

ENVIRONMENTAL POLICY  
NEW DIRECTIONS FOR THE  
TWENTY-FIRST CENTURY

8th Edition

Edited by

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*To Carol and Sandy,  
For their love and support*



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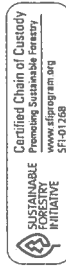
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supporting the development of technologies that help reduce GHG emissions into the atmosphere. Adaptation efforts seek to improve the ability of human societies (broadly) and local communities (more specifically) to adjust to the many challenges of a changing climate (for example, to alter agricultural practices in response to seasonal and precipitation changes, or to prepare urban areas located in coastal areas for rising sea levels and changes in severe weather occurrences).

This chapter explores climate change politics and policymaking across global, regional, national, and local governance levels. As countries worldwide struggle to formulate meaningful mitigation and adaptation policies, more aggressive political action from intergovernmental forums to local communities and individuals is necessary to meet the challenges posed by climate change causes and impacts. The next section briefly discusses the history of climate change science and the Intergovernmental Panel on Climate Change (IPCC). This is followed by an outline of the global political framework on climate change that has developed in conjunction with the IPCC assessments, the 1992 UN Framework Convention on Climate Change (UNFCCC), the 1997 Kyoto Protocol, and the 2009 Copenhagen Accord. Next, three important aspects of climate change politics are addressed: (1) EU leadership and policy responses, (2) U.S. federal and subnational climate change policymaking, and (3) challenges facing developing countries. The chapter ends with a few remarks about the future of climate change policy.

## Climate Change Science, GHG Emissions, and the IPCC

Energy from the sun reaches Earth in the form of visible light, penetrating the atmosphere. Some of this energy is absorbed by clouds and Earth's atmosphere, while some is radiated back into space by clouds and the Earth's surface in the form of long-wave infrared radiation. Naturally occurring gases in the lower atmosphere trap some of this outgoing infrared radiation in the form of heat, in what has been termed the greenhouse effect. GHGs have been present in the atmosphere for much of Earth's 4.5 billion year history; without them, the planet would have average surface temperatures of approximately  $-20^{\circ}\text{C}$  ( $0^{\circ}\text{Fahrenheit}$ ). The amount of solar energy that remains trapped in the atmosphere by GHGs has important long-term effects on the climate.

Current global climate changes are different from earlier alterations between warmer and cooler eras in that critical changes are driven by human behavior. Human activities influence both the amount of incoming energy absorbed by the Earth's surface (through land use changes including deforestation) and the amount of energy trapped by GHGs (largely by releasing  $\text{CO}_2$  into the atmosphere through the burning of fossil fuels). Since the beginning of the industrial revolution in the early nineteenth century, human activities have dramatically altered the composition of GHGs in the lower atmosphere by adding to the volume of naturally occurring gases (for example,  $\text{CO}_2$  and methane) as well as by releasing human-made

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### Global Climate Change Beyond Kyoto

*Henrik Selin and Stacy D. VanDeveer*

Climate change issues and policy debates are truly global as environmental impacts and environmental politics are visible worldwide. In the Arctic, indigenous peoples struggle to sustain their economic and cultural lives, polar bears fight to stay alive, and melting sea ice opens up new sea lanes for oil tankers and warships. In coastal areas and low-lying islands around the world—from Louisiana to Bangladesh and across the Caribbean and South Pacific—people worry about the consequences of sea level rise and intensifying storm surges. Farmers in already dry areas from Texas to Tanzania grow more anxious about increasing droughts and water shortages. The list of such concerns is long—and it is growing. In response, people participate in climate change politics in boardrooms, churches, schools, campuses and public offices from city governments to the United Nations (UN), where UN Secretary-General Ban Ki-moon declared climate change “the defining issue of our time.”<sup>1</sup>

Global climate change governance is filled with irony and paradox. While the U.S. federal government spends more money funding climate change research than any other public authority in the world, it has been among the least receptive to scientific conclusions about the severity of climate change and the importance of taking political action. During the Kyoto Protocol negotiations, many of the policy ideas about how best to address climate change were proposed by the United States and opposed by the European Union (EU). Yet, in the decade following the adoption of the Kyoto Protocol in 1997, which included many specific policies for reducing greenhouse gas (GHG) emissions put forward by the United States, it was the EU and not the United States that enacted, experimented with, and refined these policies.<sup>2</sup> Such EU efforts include the world's first and largest multilateral emissions trading scheme for carbon dioxide ( $\text{CO}_2$ ) and a suite of other measures to increase energy efficiency and renewable energy generation and decrease GHG emissions.

Climate change politics and policymaking focus on both mitigation and adaptation issues. Mitigation efforts center on ways to reduce GHG emissions. Most anthropogenic (human-caused) GHG emissions come from the burning of fossil fuels and from deforestation and other land use changes. Many of the current mitigation policies focus on switching to less carbon-intensive energy sources (including wind, solar, and hydro power); improving energy efficiency for vehicles, buildings, and appliances; and

GHGs (for example, hydrofluorocarbons, or HFCs). Also, different GHGs trap varying amounts of energy, which means that small amounts of some GHGs (like methane or HFCs) can have relatively large warming effects.

