
Introduction

The North American Free Trade Agreement (NAFTA) entered into force on January 1, 1994, just as the international community was warming to the task of reducing greenhouse gas (GHG) emissions in order to counter the adverse effects of climate change. The United States, Canada, and Mexico participated under United Nations auspices in the drafting of the Kyoto Protocol, which committed developed countries to begin lowering their aggregate emissions and to help developing countries formulate and finance GHG mitigation strategies. Canada and Mexico ratified the Kyoto Protocol; US officials signed the protocol but never submitted the treaty to Congress for ratification.

Addressing climate change and the need to sharply reduce GHGs represents a big challenge for the NAFTA partners. North America is home to less than 7 percent of the world's population but is responsible for almost a quarter of global emissions of carbon dioxide, the most important GHG.¹ The United States accounts for the vast majority of North American, and almost 19 percent of global, GHG emissions (see table 1.1). As a consequence, the climate policies adopted by the United States will substantially impact both its NAFTA partners and prospects for a new global climate regime.

From the start, the NAFTA partners recognized the need to confront climate change problems and reduce national emissions. In October 1995, the environmental ministers of the three countries declared their intent to cooperate on climate change issues, encouraging inter alia diffusion of GHG mitigation technologies, restoration and enhancement of carbon sinks, and exchange of data and research (CEC 1995). The NAFTA partners commissioned several

1. World Resources Institute, Climate Access Indicators Tool, <http://cait.wri.org> (accessed on September 17, 2010).

Table 1.1 Greenhouse gas emissions, 1990 and 2006 (CO₂ equivalent)

Country/grouping	1990			2006			1990–2006
	Million metric tons	Metric tons per capita	Tons per million dollars of GDP	Million metric tons	Metric tons per capita	Tons per million dollars of GDP	Change in total emissions (percent)
United States	6,127	24.5	867	7,060	23.6	617	15
Canada	592	21.3	1,089	718	22.0	850	21
Mexico	507	6.1	1,227	709	6.8	1,061	40
NAFTA	7,145	19.8	891	8,413	19.3	649	18
China ^a	3,823	3.4	8,598	7,551	5.8	3,956	98
India ^a	1,388	1.6	5,130	2,215	2.0	3,437	60
Brazil ^a	576	3.9	1,149	862	4.6	1,167	50
Japan	1,269	10.3	306	1,337	10.5	263	5
World ^a	30,055	5.7	1,238	37,767	5.8	983	26
	1990	2006					
US/NAFTA (percent)	86	84					
US/world (percent)	20	19					
NAFTA/world (percent)	24	22					

a. 2006 data not available; 2005 data used instead.

Note: The column “tons per million dollars of GDP” measures GDP in constant 2000 US dollars.

Sources: UNFCCC (UN Framework Convention on Climate Change); GHG Data, www.unfccc.int (accessed on June 10, 2011), Semarnat (Secretariat of Environment and Natural Resources), Statistical Database, www.semarnat.gob.mx (accessed on June 7, 2011); World Bank, *World Development Indicators*, <http://data.worldbank.org/data-catalog/world-development-indicators> (accessed on June 10, 2011).

climate change studies in the mid-1990s, but the initial work of the NAFTA Commission for Environmental Cooperation (CEC) was sidetracked for much of the next decade, as US support cooled after the US Congress failed to ratify the Kyoto Protocol. In the interim, the levels of GHG emissions rose significantly throughout North America; none of the three countries reduced its overall levels of GHG emissions despite notable declines in emissions intensity (CO₂ equivalent emissions per unit of output). As shown in table 1.1, US GHG emissions rose by 15 percent between 1990 and 2006. Canada's performance was even worse, a 21 percent increase over 1990 levels. Mexico's emissions, though still low on a per capita basis, increased by 40 percent during the same period.

Meanwhile, global emissions increased by 26 percent, compared with 18 percent in the NAFTA region. The task of mitigating global warming has become more difficult and costly over time, and dealing with climate change will require substantial changes not only by the NAFTA partners but also by other major emitting countries.

While the NAFTA record to date on climate change has not been stellar, there have been some encouraging recent developments. After years of neglect, the NAFTA partners have begun to pursue policies at the state, provincial, and national levels to mitigate GHG emissions and to encourage consumers and producers to adapt to less carbon-intensive sources of energy. To date, most of these actions have been taken in a piecemeal manner by various states and provinces, and have involved the imposition of new limits on emissions and standards for the production and use of clean energy.

Broader climate policies, however, face uncertain prospects. Although the outlook for US climate legislation looked fairly rosy after the House of Representatives passed the Waxman-Markey climate bill in June 2009, efforts subsequently stalled in the Senate. Since then, federal actions have focused primarily on regulations covering auto emissions and fuel economy standards, while efforts to craft legislation implementing cap-and-trade or other broader schemes to reduce GHGs have faced substantial roadblocks. With Congress at an impasse over climate change policies, the US Environmental Protection Agency (EPA) has begun to formulate regulations under existing statutory authorities that would require large electric power generation plants and carbon-intensive industries to achieve modest emissions reductions over the medium term.

Climate initiatives will continue to face a chilly reception in Congress, and US inaction will retard progress in Canada and Mexico as well. Canadian policymakers worry that their own energy-intensive industries, most of which trade heavily with the United States, could be placed at a competitive disadvantage if new carbon tax and regulatory policies raise the cost of doing business in Canada compared with the United States. Meanwhile, Mexican commitments made at the 2009 UN climate change conference in Copenhagen and elsewhere were conditioned upon substantial financial assistance from developed countries. This expectation may well be unrealistic, as Mexico has a relatively high income compared with other countries that have also asked for climate-related

aid. The lack of a US cap-and-trade regime further reduces the likelihood that the United States will set aside substantial funds for climate change finance in Mexico.

