MT)

The details for each scenario include:

1. **Industry alone, no offsets: Industry regulations equivalent to $25 average carbon price with no access to offsets.** Scenario 1 assumes an average cost of $25/tonne to reduce GHG emissions for regulated industrial entities through the introduction of new performance standards. At this average carbon cost, the simulation estimates that 35.4 Mt of emission reductions can be achieved at a total cost of $886 million annually in 2020.
2. **Industry alone unlimited offsets: Industry regulations with unlimited offsets, optimization to achieve Scenario 1—35.4 Mt reduction.** A target equivalent to the estimated average carbon cost of the electricity coal performance standard regulation in Scenario 2 indicates that access to offsets could reduce overall compliance costs by 42 per cent to total $513 million annually. This is a significant savings over the industry alone scenario.
3. **Industry alone 25 per cent offset limit: Industry regulations with limited offsets of 25 per cent of total emission reductions to achieve Scenario 1—35.4 Mt reduction.** Limiting access to offsets to a total of 25 per cent of emission reductions (Scenario 3) would still reduce compliance costs by 35 per cent or approximately $311 million annually. Limiting offsets to 25 per cent of total emission reductions would still reduce compliance costs to $574 million annually, which is about 12 per cent higher than the unlimited case above.
4. **Industry alone at $60 with no access to offsets.** For many industrial emitters, such as oil and gas, the cost of compliance to achieve a similar contribution of emission reductions as the power generation industry is substantially higher, and there is uncertainty in the stringency of new performance regulations. We therefore model a $60 carbon cost to determine the industrial emission reductions possible as well as the offsets. With a higher carbon cost relative to Scenario 1 ($25 versus $60) the cost burden on industry increases significantly to $5.1 billion annually but emissions are also much greater at 85 Mt.
5. **Industry alone at $60 plus unlimited offsets: Industry Regulation with unlimited offsets, optimization to achieve Scenario 4—85 Mt reduction.** With unlimited offsets, industry reductions fall significantly as do the costs of hitting the same targets as Scenario 4 where industry alone faces reductions at an average cost of $60. While 85 Mt of reductions are still achieved, the total costs fall over $2 billion, reflecting an average cost drop for $85 in Scenario 4 to $35 with the addition of offsets.
6. **Industry alone plus expanded offset coverage at $25: Industry regulations equivalent to $25 average carbon cost (35.4 Mt) plus unlimited access to offsets.** Total emission reductions could be increased by 25.8 Mt to a total of 61.2 Mt if carbon costs of $25 were applied to both regulated industrial entities and to available offset projects. This scenario demonstrates that for an alignment of compliance costs on regulated and non-regulated sectors, significant additional emission reductions are possible.
7. **High cost for industry alone plus offset expanded offsets coverage at $60: Industry regulations equivalent to $60 average carbon cost (85 Mt) plus unlimited access to offsets.** With access to unlimited offsets and an average carbon cost of $60, the modelling suggests that 147 Mt of emission reductions can be achieved at a total cost of $8.8 billion annually. Savings in this scenario compared to a scenario with no access to offsets (industry reduce 147 Mt alone) are in the order of $6.4 billion annually.