There are enormous differences in national and per capita GHG emissions (see Table 12-1). In 2007, a mere nineteen countries were responsible for over 70 percent of global CO<sub>2</sub> emissions from fossil fuel use and cement production (two heavily carbon-intensive activities). China recently surpassed the United States as the world's largest annual CO<sub>2</sub> emitter, due to rapid industrialization based on fossil fuels, including substantial amounts of coal (see Chapter 14). However, in per capita emissions, the United States still ranks much higher than China—19.4 metric tons versus 5.1 metric tons. There are also significant differences in industrialized countries' per capita emissions, despite their similarly high standards of living. For example, the fifteen EU member states (EU-15) that accepted a collective goal under the Kyoto Protocol (discussed later) have per capita emissions that are less than half those of the United States. This demonstrates that countries' emissions levels are not simply a product of their relative wealth, but are shaped by a multitude of political, economic, geographic, cultural, and technical factors.

Researchers working across academic disciplines for over 150 years have contributed to our current—and still developing—understanding of the global climate system.<sup>3</sup> The British researcher John Tyndall, as early as 1859, formulated a theory of how CO<sub>2</sub> and other gases in the atmosphere keep Earth from freezing, arguing that Earth's temperature is maintained at a higher level with CO<sub>2</sub> than without CO<sub>2</sub>. In 1869, the Swedish scientist Svante Arrhenius explored what could happen to the climate if atmospheric CO<sub>2</sub> concentrations increased, but he did not predict actual, significant

changes. In 1938, however, the British engineer Guy Stewart Callendar proposed (to the Royal Meteorological Society) that human CO<sub>2</sub> emissions were changing the climate. Furthermore, Gilbert Plass, an American scientist, in 1956 calculated that adding CO<sub>2</sub> to the atmosphere would have significant heat-trapping effects.

Climate change science advanced when Charles David Keeling at the Mauna Loa Observatory in Hawaii began measuring CO<sub>2</sub> concentrations in open air in 1960. Before industrialization, atmospheric CO<sub>2</sub> concentrations were approximately 280 parts per million by volume (ppmv). Ice core data show that historical concentrations were relatively stable for at least several hundreds of thousands of years prior to the industrial revolution. Atmospheric CO<sub>2</sub> concentrations were approximately 390 ppmv in early 2010s (far exceeding historical data), and they are growing at a rate of about 2 to 4 ppmv per year. While other GHGs besides CO<sub>2</sub> add to the warming trend, other kinds of emissions (mostly sulfate aerosols) have a cooling effect in that they repel incoming sunlight. This cooling effect is estimated to roughly cancel out the warming effect of the GHGs in addition to CO<sub>2</sub>, but this warming-cooling balance may change in the future as there are increases and decreases in specific kinds of emissions.<sup>4</sup> Most scientists agree that experimenting with the earth's climate system in these ways poses significant ecological and humanitarian risks.

Until the 1980s, scientific work on global climate change was carried out across disciplines and research groups, with little effort or ability to bring it together in a systematic fashion. In fact, it was not until the IPCC was established in 1988 by the World Meteorological Organization and the UN Environment Programme that a concerted effort to expand research collaboration and synthesize scientific data existed. Through IPCC activities, thousands of climate change scientists and experts from most of the world's countries work together, tasked with assessing and summarizing the latest scientific, technical, and socioeconomic data on climate change and publishing the findings in periodic reports presented to international organizations and national governments around the world. In this respect, the IPCC was created to inform policymaking, but not to formulate policy.

The IPCC has produced four sets of assessment reports, released in 1990, 1995, 2001, and 2007.<sup>5</sup> The first report stated that although much data indicated that human activity affected the variability of the climate system, the authors could not reach consensus. Signaling a higher degree of consensus, the 1995 report stated that the “balance of evidence” suggested “a discernable human influence on the climate.” The report also noted that regional climatic changes were beginning to influence many physical, biological and social systems. The 2001 report confirmed that global average surface temperatures had increased by 0.6°C over the past century, with a margin of error range of 0.2°C. The 2007 report concluded, with at least 90 percent certainty, that most of the warming over the previous fifty years has been caused by GHG emissions attributable to a wide range of human activities (rather than natural variations). The report forecasted that by 2100, a 0.8–4.0°C rise in average surface temperatures is anticipated based on a range of GHG emissions scenarios.

**Table 12-1** Top Eight Global Emitters of GHG Emissions (Excluding Land Use Change) in 2007

Country/Region	Percentage Share of Global Emissions	Metric Tons per Capita (Global Ranking)
China	22.7	5.1 (66)
United States	19.7	19.3 (7)
EU-27	13.8	8.2 (39)
Russian Federation	5.5	11.4 (18)
India	4.8	1.3 (122)
Japan	4.3	9.9 (25)
Germany	2.8	9.9 (26)
Canada	2.0	17.7 (9)

Source: World Resources Institute, The Climate Analysis Indicator Tool (CAIT) on-line data base (<http://cait.wri.org>). Note: Germany's emissions are also included in the total for EU-27.

The most recent IPCC report projected that future changes could be expected to include changes in precipitation patterns and amounts, rising sea levels, and changes in the frequency and intensity of extreme weather events. If these projections are correct, the changes would have a significant impact on ecological systems and human societies around the world, not least in the Arctic where annual average temperatures have increased much more than in most other parts of the world, impacting both wildlife and human societies.<sup>6</sup> The IPCC, however, has also come under criticism. A few claims in the reports later turned out to be based on inconclusive or incorrect information. While this has led some critics of climate change science and policy to question the integrity of the IPCC process, the vast majority of climate change scientists from around the world have spoken out in support of the IPCC reports and their main conclusions. The fifth IPCC assessment is due to be released in 2013 and 2014, following several years of work by thousands of scientists around the world. If earlier reports are any guide, the next report will engender substantial debate.