The most likely scenario, in the short term, is scattershot implementation of state and provincial climate change programs, combined with modest doses of federal regulation. Although state environmental leadership in the past has proven invaluable as a laboratory of innovation and has tended to prompt stricter federal standards, the state regulations currently on the table cannot produce anything close to the reductions required to fulfill the commitments made by the United States and Canada in Copenhagen in December 2009.

Moreover, while ad hoc measures to limit GHG emissions are certainly welcome steps, they also create political friction—both within each NAFTA country and between the NAFTA partners—that could generate a backlash against climate policies and raise new barriers to trade and investment in North America. A key problem is the potential for “carbon leakage,” or the displacement of carbon emissions from regulated areas to unregulated areas, which raises concerns about the impact of the tax and regulatory burdens on the competitiveness of domestic industries still reeling from the sharp recession of 2008–09. In particular, the threat of leakage provides a disincentive for states or provinces with higher concentrations of carbon-intensive industries—precisely the states that most need to transition to more sustainable methods of producing and consuming energy—to join carbon reduction efforts.

Problems can also arise from incompatibilities among regulatory policies and performance standards adopted by various states and provinces. For example, differing definitions of renewable energy, combined with inadequate networks for transmission and distribution of energy, could hinder economies of scale and make a low-carbon transition more difficult or costly to achieve. Certain state performance standards are designed to favor domestic energy production, raising barriers to trade among states and undermining the eventual goal of reducing emissions.

Substantial regional differences in production and consumption of carbon-intensive energy and goods exacerbate pressures on policymakers to protect carbon-intensive industries, and compensating regions that produce and consume a relatively high portion of energy-intensive goods has become the price of broad-based national support for a climate change mitigation regime. The longer climate change regulation is limited to a small subset of North American jurisdictions, the sharper these differences will become. If this trend continues, it will likely lead politicians to take actions to level the playing field, via subsidies or other measures aimed at offsetting the compliance costs associated with climate policies. Such countervailing actions, however, could have the opposite effect. Adverse knock-on effects on trade and investment in the NAFTA region could risk unraveling the decades-old integration of the North American economies. For that reason, US, Canadian, and Mexican officials need to accord climate change issues higher priority on the NAFTA agenda, even as they formulate their own national climate change policies.

Can the NAFTA partners work together to advance their own national and international climate change objectives? The following section sets out a necessarily brief review of climate change initiatives in the NAFTA region over the past 15 years. To date, the NAFTA record is not encouraging, but there is evidence that the issue is gaining traction in national and regional policy debates.

The NAFTA Experience with Climate Change Issues

The three NAFTA countries have experienced five-year cycles of interest and disinterest in addressing climate change, though few concrete steps were taken even during periods when climate change was discussed. The NAFTA experience can be divided into three periods: early interest (1995–2000); not-so-benign neglect (2000–2005); and refocused attention going forward (2005–2010).

Although environmental agreements have been in place in North America for more than a century, NAFTA launched a new era of trilateral environmental cooperation. The North American Agreement on Environmental Cooperation (NAAEC) was negotiated in 1993—after NAFTA was formally signed but prior to its ratification by national legislatures—primarily to address US concerns about Mexican policies and specific problems in the US-Mexico border region.² While Mexican environmental laws were similar to US statutes, they were not well enforced, and US constituencies feared that NAFTA would encourage footloose US firms to relocate south of the border to take advantage of cheap labor and pollution havens. The NAAEC established a new trilateral institution, the CEC, to encourage cooperative policies among the three NAFTA countries, develop regional projects to address environmental problems, and counter environmental abuses and violations of NAFTA commitments through limited dispute settlement powers. Mexico and Canada reluctantly acceded to the new negotiations, recognizing that the Clinton administration would not pursue ratification of the trade agreement until supplemental pacts on labor and the environment were appended to the core treaty text. The environmental side pact helped overcome congressional opposition to the NAFTA implementing legislation, which passed the House of Representatives by a narrow margin in November 1993.

Climate change issues were discussed in the CEC during NAFTA's first five years, but the topic soon drifted off the trilateral agenda as the US political debate soured on the new United Nations climate treaty. Canada and the United States signed the Kyoto Protocol. However, the US signature was not definitive; in July 1997, the Byrd-Hagel Resolution passed the Senate by a vote of 95 to 0, clearly signaling that Congress would not ratify the treaty unless it required developing countries to reduce or limit emissions—which, as negotiated, it did not. Neither the Bill Clinton nor the George W. Bush administra-

2. For a summary of NAAEC provisions, see Hufbauer et al. (2000, chapter 3).

tion submitted the treaty for ratification, and President Bush subsequently withdrew the United States from the protocol in 2001. Although Canada did ratify the Kyoto Protocol, it was not until 2000 that it released its Federal Action Plan, which aimed to reduce GHGs by 65 million metric tons (mmt) between 2008 and 2012 and thus achieve about one-third of Canada's Kyoto target. It committed C\$500 million to a list of measures to reduce emissions, but this spending did not successfully slow the growth in Canada's GHG emissions. Subsequent plans were likewise unsuccessful, and proposals to enact a cap-and-trade system for large emitters were never implemented.