TABLE 3: SCENARIO COSTS AND EMISSION REDUCTIONS

#	SCENARIO DESCRIPTION	INDUSTRIAL EMISSION REDUCTIONS (MT)	OFFSET EMISSION REDUCTIONS (MT)	TOTAL EMISSION REDUCTIONS (MT)	AVERAGE CARBON COST ($/TONNE)	TOTAL COST (MILLIONS)
Offsets for Emitter Flexibility						
1	Industry alone, no offsets: Industry Regulation equivalent to $25 average carbon cost with no access to offsets	35.4	-	35.4	$25	$886
2	Industry alone unlimited offsets: Industry Regulation with unlimited offsets, optimization to achieve Scenario 1—35.4 Mt reduction	20.5	14.9	35.4	$14	$513
3	Industry alone 25 per cent offset limit: Industry Regulation with limited offsets of 25 per cent of total emission reductions to achieve Scenario 1—35.4 Mt reduction	26.6	8.9	35.4	$16	$574
4	Industry alone at $60, no offsets: Industry Regulation equivalent to $60 average carbon cost with no access to offsets	85.0	-	85.0	$60	$5,101
5	Industry alone at $60 plus unlimited offsets: Industry Regulation with unlimited offsets, optimization to achieve Scenario 4—85 Mt reduction	49.2	35.8	85.0	$34	$2,953
Offsets to Expand Coverage						
6	Industry regulations equivalent to $25 average carbon price with unlimited access to offsets	35.4	25.8	61.2	$25	$1,530
7	Industry regulations equivalent to $60 average carbon price with unlimited access to offsets	85.0	61.8	146.9	$60	$8,812

Source: IISD Modelling

4.0 Alternative Offsets Systems to Complement Canada's GHG Performance Regulations

In *Mind the Gap*, IISD's recent assessment of the state-of-play of GHG mitigation in Canada, we identified current provincial and federal mitigation actions and then identified additional mitigation opportunities to close the gap while keeping carbon costs down. The federal government's preference for performance GHG regulations served as a basis for identifying a path forward on developing climate policy. In the paper, we also identified Canadian offsets as a major element of a forward-looking climate policy. We observed, as we have in this paper, that offset systems can be designed to complement performance regulations as a flexibility mechanism for emitters or can support target attainment independently through a carbon management fund.

Mind the Gap also presented five principles to help guide the development of a forward-looking Canadian climate change policy. These principles are intended to shape how federal government sector-by-sector GHG performance regulations might be designed to ensure cost-effective reductions in the longer term. The five principles are useful for exploring how offsets might improve the current regulatory approach. The principles include:

1. Establish certainty through a published regulatory schedule making expected effort clear;
2. Regulations need to enable flexibility while achieving emission reductions;
3. The regulations should not impose disproportionate costs;
4. Regulations should seek reductions throughout the entire emission inventory; and,
5. Regulations should be designed to transition to carbon pricing.

Below, we use these principles to explore how two alternative offset systems could improve a national climate policy: first, allowing offsets to be used for compliance in sector-by-sector regulations; and second as a separate, independent offset regime to complement regulations.

4.1 Allowing Offsets to be used for Compliance in Sector-By-Sector Regulations

Government could allow firms in regulated sectors to comply using offsets from specific unregulated sectors. That is, rather than complying with the performance regulation exclusively through emission reductions, firms could comply with a mixture of emission reductions and offset purchases. Including offsets in a regulatory regime in this fashion improves the overall performance of the climate policy strategy, as tested against the five principles above:

- This approach clearly improves the flexibility for compliance, as per Principle #2. In cases where achieving a performance standard is particularly expensive given a firm's unique circumstances, offsets would provide an alternative compliance method. This flexibility would improve the cost-effectiveness of the climate strategy while addressing competiveness impacts, assuming all offsets are credible, verifiable, and additional.
- Offsets would also help ensure that disproportionate costs would not be borne across the economy as a result of regulations as per Principle #3. Indeed, even if stringency of the sector GHG regulations was not matched across different sectors, if all regulated sectors have access to offsets, the costs will be aligned. Sectors with higher marginal costs of abatement will purchase more offsets, sectors with lower abatement costs, fewer. As a result, the offset market price should serve to balance compliance costs, improving cost-effectiveness. This indirect linking between sectors and smoothing of abatement costs through offsets addresses a key weakness inherent in rigid sector GHG regulations.