Specifically, IPCC reports assessing a host of scientific and socioeconomic issues are intended to gather and present policy relevant information for national policymakers. They are also widely reviewed and cited by people in international organizations, local governments, large and small firms, environmental advocacy groups, and many more. The reports include a set of different emissions scenarios (so-called SRES scenarios) that project possible GHG emissions levels decades into the future, based on a different set of assumptions about future levels of economic growth and the choices made by governments and citizens that affect the generation of GHG emissions. These scenarios are designed to help decision makers and planners think about how climate change may impact societies and the implications for projects such as the building of a new sewage treatment system in a coastal area affected by sea level rise or the design of new water policies in a drought-stricken region. Such scenarios make it clear that all countries face a host of adaptation challenges, even if these vary tremendously across societies.

### International Law and Climate Change

Law and policy regarding global climate change are shaped by a complex mix of evolving scientific consensus and the material interests and values of state, nongovernmental, and private sector actors. There are two major multilateral treaties (as well as a growing number of other kinds of policy responses): the 1992 UN Framework Convention on Climate Change and the 1997 Kyoto Protocol. The UNFCCC was negotiated between the publication of the first IPCC report and the 1992 UN Conference on Environment and Development in Rio de Janeiro, where it was adopted. It entered into force in 1994 and, by 2011, 194 countries and the EU had ratified the treaty. As a framework convention, the UNFCCC sets out a broad strategy for countries to work jointly to address climate change.

Like other framework conventions, the UNFCCC defines the issue at hand, sets up an administrative secretariat to oversee treaty activities, and lays out a legal and political framework under which states cooperate over time. The UNFCCC contains shared commitments by states to continue to research climate change, to periodically report their findings and relevant domestic implementation activities, and to meet regularly to discuss common issues at Conferences of the Parties (COPs). Usually framework conventions do not include detailed commitments for mitigation or adaptation, leaving those issues to be addressed in subsequent protocols. Similar approaches using the framework convention-protocol model have been applied to environmental issues such as protection of the stratospheric ozone layer, acid rain and related transboundary air pollution problems, and biodiversity loss.

The UNFCCC defines climate change as “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods” (Article 1). Similarly, adverse effects of climate change are identified as “changes in the physical environment or biota resulting from climate change which has significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems, or on the operation of socioeconomic systems, or on human health and welfare” (Article 1). To avoid adverse effects of climate change, the UNFCCC set the long-term objective of “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system” (Article 2).

The UNFCCC establishes that the world’s countries have “common but differentiated responsibilities” in addressing climate change (Article 3). This principle refers to the notion that all countries share an obligation to act, but industrialized countries have a particular responsibility to take the lead in reducing GHG emissions because of their relative wealth and contribution to the problem through historical emissions. To this end, industrialized countries and countries with economies in transitions (that is, former communist countries) plus the European Economic Community (now the EU) are listed in Annex I. This Annex has been modified since the UNFCCC was adopted and currently lists forty countries and the EU.<sup>7</sup> The UNFCCC states (in Article 4) that Annex I countries should work to reduce their anthropogenic emissions to 1990 levels, but no clear national deadlines were set for this target. The UNFCCC did not assign non-Annex I countries (that is, developing countries) any GHG reduction commitments.

Responding to mounting scientific evidence about human-induced climate change, much of it presented in the second IPCC report, and to growing concern about negative economic and social effects of climate change among environmental advocates and policymakers, the UNFCCC parties negotiated the Kyoto Protocol between 1995 and 1997. The final stage of the protocol negotiations was contentious on a number of issues. In particular, U.S. and

European negotiators differed on both the targets for emissions cuts that should be included in the agreement and the policy mechanisms that should be allowed or recommended for parties to reach their GHG reduction targets. Only as a result of last-minute compromises by a number of participants, brokered in part by an intervention by the then U.S. Vice President Al Gore, did the parties agree on a final text.

The Kyoto Protocol regulates six GHGs: CO<sub>2</sub>, methane, nitrous oxide, perfluorocarbons, HFCs, and sulfur hexafluoride. UNFCCC Annex I countries commit to collectively reduce their GHG emissions by 5.2 percent below 1990 levels by 2008–2012. Toward this goal, thirty-nine states on the UNFCCC Annex I list have individual targets. Some agreed to cut their emissions, while others merely consented to slow the growth in their emissions. For example, the EU-15 took on a collective target of an 8 percent reduction while the United States and Canada committed to cuts of 7 percent and 6 percent, respectively. In contrast, Iceland committed to limit its emissions at 10 percent above 1990 levels. Post-communist countries, such as Russia and those in Central and Eastern Europe, agreed to cuts from 1990 levels, but many of these cuts were achieved by the economic restructuring that followed the end of their communist political and economic systems.

The Kyoto Protocol outlines five ways that countries with reduction commitments may meet their targets. Countries may (1) develop national policies that lower domestic GHG emissions (the Kyoto Protocol does not restrict or mandate any particular domestic policy); (2) calculate benefits from domestic carbon sinks (for example, forests) that soak up more carbon than they emit, and count these toward national emissions reductions; (3) participate in transnational emissions trading schemes with other Annex I parties (that is, Annex I countries can create markets in which actors can buy and sell emissions permits); (4) develop joint implementation programs with other Annex I parties and get credit for lowering GHG emissions in those countries; and (5) design a partnership venture with a non-Annex I country through what is known as the Clean Development Mechanism (CDM) and get credit for lowering GHG emissions in the partner country.