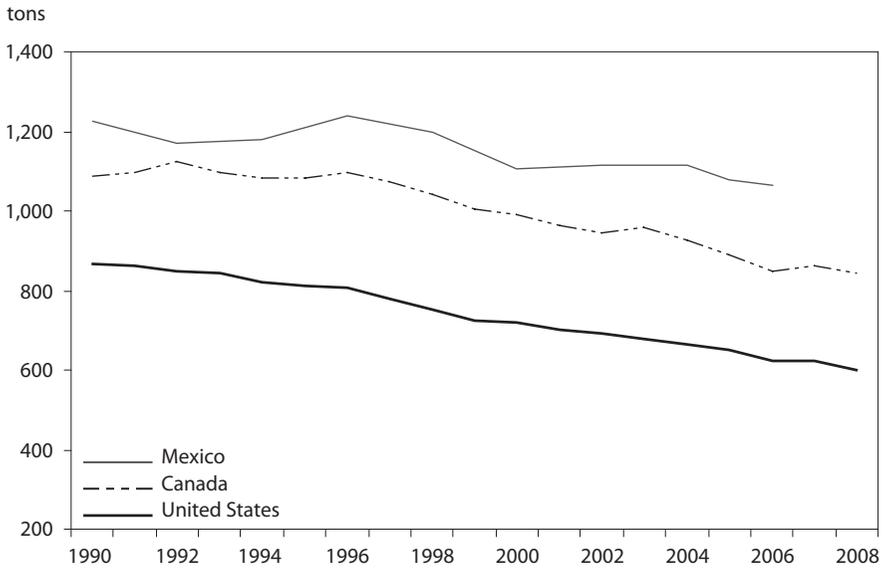
Unlike the United States and Canada, Mexico was not required to commit to GHG reductions in the Kyoto Protocol, yet its efforts in this area were comparable to those of its NAFTA neighbors. In the 1990s, Mexican climate initiatives focused primarily on developing basic information on the nature of national emissions problems. In 1992, the National Autonomous University of Mexico and the National Institute of Ecology—the research branch of Mexico's Secretariat of Environment and Natural Resources (Semarnat)—established the National Scientific Program on Global Climate Change to coordinate research and develop core data. Mexico published its first greenhouse gas inventory in 1995. Like the United States and Canada, however, Mexican officials talked about climate change but did not translate intentions into effective action. Mexico's emissions intensity spiked in 1997 before falling back to previous levels in 1999 and essentially leveling off over the past decade. Mexico's GHG intensity is now about 25 percent greater than the Canadian level and about 70 percent greater than the US level (see figure 1.1).³

Guided by its constituent members, the CEC discussed climate change but took little concrete action—not surprising since the CEC was from the outset burdened by a large agenda with a small budget. Although CEC ministers resolved in 1995 to “facilitate cooperation on issues of mutual interest in the areas of climate change” and directed the CEC Secretariat to do so (CEC 1995), these initiatives were put into deep freeze after the harsh US congressional reaction to the Kyoto Protocol cited above. Nevertheless, the CEC has published a yearly Pollutant Release and Transfer Registry report on industrial emissions, which provides a factual foundation for future cooperation on GHG emissions in North America.

By contrast, another new North American institution, the North American Development Bank (NADB), contributed little to efforts to reduce GHGs. Part of this poor performance was due to the NADB's initial narrow focus; it was created to garner political support in Congress for NAFTA ratification by

3. See UNFCCC (UN Framework Convention on Climate Change), GHG Data, www.unfccc.int (accessed on June 10, 2011); Semarnat (Secretariat of Environment and Natural Resources), Statistical Database, www.semarnat.gob.mx (accessed on June 7, 2011); and World Bank, *World Development Indicators*, <http://data.worldbank.org> (accessed on June 10, 2011). These intensities were calculated using GDP expressed in constant 2000 US dollars. If calculated using purchasing power parity GDP, Mexico's GHG intensity is actually lower than that of the United States and Canada.

Figure 1.1 Greenhouse gas intensity in the United States, Canada, and Mexico, 1990–2008 (emissions per million dollars of GDP at constant 2000 US dollars)



Note: Data for Mexico are available only up to 2006.

Sources: UNFCCC (UN Framework Convention on Climate Change), GHG Data, www.unfccc.int/ (accessed on June 10, 2011); Semarnat (Secretariat of Environment and Natural Resources), Statistical Database, www.semarnat.gob.mx (accessed on June 7, 2011); World Bank, *World Development Indicators*, 2010, <http://data.worldbank.org/data-catalog/world-development-indicators> (accessed on June 10, 2011).

targeting funding for wastewater treatment plants in the US-Mexican border region. The NADB also was inhibited by limited funding, unwieldy lending requirements, and lack of borrowing capacity in Mexican municipalities.⁴ While the NADB has the potential to contribute to climate change initiatives, it was not given the means or direction to do so. We discuss how these failings can be redressed in the final chapter.

The next five-year cycle, through 2005, could be called the era of energy exuberance. The three NAFTA countries gave short shrift to climate change issues. Instead, in the aftermath of the terrorist attacks of September 11, 2001, and the subsequent war in Iraq, concerns about energy security overwhelmed the environmental agenda. Expanding US oil and gas production took precedence over, and diverted attention from, environmental initiatives. Indeed, the Bush administration’s chief environmental advocate, EPA administrator Christine Todd Whitman, resigned in frustration over the dismissive approach

4. For a fuller discussion of the NADB, see Hufbauer and Schott (2005).

of White House officials to the broad environmental agenda. US GHG emissions increased during this period despite improvements in US energy intensity indices, as shown in figure 1.1.

In Canada, the Alberta oil boom upstaged efforts to comply with Kyoto obligations. Rising oil prices made exploitation of the oil sands economically attractive, and new investment surged into the Fort McMurray area. With booming production in the oil and gas sector, along with rapid growth in road transport, Canadian GHG emissions continued to increase, thus undercutting even the modest goals set out in the 2000 Federal Action Plan.⁵

In Mexico, climate initiatives foundered for several reasons, including the difficulty of reforming energy policy, cutting transport emissions, and curbing deforestation. Oil production began a slow decline, which in turn constrained public funding for environmental projects and enforcement, since the revenues of the state oil monopoly, PEMEX, provide a substantial share of federal government revenues. Facing rapid depletion of one of Mexico's major oil fields, Mexican politicians argued about energy reforms and ended up doing very little. Simply put, President Vicente Fox and his administration were unable to master the art of compromise with a Mexican Congress that was no longer dominated by a single party, and climate change initiatives were among the areas that suffered accordingly.