- As in the case of the first option, the offset compliance market would also serve to broaden the coverage of the overall climate policy strategy to sectors that are difficult or impractical to regulate, as per Principle #4. By ensuring GHG policy seeks emission reductions throughout the economy, the cost-effectiveness of the overall strategy is again improved as lower cost abatement is obtained.
- Incorporating an offset compliance mechanism into regulations would also help facilitate a transition to carbon pricing. Introducing a market mechanism would ensure that firms closely examine their abatement costs and opportunities in order to minimize their compliance costs. They would carefully track emissions and costs of abatement opportunities. An eventual transition away from a regulated performance standard to a tradable permit system would effectively only add one additional compliance option: firms would also be able to purchase permits from other regulated sectors in addition to offsets from unregulated sectors. This transition would be relatively straightforward; firms would be well prepared by first trading in an offset compliance market.

4.2 A Separate, Independent Offset Regime to Complement Regulations

Government could implement a separate, independent offset system to complement sector-by-sector GHG regulations. The system would cover sectors not covered by regulations such as buildings, transport, agriculture and waste. Including this kind of an offset mechanism as part of a regulatory strategy improves the policy in multiple ways:

- The offset regime would allow a greater number of sectors and overall broader coverage of emissions throughout the economy, as per Principle #4. Sectors like agriculture or forestry that would be difficult to regulate through performance-based standards would be covered under the policy, improving the cost-effectiveness of the overall approach.
- Similarly, using offset mechanisms would allow for greater flexibility in these sectors to achieve emission reductions, as per Principle #2. Regulations requiring specific tilling practices, for example, are likely impractical, but an offset regime that included agriculture could incent these kinds of emissions reducing practices where they are appropriate (and cost-effective).
- In order for an offset regime to adhere to Principle #3, the stringency of this separate offset system would have to be aligned to the stringency of the sector-by-sector regulations. To accomplish this, government would have to set a price target that aligned with the stringency of proposed sector regulations. Ideally, the government would move from adopting quantity targets to setting price targets that are then used to align costs across emitters.
- Perhaps most importantly, including a complementary offset regime would facilitate a later transition to a market-based carbon pricing approach. For example, the existence of the offset regime would spur growth and learning in market and emissions trading institutions that would position the economy for a smooth transition to a cap-and-trade system or intensity-based emissions trading system down the road.

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Appendix: Summary of Carbon Regulations with Offset Compliance Mechanism

CARBON REGULATION WITH OFFSET COMPLIANCE MECHANISM	SYSTEM TYPE	JURISDICTION(S)	STATUS	SYSTEM TYPE AND COVERAGE	OFFSET APPLICABILITY / COVERAGE
Operational Programs					
British Columbia Greenhouse Gas Reductions Targets Act (B.C. GGRTA)	Regulatory (Public Service Requirement)	British Columbia	Active (2008)	Provincial compliance program for B.C. public sector with offsets as compliance mechanism. Other buyers are voluntary.	Unlimited domestic offset.
Certified Emission Reduction Purchases by the Government of Canada	Kyoto Market Mechanism	Government of Canada	Active (2010)	IIn 2010, and for the first time, Canada took possession of 216,750 Certified Emission Reductions (CERs) from various countries. These CERs are from an investment of $22.5 million dollars from Budget 2000 and Action Plan 2000 that the Government of Canada made to three World Bank Carbon funds: the Prototype Carbon Fund, the Community Development Carbon Fund and the Biocarbon Fund. In return for this investment, the Government of Canada receives a share of the credits generated by the funds.	Brazil, China, Columbia, Guatemala, Honduras, Indonesia, India, Peru and the Philippines.
Alberta Specified Gas Emitter Regulation (SGER)	Hybrid (Market, emission intensity, carbon tax)	Alberta	Active (2007)	Provincial regulation of emission intensity with offsets as compliance mechanism. Regulated entities include facilities emitting >100 Kt of CO_2e per year. Compliance options include purchase of Emission Performance Credits from other regulated entities that are able to do better than their emission reduction target (i.e., trading), purchase Alberta-based offsets or contribute to management fund at $15/ tonne of CO_2e.	Unlimited Alberta-based offset credits.
European Union Emissions Trading Scheme (EU ETS)	Market (Cap-and-trade)	27 EU member states, plus Norway, Iceland and Lichtenstein	Active (2005)	Cap-and-trade program with offsets as a limited compliance mechanism. Currently over 12,000 downstream emission sources from a number of industrial sectors that account for 50 per cent of EU emissions are included. More sectors to join in 2012 and 2013.	CDM/JI offset credits are allowed.[18] Limitations on the use of CDM/ JI credits for compliance vary by member state; from 0 per cent to 22 per cent and are set by national allocation plans. Credits will be limited to 50 per cent of the EU-wide reductions between 2008–2020 (1.6 billion credits).