The latter three options—international allowance trading, joint implementation programs, and the CDM—were intended to provide flexibility and reduce the costs of complying with the Kyoto commitments by allowing various actors to reduce emissions wherever (and however) it was most efficient, including in other countries. UNFCCC parties and observers hoped that these implementation mechanisms would help policymakers and private sector actors learn lessons about how best to reduce emissions over time in an affordable manner—in ways that would drive international investments between countries at various levels of economic development. The many rules, guidelines, and administrative procedures required to operate these mechanisms have been hammered out in negotiations between the parties since the adoption of the Kyoto Protocol. The UNFCCC parties confirm these rules and procedures at their annual COPs.

The Kyoto Protocol had been ratified by 191 countries and the EU as of mid-2011. The United States is the only major country that refused to ratify. The Kyoto Protocol's first commitment period setting only modest reduction targets expires in 2012. Because it takes years to negotiate and ratify treaties, UNFCCC parties began talking in the mid-2000s about what a follow-up agreement to the Kyoto Protocol should include.<sup>8</sup> Debates about what should come after Kyoto are also commonplace among scholars, environmental advocacy groups, and private sector actors. At a conference in Bali, Indonesia, in 2007, the UNFCCC parties launched a political process designed to negotiate a follow-up agreement to the Kyoto Protocol. A tentative location and date for adopting the next agreement was set for Copenhagen, Denmark, in 2009. These and subsequent negotiations involve trying to find consensus on a host of major issues on which there are wide range of conflicting views and interests, including the following:

- Targets and timetables: What GHG reduction targets are both aggressive enough to make a real difference to atmospheric GHG concentrations, and politically, economically, and technically feasible?
- National commitments: Which countries can and should take on mandatory GHG emissions reduction commitments, and how should these commitments be formulated?
- Joint mitigation mechanisms: How should international collaboration through institutions like international permit trading, joint implementation programs, and the CDM be developed further?
- Forest issues: Should issues of deforestation and sustainable forest management be linked to climate change mitigation efforts and commitments under the new treaty? If so, how?
- Addressing adaptation: What should the treaty say about challenges associated with adapting to environmental and social impacts of climate change, and should it stipulate specific adaptation commitments?
- Financing and capacity building: How should international efforts support capacity building around the world, including financing and technology transfer to developing countries?
- Information and assessment: How should international cooperation generate and utilize data about environmental changes, the effects of specific policy measures, and calculations of economic costs and benefits?

In Copenhagen, national leaders were unable to reach consensus on a legally binding treaty—indeed they did not even agree on whether they should attempt to negotiate a new treaty. Instead, leading countries (and emitters) settled on the “Copenhagen Accord,” under which industrialized and developing countries formulate their own voluntary GHG reduction targets for 2020 and announce them within the UNFCCC institutions. By 2011, 113 countries and the EU had agreed to the Copenhagen Accord, which sets the goal that average global temperature increases should remain below 2 degrees Celsius (related to the goal to prevent dangerous anthropogenic interference with the



climate system, as stated in the UNFCCC). Scientists linking atmospheric GHG levels with temperatures believe that this requires stabilizing atmospheric GHG concentrations below 550 ppmv (and preferably closer to 450 ppmv). To achieve this, global GHG emissions can continue to increase only until around 2020 (and then must be brought down close to pre-industrial levels). This seems unlikely even if all reduction targets reported under the Copenhagen Accord are actually met, which should not be assumed.

In addition, the Copenhagen Accord notes that industrialized countries will try to mobilize \$30 billion from 2010 to 2020, with the goal of reaching \$100 billion a year by 2020, to support mitigation and adaptation projects in developing countries. The Copenhagen negotiations established a Green Climate Fund, confirmed by the UNFCCC parties a year later at the 2010 COP in Cancun, Mexico. The fund is designed to operate alongside other funding mechanisms, including the Global Environment Facility and projects supported by the World Bank. It is unclear, however, exactly which public and private sector sources these funds will come from and many donor countries—including the United States—have been slow to contribute. Discussions continue about which countries and projects would be eligible for support. In fact, global climate change politics contain many more unsettled issues, given that after the 2009 Copenhagen Summit the negotiating progress on the seven outstanding issues (bulleted above) remains limited, as again made clear at the 2011 UNFCCC COP in Durban, South Africa.

### EU Leadership and European Policy Responses

Since the 1990s, the EU has emerged as a global leader in climate change politics and policymaking.<sup>9</sup> Even as the EU grew from fifteen members in the mid-1990s to twenty-seven members during the latest enlargement in 2007, EU institutions such as the European Commission (the administrative bureaucracy), the Council of the European Union (member state government officials), and the European Parliament (representatives elected by member state citizens) collaborated with each other and with civil society and private sector actors to implement a set of pan-European climate change and energy-related policies and goals. The European Commission puts forward legislative proposals that are negotiated with, and adopted or rejected by, the Council of the European Union and the European Parliament. The population of EU-27 is almost 500 million, which means that roughly one in fourteen of the world's people live in the EU. Furthermore, twenty-five of the forty UNFCCC Annex I countries are EU members.<sup>10</sup>

EU climate change action began in earnest during the 1990s. The EU-15 collective Kyoto target (8 percent below 1990 GHG emission levels by 2012) was divided among member states under a 1998 burden-sharing agreement. Intended to facilitate decision making and implementation, the EU-15, assisted by the European Commission, devised differentiated reduction targets for each country based on the burden-sharing concept.<sup>11</sup> Member states divided the joint Kyoto commitments amongst themselves. Under this

agreement, several member states, including Luxembourg (-28 percent), Denmark (-21 percent), Germany (-21 percent), and the United Kingdom (-12.5 percent), took on relatively far-reaching commitments, while less wealthy member states such as Portugal (+27 percent), Greece (+25 percent) and Spain (+15 percent) could increase their GHG emissions in the period up to 2012, as part of these countries' efforts to expand industrial production and accelerate economic growth.