Since 2006, however, all three countries have begun to refocus attention on climate change policies. A number of factors have contributed to this transition, including a growing international commitment to climate change action in response to the growing weight of scientific evidence reported by UN agencies and academic research—popularized by Al Gore's widely distributed documentary *An Inconvenient Truth*. Polling in the United States showed an increase in public concern about climate change between 2000 and 2008.⁶

In Canada, the federal government in 2007 issued Turning the Corner, a plan for an intensity-based target system for GHG emissions; the plan's implementation, however, has been put on hold, as federal and provincial officials continue to debate the cross-cutting effects of resource policies and climate change initiatives. In 2010, Canada set its pledge to the same target as the United States and promised to follow through only if the United States did. As policy stalled in Ottawa and federal officials awaited signs of how US policy would evolve, individual provinces began to adopt GHG mitigation and adaptation strategies. Several provinces introduced carbon taxes and regulations to reduce GHG emissions, and several established trust funds to finance research and development of carbon sequestration technologies. In some cases, prov-

5. The oil and gas industry was the second-largest contributor to the rise in greenhouse gas emissions between 2000 and 2008; the largest was road transportation. See Environment Canada (2010).

6. Public concern about climate change has decreased markedly since 2008, however, due inter alia to the economic downturn in late 2008 and 2009, which shifted priorities to restoring output and employment growth.

inces set out emissions intensity limits and renewable electricity requirements for electric utilities in order to encourage cleaner technologies. Ontario set the goal of phasing out coal-fired electricity generation. These initiatives are discussed in more detail in chapter 3.

In Mexico, the Calderón government commissioned the consulting firm McKinsey and Company, and other experts to develop a long-term strategy for reducing GHG emissions (Centro Mario Molina 2008). In light of that analysis, Mexico pledged in December 2008 to reduce emissions 50 percent below 2002 levels by 2050, an aggressive target for a developing country. It further committed in December 2009 to reduce emissions 51 mmt below business-as-usual levels by 2012, equivalent to a 6.4 percent cut, and 30 percent below business-as-usual levels by 2020. Its 2009 Special Climate Change Program (PECC) outlines a roadmap to meet these goals. We discuss this plan and the challenges to its implementation in chapter 4.

The most notable, albeit incomplete, developments in climate change policies have taken place in the United States since the start of the Obama administration in January 2009. At that time, the US Congress began deliberations on a comprehensive climate change bill that would create a cap-and-trade system for reducing GHG emissions over time. The American Clean Energy and Security Act passed the House of Representatives in June 2009. The bill included a number of provisions aimed at building broad-based political support for a new carbon regime, including free allowances to major emitters and emissions offset provisions that help mitigate compliance costs. The bill set the goal of reducing total US emissions by 20 percent from 2005 levels in 2020; its cap-and-trade component required covered sources to reduce emissions 3 percent by 2012, 17 percent by 2020, and 83 percent by 2050. However, parallel legislation in the US Senate failed to advance in 2009–10. Absent federal legislation, US policy will continue to be formulated and implemented by the laws and regulations of individual states and by EPA regulation pursuant to the Clean Air Act of 1970. The next chapter discusses the US regulatory initiatives in more detail.

While national cap-and-trade schemes have foundered, nascent carbon trading regimes are under construction in three major North American regional initiatives: the Regional Greenhouse Gas Initiative (RGGI), the Midwest Greenhouse Gas Accord (Midwest Accord), and the Western Climate Initiative (WCI). Of the three, the WCI and the RGGI are more advanced, and the RGGI is the only framework that is currently being implemented; see table 1.2 for a comparison of the WCI and RGGI.

The members of the RGGI include Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. The program covers only electric power generators. The cap-and-trade system is designed to stabilize emissions from 2009 to 2014 and reduce emissions 10 percent below 2009 levels by 2018.

The WCI is an agreement among California, Montana, New Mexico, Oregon, Washington, British Columbia, Manitoba, Québec, and Ontario to reduce emissions 15 percent below 2005 levels by 2020. Members accounted

Table 1.2 Regional Greenhouse Gas Initiative (RGGI) versus Western Climate Initiative (WCI)

	RGGI	WCI
Target	Emissions 10 percent below 2009 levels by 2018.	Emissions 15 percent below 2005 levels by 2020.
Time frame	Emissions stabilized from 2009 to 2014; 2.5 percent decline in emissions per year from 2015 to 2018, for a total of 10 percent decline by 2018.	Emissions from electrical generators, large industrial and commercial combustion, and large industrial process emissions capped starting in 2012. Residential emissions and emissions from small industrial/commercial combustion and transportation fuel combustion capped starting in 2015.
Regulated entities	Electric power generators are regulated; imported electricity is not regulated.	Regulation is as close to the point of emission as possible, or where fuels “enter commerce in the WCI partner jurisdictions.”
Offsets	Offsets must come from within the RGGI region.	Offsets must come from within North America.

Sources: RGGI (2008); WCI (2010).

for 10 percent of US emissions in 2005 and 50 percent of Canadian emissions in 2008.⁷ Unlike the RGGI, the WCI envisions an economy-wide cap by 2015. California has led US states on implementation, publishing a draft regulation under Assembly Bill 32 in 2009. With the exception of California, however, the US member states appear unlikely to muster the political will to overcome the serious resistance to cap-and-trade that has recently emerged in the United States.

While GHG regulation has proceeded unevenly in the United States and Canada at the federal and subnational levels, the issue has gained increasing salience on the NAFTA agenda. As we discuss below, the North American Leaders’ Summit in August 2009 refocused attention on the importance of climate change issues and instructed officials to develop a trilateral working plan for consideration at their next summit. At the CEC ministerial meeting in August 2010, North American environmental ministers also committed to improving the comparability of data gathering and inventories for mitigation and adaptation projects (CEC 2010). Whether the NAFTA partners can then turn the plan into concrete actions is another story. To do so, each country will have to sidestep the politically sensitive concerns about the impact on production and employment that have so far confounded efforts to formulate national policies.