[18] Clean Development Mechanism and Joint-Implementation are two international project-based offset mechanisms established under the Kyoto Protocol where the EU ETS is the principal buyer.

CARBON REGULATION WITH OFFSET COMPLIANCE MECHANISM	SYSTEM TYPE	JURISDICTION(S)	STATUS	SYSTEM TYPE AND COVERAGE	OFFSET APPLICABILITY / COVERAGE
New South Wales Greenhouse Gas Reduction Scheme (NSW GGAS)	Regulatory (Performance Standard)	New South Wales, Australia	Active (2003)	Regional trading program where regulated entities can reduce their emission intensity, purchase offsets or pay penalty for failing to meet target ($15 per tonne CO_2e in 2011). Electricity retailers larger than 100 GWh are included. Other buyers are voluntary.	Unlimited offsets from Renewable Energy Credits anywhere in Australia. Tradable abatement certificates from demand-side abatement, large-user abatement and carbon sequestration projects only within NSW.
Regional Greenhouse Gas Initiative (RGGI)	Market (Cap-and-trade)	10 U.S. states	Active (2009)	Regional cap-and-trade program with offsets as compliance mechanism. Electricity generating units greater than 25 Mw are included.	Offsets up to 50 per cent of the projected avoided emissions to comply with emissions cap, with price triggers that allow more offsets if price exceeds specific thresholds.
State Power Plant Rules	Regulatory (Performance Standard)	Oregon and Washington	Active (2011)	Mandatory emission standards with offsets as compliance mechanism, electricity generation only.	Unlimited offsets. May be subject to approval.
Proposed Systems					
Western Climate Initiative (WCI)	Market (Cap-and-trade)	11 Jurisdictions (7 States and B.C., Ontario, Quebec and Manitoba)	Planning (start date 2013)	Cap-and-trade with offsets as potential compliance mechanism. Regulated entities include facilities that exceed 25 Kt CO_2e from electricity generation, combustion at industrial and commercial facilities, industrial process and transportation fuel combustion.	No more than 49 per cent of total emission reductions (2012–2020). Each jurisdiction granted flexibility to set lower limits, certify and issue offset credits. Projects allowed in the U.S., Canada and Mexico, and in developing countries at the discretion of partner jurisdictions.
American Clean Energy and Security Act, 2009	Market (Cap-and-trade)	U.S. National	Draft Act	The draft covers 84.5 per cent of total U.S. emissions by 2016.	No more than 15 per cent of a given entity's compliance obligation could be met through domestic and 15 per cent through international offset credits
Australia Carbon Pollution Reduction Scheme (CPRS)	Market (Cap-and-trade)	Australia	Under Development (2015?)	Domestic cap-and-trade scheme with offsets as a compliance mechanism.	Unlimited offsets from domestic and CDM/JI.
Canada's Offset System for Greenhouse Gases[19]	NA	Canada	Under Development	Proposed compliance mechanism for facilities regulated GHG regulations.	Canadian domestic offset projects only.

[19] Note that this is a proposed system that could be linked to federal performance standards for GHG emission reductions targeted at regulated industrial entities.

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