The desire to meet the Kyoto target served as an important impetus for EU policymakers to develop a growing number of joint policies and initiatives. For example, in 2007 EU political leaders endorsed the so-called 20-20-20 by 2020 goals. These policy goals, all of which have a 2020 deadline, refer to a 20 percent reduction in GHGs below 1990 levels, 20 percent of the total energy consumption coming from renewable sources, and a 20 percent reduction in primary energy use compared with projected trends. EU policy also states a willingness to increase the Union's GHG reduction target to 30 percent by 2020, if other industrialized countries do the same. These goals—20 percent GHG reductions by 2020 with a willingness to go higher if others do—were also submitted to the UNFCCC Secretariat as the EU's stated goals under the Copenhagen Accord. The EU's 20-20-20 goals were contained in a major climate and energy package of policies enacted in 2009. This suite of policies also uses a burden-sharing approach of setting differentiated national targets for GHG emission reductions from sources not covered by the trading scheme and for the expansion of renewable energy use.

Receiving much attention is the EU's Emissions Trading Scheme (ETS), a main policy instrument for meeting the Kyoto target, as well as policy goals for 2020 and beyond. This is the world's first international GHG trading scheme. Ironically, the EU was opposed to GHG emissions trading during the Kyoto negotiations—an issue championed by the United States, which drew on its domestic experience with emissions trading for sulfur dioxide and nitrogen oxide. The European Commission and several member states had attempted to enact an EU-wide carbon tax in the late 1990s. This effort failed when member states could not agree on a common tax. In the face of this policy failure and the need to meet its Kyoto target, the EU developed the ETS.<sup>12</sup> The first phase of the ETS operated between 2005 and 2007, with a second trading period operating from 2008 to 2012, and a third beginning in 2013.

The EU ETS initially covered CO<sub>2</sub> emissions from over 11,500 major energy-intensive installations across all twenty-seven member states. Yet most installations are located in larger member states, with Germany having over 21.8 percent of all ETS allowances. The United Kingdom is second, with 11.8 percent of allowances.<sup>13</sup> During the first trading period, the ETS got off to a rough start. All allowances were distributed for free, and several member states allocated too many emissions permits, leading to a collapse of the price of emissions (see Chapter 9). The European Commission and member state representatives have worked to reduce the allocation of permits in the second trading period, and to push member states to auction at least a portion of the



allowances. In the third trading period, the EU will create a tighter regional emissions cap with fixed annual reductions, increase mandatory auctioning of allowances, and expand the number of GHGs and sectors covered by the ETS. The plan to expand the scheme to cover emissions from the airline industry has provoked substantial opposition among U.S. airlines and U.S. federal policymakers.

By 2009, GHG emissions by the EU-15 were 12.7 percent below 1990 levels (influenced by a 7.1 percent decrease between 2008 and 2009 following the economic crisis).<sup>14</sup> There are notable differences in national emissions trends, in part as envisioned under the burden-sharing agreement, ranging from -27 percent (United Kingdom) and -26 percent (Germany) to +25 percent (Portugal) and +30 percent (Spain). Even if national emissions go up again as the economy improves, the EU-15 appears well positioned to meet its Kyoto target of an 8 percent reduction from 1990 levels by 2012, using a wide variety of policy measures. Most states that joined the EU after 1997 have emissions well below their Kyoto targets, largely as the result of reconstruction of old communist economies. Nevertheless, the EU must secure effective implementation of existing instruments—and develop a few new ones—to meet policy goals for 2020 and beyond.

#### U.S. Federal and Subnational Climate Change Policy

In sharp contrast to the EU, the U.S. federal government refused ratification of the Kyoto Protocol. In July 1997, a few months before the Kyoto Protocol was adopted and signed by the Clinton administration (with substantial involvement by Vice President Al Gore), the Senate passed by 95-0, a "Sense of the Senate" resolution put forward by senators Robert Byrd, D-W.Va., and Chuck Hagel, R-Neb. The resolution opposed the draft treaty "because of the disparity of treatment between Annex I Parties and Developing Countries and the level of required emission reductions . . . could result in serious harm to the United States economy, including significant job loss, trade disadvantages, increased energy and consumer costs, or any combination thereof."<sup>15</sup> The Senate thereby rejected the principle of common but differentiated responsibilities—a principle it had accepted earlier in the decade when it ratified the UNFCCC.

While European political leaders made climate change a priority, President George W. Bush (2001-2009) opposed national, mandatory GHG reductions, despite having expressed support for CO<sub>2</sub> regulations during his 2000 presidential campaign.<sup>16</sup> U.S. federal policy under the Bush administration focused instead on voluntary programs and the funding of scientific research and technological development. Yet, the 2007 Energy Independence and Security Act raised the national Corporate Average Fuel Economy (CAFE) standards for vehicles—the first increase in over thirty years. The Obama administration (2009-) has expressed support for regulating GHG emissions and worked within the Executive Branch to change some aspects of federal policy, even as policymakers in the U.S. Congress failed to agree on

significant legal changes to address climate change mitigation or adaptation. The Obama administration has used executive authority to push emissions reduction among federal agencies, has proposed substantially higher automobile CAFE standards, and is leading a large energy efficiency initiative in the Department of Defense. U.S. national GHG emissions increased by 7.3 percent between 1990 and 2009 (following a 6.1 percent drop between 2008 and 2009).<sup>17</sup>