7. Data are from US state environmental agencies and Environment Canada and can be found in Fickling (2010).

Implications for NAFTA of Climate Change Policies

Why has it been so hard to begin to reduce GHG emissions in North America? Part of the answer lies in the heavy dependency on fossil fuels and part in the failure to adequately attribute the environmental costs of carbon emissions to the producers and users of those fuels. As a result, industries and individuals have pursued investments or purchases based on a “free carbon” development model—leading to more coal-fired electricity generation plants, more gas-guzzling vehicles, and more suburban housing and strip malls in place of farms and forests.

Reducing GHGs will require changes in the way firms and individuals produce and consume, whether by improving the efficiency of energy use, by mandating the use of cleaner energy, by changing the vehicles that people drive, or simply by imposing a price on carbon emissions. Still reeling from the sharp recession of 2008–09, NAFTA policymakers face enormous pressure to achieve this economic shift without hurting consumers or damaging the competitiveness of local industries—that’s why draft US legislation in 2009 contained generous offsets and subsidies for at least a decade to buffer emitters and consumers alike from the higher costs that would arise from pricing carbon.

Unfortunately, some of the ways in which politicians react to this pressure could have adverse impacts. Some measures to compensate consumers and industries could dampen incentives to adapt and conserve or could provide a de facto subsidy for certain domestic producers. Some measures would erect trade barriers to protect domestic industries, a practice that probably runs afoul of international rules. As a consequence, the measures could have unintended consequences for economic welfare and foreign relations that spill over into the NAFTA region.

NAFTA officials face three major challenges in crafting climate policies. First, they need to manage the regional impacts of climate laws and regulations, which could vary significantly depending on a region’s sources of electricity generation, its economic activities, and its natural resource endowments. Second, they need to address ongoing competitiveness concerns, i.e., the implications of climate policies for production and employment, and trade and investment, in the NAFTA region. Third, they need to upgrade and better align their energy and transport infrastructure to improve energy efficiency and expand use of renewable energy sources and low-carbon fuels, which could at least partly alleviate regional competitiveness pressures. The following subsections describe each of these challenges.

Managing Regional Differences

Production and use of energy and energy-intensive goods differ widely both between the NAFTA partners and within each country. Producers of fossil fuel-based energy such as coal and petroleum will be vulnerable to climate change policies almost by definition—emissions reductions will require a

reduction in the burning of fossil fuels. Producers of energy-intensive goods such as aluminum, steel, paper, cement, and chemicals will be vulnerable if they cannot switch to low-carbon energy sources, make energy-efficiency improvements, or pass along extra costs to consumers. Moreover, many producers of energy-intensive goods are located in areas served by high-carbon energy. The concentration of fossil fuel extraction and energy-intensive manufacturing in certain regions amplifies concerns about industrial competitiveness.

Legislative politics is the art of appeasing local constituencies, and the politics of climate change has been no exception. In crafting climate change legislation, political leaders have favored measures that reflect regional resource endowments and the interests of important industries in their area. What constitutes good politics, however, may not constitute effective policy to mitigate GHG emissions. Below, we provide an overview of the regional breakdown of the sources of energy and emissions in each country, and we describe some of the frictions among local, national, and continental interests that could result from climate policy. These issues will be discussed further in the following chapters.

United States

Despite periodic calls for “energy independence,” the United States is a net importer of oil and gas from its North American neighbors and other countries, and it is likely to remain so in the future. This dependence on foreign sources of energy could cause significant tension between the need to reduce greenhouse gas emissions and the need to ensure a steady supply of energy from nations that support US security interests.⁸ The only major fossil fuel that is not imported is coal, which the United States uses heavily for electricity. Coal-fired electricity generation accounts for about half of US consumption—and is the most carbon-intensive fuel for electricity production.

Across the country, regional differences in total GHG emissions embedded in overall consumption are relatively small. However, the differences among GHG emissions embedded specifically in electricity consumption are larger. In general, midwestern and southeastern states are more likely to obtain electricity from fossil fuel-based sources, whereas Pacific and northeastern states are more likely to obtain electricity from less carbon-intensive sources.⁹

Industries that use a large amount of energy account for a greater percentage of GDP and employment in the southeastern United States and certain midwestern states—the same areas that tend to have the most carbon-intensive

8. A prominent recent example of this conflict is the construction of the Keystone XL pipeline from Canada to the US Gulf Coast. Despite concerns raised by the EPA regarding additional GHG emissions from the oil sands, the State Department (which is required to certify the pipeline) seems to favor the project. See chapters 2 and 3 for a more detailed discussion.

9. All energy consumption statistics are from the Energy Information Administration, 2010, Net Generation by State by Type of Producer by Energy Source (EIA-906).

sources of energy.¹⁰ Fossil fuel production is also concentrated in these areas. Not surprisingly, congressional representatives from the Midwest and the South tend to take a pessimistic view of the effect of carbon pricing on their states' economies and have demanded that legislation favor their states' vulnerable industries as a condition of their support.

These regional disparities are likely to be exacerbated by differences in state GHG regulations; the state regulation patchwork is expected to remain the dominant climate policy paradigm in the short term. States with the most robust climate change policies tend to be those that already emit relatively fewer GHGs per capita, and they are overwhelmingly concentrated in the Northeast, West, and Great Lakes area, with the Northeast and the West Coast states leading the pack. As these states reduce emissions, states in the Southeast and Midwest are continuing along a fossil fuel-intensive growth path—and they may thus increasingly resist climate change policies that raise their energy costs and put their industries and workers at a competitive disadvantage.

Canada

Canada is the only NAFTA country that currently gets a large share of its electricity from a zero-carbon source. Hydropower provides almost 60 percent of Canada's electricity.¹¹ Yet, with growing oil sands production, it will be a challenge to reduce total Canadian GHG emissions over the coming decade.