The United States is a laggard in global climate change politics and is often referred to by other countries and advocacy groups as a major obstacle to international policy making progress due to its refusal to undertake mandatory emission cuts. However since the early 2000s, a diverse set of policy responses have developed beneath the federal level. Significant differences exist between GHG emissions trends among the 50 U.S. states, with some states curbing emissions growth while emissions continue to grow rapidly in others. These differences stem from a host of factors, including differential economic and population growth rates, differing energy and environmental policies, diverging transportation needs, substantial variance in the sources of energy used, and large differences in state and local policies. Nevertheless, U.S. state governments play significant roles in developing related energy and environmental policies to address climate change and other sustainable development issues (see Chapter 2).

In part because of federal inaction, the most significant climate change policymaking in the United States since the early 2000s has occurred at state and municipal levels.<sup>18</sup> In the absence of federal leadership, and sometimes motivated by European examples, most U.S. states have taken initiatives beyond federal requirements and adopted numerical targets for short-term and long-term GHG reductions. By 2011, over two-thirds of all U.S. states had formulated individual climate change action plans. Many have taken a host of other actions, including establishing renewable portfolio standards requiring electricity providers to obtain a minimum percentage of their power from renewable sources, formulating ethanol mandates and incentives, setting CO<sub>2</sub> vehicle emissions standards (based on a California initiative), adopting green building standards, mandating the sale of more efficient appliances and electronic equipment, and changing land-use and development policies to curb emissions. Among U.S. states, California's suite of climate change and energy policies, including the planned 2012-13 launch of a cap-and-trade scheme for GHG emissions, make it a national and international leader in such efforts.<sup>19</sup>

U.S. states are also enacting a multitude of collaborative standards and policies on GHGs.<sup>20</sup> In 2000, the Conference of New England Governors (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut) and Eastern Canadian Premiers (Nova Scotia, Newfoundland and Labrador, Prince Edward Island, New Brunswick, and Quebec) adopted a resolution recognizing climate change as a joint concern that affected their environments and economies. Based on this resolution, the governors and premiers in 2001 adopted a Climate Change Action Plan, under which states

and provinces pledged to reduce their GHGs to 1990 levels by 2010 and 10 percent below 1990 levels by 2020. They also agreed to ultimately decrease emissions to levels that do not pose a threat to the climate, which according to an official estimate would require a 75 to 85 percent reduction from 2001 emission levels.

A second major multistate initiative in the Northeast is the Regional Greenhouse Gas Initiative (RGGI), originally proposed in 2003.<sup>21</sup> Beginning in 2009, it creates a cap-and-trade scheme for CO<sub>2</sub> emissions from major power plants in ten participating states: Maryland, Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Delaware. RGGI is designed to stabilize CO<sub>2</sub> emissions from the region's power sector between 2009 and 2015. Between 2015 and 2018, each state's annual CO<sub>2</sub> emissions budget is expected to decline by 2.5 percent per year, achieving a total 10 percent reduction by 2019. While the goals of both regional initiatives in the Northeast are relatively modest, they remain more stringent than federal policy. Many state officials also framed the regional efforts in terms of influencing future federal policy and public and private sector views on climate change, but federal interest in cap-and-trade schemes has waned in recent years.

While the Northeast regional cooperation remains the most well developed to date, RGGI has inspired other initiatives, including the Western Climate Initiative involving U.S. and Mexican states and Canadian provinces exploring joint initiatives on emissions trading and other policy measures. Another initiative involves collaboration among a group of U.S. states and one Canadian province in the Great Lakes region. Furthermore, in 2007 the state-led initiative involving the largest group of states was announced: thirty-one states signed on as charter members of The Climate Registry. The Climate Registry does not mandate GHG reductions but is a collaborative effort to develop a common system for private and public entities to report GHG emissions, allowing officials to measure, verify, and publicly report emissions in a consistent manner. By 2011, membership had increased significantly to include 421 government, corporate and non-profit entities across the United States, Canada and Mexico.

States also initiated legal action against federal authorities. Attorneys General from California, Connecticut, Illinois, Maine, Massachusetts, New Jersey, New Mexico, New York, Oregon, Rhode Island, Vermont, and Washington filed suit in federal court in February 2003, challenging a U.S. Environmental Protection Agency (EPA) decision during the Clinton administration not to classify CO<sub>2</sub> as a vehicle pollutant to be regulated under the Clean Air Act. Numerous state regulatory agencies, city officials, and environmental groups endorsed the suit. In April 2007, the U.S. Supreme Court ruled 5–4 that CO<sub>2</sub> can be classified as a pollutant under the Clean Air Act and that the EPA has the authority to regulate CO<sub>2</sub> emissions from vehicles. The ruling energized those in Congress and elsewhere who are pushing for the adoption of more aggressive national climate change policies.

Supported by leader states, the Obama administration has taken a few steps toward expanding climate change regulations in the absence of congressional action. Various efforts by legislators to pass legislation, including EU ETS and RGGI, and the setting of a national renewable portfolio standard failed to garner the necessary votes in both houses of Congress in 2008 to 2011. Instead, the EPA issued an endangerment finding in 2009 stating that the current and projected atmospheric concentrations of the six greenhouse gases covered by the Kyoto Protocol threaten the public health and welfare of current and future generations. Based on this finding, EPA staff began exploring options for expanding GHG controls through administrative and regulatory means without additional congressional action (though Obama administration officials repeatedly stated they preferred Congress to act). As such, many leader states began efforts seeking to have their early actions recognized by the EPA as consistent with mandates under development by federal authorities.