In Canada, managing regional differences means balancing competing provincial interests: the pursuit of climate change objectives versus the exploitation of natural resources. In the East, the provinces of New Brunswick, Québec, and Ontario have relatively large manufacturing sectors. Even the most fossil fuel-dependent of these three provinces, New Brunswick, derives 40 percent of its electricity from zero-carbon sources. In the West, energy-intensive manufacturing is dominated by British Columbia and Alberta. British Columbia derives over 90 percent of its electricity from hydropower. Alberta, however, derives three-quarters of its electricity from coal and has a large energy-intensive manufacturing presence.¹²

Alberta largely owes its economic boom to oil sands production. A recent report by the National Roundtable on the Environment and the Economy estimates that Alberta would lose a great deal of economic growth from the oil sands if climate policy were implemented (NRTEE 2011). As a result, Alberta has sharply different priorities with regard to mitigating GHG emissions than eastern provinces. And although the Saskatchewan oil sands are at an earlier stage of development than Alberta's, the conventional oil and gas industry is a major player in Saskatchewan as well.

10. This subject is discussed in more detail in chapter 2.

11. Statistics Canada (2009, table 2).

12. *Ibid.*

The concentration of carbon-intensive activities in Alberta and Saskatchewan creates a substantial division of interests between these western Canadian provinces, which rely on petroleum exports for economic growth, and the eastern Canadian provinces, which are home to a substantial manufacturing sector. All energy-intensive Canadian exports stand to lose from a failure to harmonize climate change regulations with those of countries abroad; if Canada's regulations are mismatched with—either more or less stringent than—those of major export markets such as the United States, the European Union, and Japan, there is a threat of lost competitiveness. However, Alberta and Saskatchewan also stand to lose a great deal from regulation of the carbon embedded in petroleum extraction, and petroleum firms and politicians in these provinces have advocated that Canadian regulations minimize compliance costs for the petroleum industry or at the very least take steps to compensate the western provinces for the additional costs.¹³ If the petroleum sector is held to a more lenient standard than other industries, it will force the manufacturing, residential, and transport sectors to achieve greater emissions reductions in order to meet Canada's mitigation goals—a disadvantage to the eastern Canadian provinces, which do not earn substantial revenues from oil production.

Mexico

In contrast to its northern neighbors, Mexico's top priority is to cut greenhouse gas emissions from transportation, which make up the largest part (34 percent) of its sectoral emissions portfolio. Mexico also relies heavily on fossil fuels, albeit cleaner ones than the United States, obtaining 55 percent of its energy from petroleum and 32 percent from natural gas.¹⁴ The government's most recent GHG emissions reduction plan, the PECC, envisions reduced methane emissions from production of hydrocarbons and wastewater treatment plants. In addition, Mexico has long struggled with deforestation, and reduced emissions from deforestation and degradation (REDD) plays a central role in the PECC.

While Mexico has set aggressive goals compared to other developing countries, meeting these goals will require it to overcome considerable capacity and financial constraints. Mexico would benefit from bilateral technical and financial assistance from its NAFTA partners, as well as the development of an integrated North American climate regime that would enable environmentally sound Mexican projects to sell carbon credits to the other two countries.

13. For example, Premier Brad Wall of Saskatchewan advocated strongly against a federal policy that failed to give credit for provincial investment in carbon capture and sequestration. See Brad Wall, speech given at the Canadian Energy Forum held by the Energy Council of Canada, Ramada Hotel Ballroom, Regina, Saskatchewan, February 9, 2010.

14. Energy Information Administration, *International Energy Statistics*, 2010.

Mexico ranks fourth in the world in terms of number of registered certified emissions reductions.¹⁵

Addressing Competitiveness Concerns

Climate change policies can have substantial implications for both the level and distribution of production and employment, as well as for prospective decisions on new investments within the North American region. Depending on the stringency of the policies regulating the use and price of carbon, lowering GHG emissions could affect what goods are produced as well as where and how they are produced. That's why the issue has been accorded high priority on the agenda of the North American Leaders' Summit.

As noted above, some standards may cause carbon leakage, simply displacing GHG-producing activities to unregulated jurisdictions without preventing the resultant environmental harm. Much of the attention has been focused on carbon leakage at the producer level—the movement of carbon-intensive production from places where carbon-intensive production is expensive to places where carbon-intensive production is cheap. Certain highly traded, energy-intensive sectors have expressed concern about this possibility, and as a result the issue of leakage has become a major focus of attention in the debate over cap-and-trade programs. The potential for producers to move out of regulated jurisdictions has become a significant issue at the state level as well as the federal level, due to the patchwork nature of state policies; officials from several states have expressed concern about leakage as a result of their participation in the Western Climate Initiative.

State performance standards such as low-carbon fuel standards (LCFS) and renewable portfolio standards generally regulate at the point of consumption.¹⁶ For this reason, interstate leakage would primarily consist of movement of carbon-intensive consumption from places where carbon-intensive consumption is expensive to places where carbon-intensive consumption is cheap. For example, a utility selling electricity sourced from both renewable and coal-fired electricity to several states could, in theory, respond to a renewable portfolio standard by shifting its sales so that all of its renewable offerings went to the regulated state and its coal-fired offerings went to the unregulated state. We discuss this possibility in later chapters.

These concerns about leakage are speculative; models produce mixed results as to whether climate change policies will cause substantial relocation in the near term (Houser et al. 2008). Nevertheless, concerns regarding competitiveness of regulated producers have become central to the political rhetoric surrounding legislation. In response, politicians have vetted a mixture

15. UN Framework Convention on Climate Change, Registered Projects by Host Party, <http://cdm.unfccc.int/Statistics/index.html> (accessed on June 8, 2011).

16. The exception is the renewable portfolio standard, which regulates producers.

of subsidies, exemptions, and border measures to compensate local industries. Border adjustments are popular as a means of leveling the playing field, especially because they do not incur budgetary costs. These so-called competitiveness measures could potentially trigger countervailing measures from affected jurisdictions. Such reactions would increase the costs of, and possibly provoke a public backlash against, environmental measures enacted to reduce greenhouse gas emissions.

Particularly in the US Congress, border adjustments have been a prerequisite for passage of any cap-and-trade bill and undoubtedly will resurface when climate legislation is vetted in the future. Although Canada's cleaner electricity generation portfolio makes most of its industries less likely to experience these border measures (Dachis 2009), Canada still faces the risk of US protectionism if it does not adopt a climate policy similar to that of its southern neighbor (NRTEE 2009). Border measures are also a concern for Mexico, which is unlikely to adopt comparable emissions-reduction policies in the near term.

Canadian officials, meanwhile, worry that a failure to coordinate climate policy with the United States could jeopardize Canada's energy-intensive manufacturing exports. If the energy and regulatory costs of Canadian policy are substantially higher than those in the United States, investments in new production plants could be diverted from Canadian to US sites. Gary Hufbauer and Jisun Kim (2009) note that a few industries have a high volume of intra-industry trade, suggesting that they have a high degree of firm-to-firm competition across the border. Marginal changes such as the imposition of border measures would be likely to render firms in these industries less competitive than their counterparts in the other country. As the industries identified by Hufbauer and Kim (2009) account for up to 11 percent of Canadian manufacturing employment in certain provinces, Canada has a strong interest in aligning its climate policies (including energy use standards) with those in the United States in a way that promotes mitigation and adaptation and reduces the risk that Canadian production will relocate in response to a GHG "pollution haven" south of its border.

Canada's concerns about US policy are not limited to federal legislation. The government of Stephen Harper also wants to encourage development of Alberta's oil sands resources, and it has been concerned about foreign regulations that could curtail oil sands exports if widely adopted. California's low carbon fuel standard is one such regulation. The LCFS requires retailers of transport fuels to reduce the GHG emissions intensity of their products by 10 percent from 2006 levels by 2020. Toward this end, the LCFS regulation assigns GHG intensity values to different fuels; because oil sands crude receives a separate life-cycle analysis from "conventional" fuels, its GHG intensity value is likely to be substantially higher. The Canadian government has expressed its concern that the LCFS is discriminatory, as it favors domestic production over Canadian oil sands exports. We discuss this issue further in chapter 2.

Aligning Infrastructure and Policy

Compounding the competitiveness problem is the fact that energy infrastructure and distribution networks are not fully integrated in the NAFTA region. In particular, distribution networks for low-carbon energy need to be improved. Continent-wide infrastructure and streamlined policies could lower costs and stimulate trade in low-carbon goods.

The North American countries need to develop new cross-border infrastructure as part of a serious effort to reduce emissions. Transmission will need to be updated across the continent; given the high level of interconnection between the United States and Canada, it will be essential to coordinate the construction of a “smart,” 21st century grid. Meanwhile, the US market could drive development of Mexico’s abundant wind, solar, and geothermal resources, if the limited transmission capacity between the two countries is substantially upgraded.

Some progress has already been made on this front. Manitoba and Saskatchewan are in the preliminary stages of spearheading a Western Energy Corridor for renewable and nonrenewable transmission, and New Brunswick and Maine have proposed to build a Northeastern Energy Corridor to transmit renewable energy between the two jurisdictions.¹⁷ However, much work remains, particularly in terms of US-Mexico transmission networks.

Creation of a favorable environment for innovation requires coordination not only of infrastructure but also of the policy framework within which businesses must operate. Harmonization of standards would allow businesses to operate in a more predictable and uniform regulatory environment and create economies of scale that could encourage innovation and reduce compliance costs. A predictable regulatory environment and economies of scale could in turn alleviate competitiveness impacts resulting from the regulations. To be sure, policymakers require the freedom to tailor policies to local conditions, and local jurisdictions often serve as laboratories of innovation, where policies are tested and proven before being implemented at higher levels of government. However, there is ample room to coordinate regulation without taking away the benefits of localization. Opportunities to do so can be found in renewable standards, where coordinated definitions of renewable energy could promote investment, and cap-and-trade systems, which might be linked through mutual acceptance of other jurisdictions’ carbon allowances.

Common North American Interests

Despite the challenges, the three NAFTA partners have mutual interests in a coordinated and comprehensive energy strategy. First, they share a common environment and a long history of bilateral cooperation on environmental

17. Government of New Brunswick, New Brunswick and Maine Support International Energy Corridor, press release, March 25, 2009, www.gnb.ca (accessed on June 9, 2011).

problems. The United States and Canada have signed acid rain and other trans-boundary pollution agreements; the earliest US-Mexico treaty that established the precedent to the current International Boundary and Water Commission dates back to 1889. More recently, the North American Development Bank has provided funding and coordination for environmental infrastructure in the US-Mexico border region.

Second, a large share of the energy consumed in North America is produced in North America, and a lot of it is traded across the US-Canada and US-Mexico borders. How energy is produced, used, and traded has a large impact on GHG emissions and affects how each country can adapt to a low-carbon future.