In addition to the growing number of state initiatives, U.S. municipalities are taking considerable action. By 2011, more than 1,050 mayors from all fifty states, representing almost 90 million Americans, had signed a declaration of meeting or exceeding the reductions negotiated in Kyoto for the United States.<sup>22</sup> Over 260 North American municipalities are members of the International Council for Local Environmental Initiatives and its Cities for Climate Protection program. Although many municipal climate change programs are modest, some have achieved impressive results.<sup>23</sup> American municipalities are also increasingly developing new GHG reduction and energy efficiency programs that rely in part on innovative private financing. Additionally, a growing number of U.S. firms are seeking to voluntarily reduce GHG emissions and are investing in low carbon technology, but it is important to note that a significant number of firms are still taking only limited (if any) action.<sup>24</sup> While firm action continues, it is clear that the dwindling prospect of serious federal legislation to reduce GHG emissions also discourages many corporations from planning investments to reduce future emissions.<sup>25</sup>

One 2007 estimate of CO<sub>2</sub> emissions reductions in U.S. states based on only three sets of policies—energy efficiency mandates, renewable portfolio standards, and impacts of the regional trading schemes under development in the Northeast and along the West Coast—suggests that such actions could cut 1.8 billion tons of CO<sub>2</sub> emissions by 2020.<sup>26</sup> Another estimate suggests that if seventeen of the states and 284 of the cities with explicit GHG reduction targets were to meet their goals by 2020, it would constitute almost 50 percent of the cuts needed for the United States to get back to 1990 emissions levels.<sup>27</sup> Yet many states and municipalities struggle to cut their GHG emissions, and many (perhaps most) are unlikely to meet their self-imposed and relatively modest short-term reduction targets. Nevertheless, important political and technical precedents for future climate change actions are being

set all over the United States even as there continues to be significant public and private sector opposition against mandatory action and controls.

The Republican victories in the 2010 elections at the state and federal levels substantially increased government opposition to climate change and renewable energy policies at both levels of government. This opposition includes efforts in a number of formerly leading states to roll back enacted policies and withdraw from multistate cooperation arrangements. In the U.S. Congress, particularly in the House, such opposition included many attempts to limit EPA's regulatory authority and efforts to restrict executive branch agencies from planning for climate change or developing emissions reduction or adaptation policies (see Chapter 5). Meanwhile, the Obama administration pledged, under the Copenhagen Accord it championed in 2009, to reduce U.S. emissions by about 17 percent by 2020 (from 2005 levels)—goals similar to the climate change legislation that passed the U.S. House before the 2010 elections, but failed to pass the Senate. By early 2012, the president's administration had launched another set of increases in automobile efficiency standards to cover the years 2017 to 2025. If implemented, these policies and others in development at the EPA would have the effect of slowing or reducing some future GHG emissions in the United States. However, it is unlikely that such actions alone (absent congressional action) can meet the president's announced GHG emissions reduction goals under the Copenhagen Accord. The frustration of many climate change policy advocates, including high-profile leaders such as former vice president Al Gore, about the lack of substantial progress on climate change regulations in the first half of Obama's term led some to criticize the president's leadership and his commitment to the issue.<sup>28</sup>

### Challenges Facing Developing Countries

As the international community struggles to address climate change under the UNFCCC and a multitude of associated programs and initiatives, including the Copenhagen Accord, many developing countries face myriad challenging mitigation and adaptation problems, alongside a multitude of other critical sustainable development issues (see Chapter 13). The situation of relatively vulnerable developing countries gives rise to critical procedural and distributive social justice issues, from a global equity perspective.<sup>29</sup> *Procedural justice* refers to the ability to fully partake in collective decision-making processes focusing on mitigation and adaptation issues (including under the UNFCCC), whereas *distributive justice* concerns how climate change impacts or how mitigation policies affect societies and people differently.

For many developing countries, a set of important procedural justice issues relate to how international climate change policy is formulated and how these countries' domestic interests are represented and taken into account. Many governments—and particularly those of smaller developing countries—face multiple problems engaging actively in multilateral environmental negotiations and assessments.<sup>30</sup> These problems include having fewer

human, economic, technical, and scientific resources (compared with leading industrialized countries) with which to prepare for international negotiations or implement resulting agreements. The significant capacity differences between wealthier industrialized countries and poorer developing countries risk skewing international assessments, debates, and decision making in favor of the perspectives and interests of more powerful countries.

The Kyoto Protocol exempted developing countries from mandatory GHG reductions based on the principle of common but differentiated responsibilities. This, however, has become highly controversial. In particular, major industrializing countries such as China, India, South Korea, Mexico, and Brazil are coming under increasing political pressure from industrialized countries to accept some GHG restrictions. While industrialized countries and countries with economies in transition may continue to set GHG reduction targets in national, annual, absolute terms, some analysts and policymakers argue that the developing countries taking action might be better served by a system based on per capita income or per capita emissions. Such a system might be more equitable and plausible for gradually expanding international participation and for strengthening commitments over time.<sup>31</sup> The Copenhagen Accord affords countries the opportunity to volunteer commitments in whatever metrics they choose, but such diversity of goals and metrics is likely to prove difficult to both monitor and implement. For example, China pledged by 2020 to reduce CO<sub>2</sub> emissions per unit of GDP by 40–45 percent from 2005 levels and to increase renewable energy generation and forest cover. Most other large developing country emitters (including Brazil, India, Indonesia, Mexico, South Africa and many others) pledged to reduce GHG emissions growth by some percentage compared to business-as-usual estimates of future emissions growth. In all cases, emissions are predicted to continue to grow and measuring compliance with such pledges is fraught with uncertainty.