The NAFTA region has an interdependent but not fully integrated energy market. Canada is the leading source of US oil imports (about 20 percent of total US crude oil imports came from Canada in 2010, and about 70 percent of the crude oil produced in Canada was shipped to the United States); Mexico consistently ranks second or third. Combined, Canada and Mexico accounted for about 35 percent of US oil imports in 2010.¹⁸ In 2010, this energy trade was running at an annual rate of almost \$50 billion between the United States and Canada and at almost \$30 billion between the United States and Mexico.¹⁹

Natural gas is the second-largest component of NAFTA energy trade. Canada is almost solely responsible for bridging the gap between natural gas production and natural gas demand in the United States, providing 90 percent of US imports, or about 16 percent of consumption. US-Canada natural gas trade totaled about \$31 billion in 2008. Likewise, the United States provides about half of Mexico's natural gas imports, or 14 percent of its consumption. Natural gas trade between the United States and Mexico totaled \$694 million in 2008.²⁰

US-Canada electricity trade is also notable. While Canadian imports do not make up a large portion of most US states' electricity portfolios, they comprise a major percentage of total consumption in a few border states. Vermont obtains almost 40 percent of the electricity consumed from Québec, and North Dakota and Minnesota obtain more than 10 percent of electricity consumed from Manitoba. US exports are less significant to Canadian provincial electricity supply; the exception is British Columbia, which gets almost 10 percent of its electricity supply from American states. While Mexico lacks sufficient electricity interconnections with the United States (only Baja California and California are connected), its wind and solar resources are a potentially significant source of electricity for both the Mexican and US markets.

18. Energy Information Administration, US Crude Oil Imports by Country of Origin, <http://eia.doe.gov> (accessed on June 14, 2011).

19. US International Trade Commission Dataweb, www.usitc.gov.

20. Energy Information Administration, Summary of US Natural Gas Imports, 2007–2008, available at <http://eia.doe.gov> (accessed on July 9, 2011).

In addition, the North American countries share a common interest in minimizing distortions for North American trade and investment. As noted above, US congressional draftsmen have included border adjustments in virtually all climate change legislation. While such provisions seem aimed at China and other Asian countries, they actually could have a more significant impact on trade from Canada and Mexico. Canada is the largest supplier by far of energy-intensive manufactures to the United States, including steel (20 percent of US imports), cement (53 percent of US imports), paper (52 percent of US imports), and aluminum (55 percent of US imports). Canadian exports of these four products, plus chemicals, totaled \$17 billion in 2009.²¹ As a result, both countries are justifiably concerned about maintaining a level North American playing field for energy-intensive manufacturing. Decisions that affect energy production or consumption in one country will have significant spillover effects throughout the region.

In addition to minimizing adverse competitiveness impacts within North America, North American energy-related firms need to stay ahead of global competition. As the Canadian Council of Chief Executives (2010) points out, China has become a world leader in global green technology investment, and South Korea has announced that it will invest 1 percent of GDP in clean technology over five years. Arguing that “long-term energy innovation will be fundamental to enhancing Canada’s global brand” (Canadian Council of Chief Executives 2010, 48), the council has pleaded for an integrated North American energy and environmental strategy to spur this investment. Industry support for such policies has not been as widespread in the United States, but key voices have echoed the council’s call. In a January 2011 op-ed, the CEO of General Electric called clean energy one of the “areas where America can lead.”²² In a speech that cited increasing competition for energy resources from countries such as China, Exxon CEO Rex Tillerson called in 2009 for a revenue-neutral carbon tax.²³ Various firms, including PG&E, Duke Energy, Dow Chemical, and Caterpillar, endorsed an economy-wide price on carbon in 2009 (USCAP 2009). Mexico’s oil company, PEMEX, has also tried to move ahead of the global cap-and-trade curve with an internal initiative to achieve modest emissions reductions.

Finally, North American countries all require a livable climate—and thus share an interest in reinforcing global climate negotiations. Climate change mitigation remains a global collective action problem. North America emits only a fifth of the world’s greenhouse gas emissions—and the rest of the world’s emissions are growing far faster than North America’s. Whereas North

21. Ibid.

22. Jeffrey Immelt, “A Blueprint for Keeping America Competitive,” *Washington Post*, January 21, 2011.

23. Rex Tillerson, Strengthening Global Energy Security, speech at the Woodrow Wilson Center, Washington, DC, January 8, 2009.

American emissions on the whole increased by 17 percent between 1990 and 2005, total world emissions increased 26 percent.²⁴ These data clearly show that North America alone cannot mitigate climate change.

Near-term prospects for a fully comprehensive global accord are not bright. In the absence of a binding global agreement, regional cooperation on climate change issues assumes greater importance and could eventually help pave the way for stronger multilateral cooperation. Indeed, the text negotiated at the 16th Conference of the Parties (COP-16) meeting of the UN Framework Convention on Climate Change (UNFCCC) in Cancún in December 2010 calls for bilateral and regional cooperation on climate financing and REDD to supplement the financial provisions negotiated within the UNFCCC. North America is one of the most important regions of the world in climate terms, containing as it does 3 of the top 15 greenhouse gas emitters in the world—including the second-largest emitter, the United States.²⁵ These countries have already begun to play an active role in international negotiations. Mexico spearheaded a “green fund” proposal for international climate financing during the run-up to the 2009 Copenhagen talks, and it hosted the sequel to the Copenhagen session in Cancún in late 2010. US negotiators, meanwhile, offered \$100 billion in climate finance from developed countries in return for commitments to climate action from key developing countries.

As a consequence, cooperation on climate change within the North American region could set a meaningful precedent for North-South cooperation globally. To the extent that North American cooperation can serve as a model for the multilateral stage, it could have benefits that extend much farther than North American emissions alone.

Plan of the Book

This book assesses both the challenges facing the three NAFTA partners in reducing GHG emissions and the implications of climate initiatives in each country for North American economic integration. In separate chapters, we examine climate change policies in the United States, Canada, and Mexico, and then assess what needs to be done to coordinate or integrate state, provincial, and national climate programs both bilaterally and regionally. While climate change laws and regulations pose the risk of new frictions in North American trade and investment, they also create incentives for cooperation through new bilateral and regional initiatives. The study therefore concludes with recommendations on how the three countries can better use NAFTA to advance their national environmental objectives.

24. World Resources Institute, Climate Access Indicators Tool, 2010, <http://cait.wri.org>.

25. *Ibid.*