On distributive justice issues, the UNFCCC recognizes that some countries are “particularly vulnerable” to adverse effects of climate change (UNFCCC Preamble). Such countries include “low-lying and other small island countries, countries with low-lying coastal, arid and semi-arid areas or areas liable to floods, drought and desertification, and developing countries with fragile mountainous ecosystems.” Many of the most harmful effects of a warming climate will take place in developing countries, which have historically contributed least to global GHG emissions. For example, countries in Southeast Asia with vast and densely populated low-lying coastal areas, including Bangladesh and India, will experience many of the first impacts of sea level rise and increased storm intensity. Changes in seasons and precipitation present a more acute threat to millions of poor, small-scale farmers in Africa and other tropical countries than they do to those in rich countries.

Developing countries typically have fewer resources to adapt to a changing climate than industrialized countries, which raises important concerns about both inter- and intra-generational equity in prioritizing the vulnerabilities of those who are most exposed.<sup>32</sup> For example, the Netherlands stands a

much better chance of managing sea level rise than does Bangladesh, merely as a result of its greater wealth. Similarly, European and North American countries are likely better equipped (materially and institutionally) to adjust agricultural practices than are sub-Saharan African countries. Many similar issues can be extended to indigenous populations who are often among the most vulnerable in any society. For example, Arctic indigenous peoples are among the first to grapple with impacts of climate change resulting from activities not of their making.<sup>33</sup>

Simply put, adaptation to ongoing and accelerating climate change requires the investment of additional resources. Annex II of the UNFCCC currently lists twenty-three countries and the EU as committed to providing "new and additional financial resources" to developing countries for addressing climate change issues (Article 4).<sup>34</sup> Helping particularly vulnerable countries and local communities that face significant challenges as a result of climate change should be a priority for the international community, but funding needs and requests have greatly outnumbered the amount of financial resources made available by UNFCCC Annex II countries and international organizations. As such, funding for adaptation has become a major issue in international political and economic forums, and many developing countries will pay close attention to what happens with the Green Climate Fund in the years to come.

### Where Do We Go from Here?

Climate change policy is developing across global, regional, national, and local governance levels. Both industrialized and developing countries face fundamental mitigation and adaptation challenges—the world's countries do not face the same challenges, but climate change affects all countries in many ways. While some opponents of climate change action believe that short-term mitigation costs are too high, a growing number of analysts and policymakers argue that early action is less costly for societies than is coping with severe climatic changes in the future (see also Chapter 9).<sup>35</sup> As global emissions continue to rise, the challenge of finding ways to significantly reduce GHG emissions—by upwards of 80–90 percent by 2050 as often stated—while simultaneously tackling poverty and promoting sustainable economic and social development cannot be overstated (see Chapters 13, 14, and 15). Certainly the Copenhagen Accord has yet to produce commitments large enough to meet these challenges in the short or the long term, and many analysts remain skeptical about the prospects for implementation and compliance for even the quite modest commitments made to date. Even if the global climate change negotiations were to produce a broader and stronger agreement, climate change politics and policymaking will continue to evolve for decades to come.

Effective climate change governance requires broad, but not universal, participation. To advance global policy, major emitters such as the United States, the EU, China, India, and a handful of other large and rapidly growing

developing countries must reach greater agreement on how to develop domestic mitigation and adaptation policies. The climate change agenda cannot be advanced sufficiently without the support of leading industrialized and developing countries. The principle of "common but differentiated responsibilities" embedded in the UNFCCC suggests that developing countries are likely to need different goals from those of developed economies, but the realities of GHG emissions necessitate that all large- and medium-sized national emitters must curb their emissions if the most catastrophically high levels of warming are to be avoided. To date, much focus has been on past and current contributions of industrialized countries and their responsibilities to lead. While this remains important, countries traditionally classified as developing account for almost 60 percent of global annual emissions. This raises important, politically difficult, and ethically sensitive issues about the changing roles of countries like Brazil, China, and India. At the same time, the world's poorest countries and peoples face growing climate-related risks.

The way of formulating global climate change action through the UNFCCC and its associated mechanisms has been criticized for not being flexible enough to promote the scale and scope of changes needed to significantly cut GHG emissions within relevant time frames.<sup>36</sup> Also, a growing number of international and domestic forums exist in which many actors are involved in standard setting and the creation of new governance mechanisms, opportunities, and challenges.<sup>37</sup> Furthermore, ongoing debates continue about the need for internationally mandated GHG reductions (as exemplified by the Kyoto Protocol) or more voluntary approaches (as initiated through the Copenhagen Accord and other recent initiatives). Which are more conducive to progress toward emissions reductions and adaptations? Such debates will shape the future of international and domestic policymaking and implementation.

International politics and national and local governments are central to addressing major climate change mitigation and adaptation challenges, but market institutions also are significant and large and small firms are critical players in their roles as investors, polluters, innovators, experts, manufacturers, lobbyists, and employers.<sup>38</sup> The scientific debate about the reality of human-induced climate change is generally settled, but significant disagreements remain among private sector actors, and across local, national, and international governance scales about allocation of costs and responsibilities for cutting GHG emissions and switching to cleaner technology. Yet major political and social changes—such as the drive for low-carbon economies and lifestyles—also create business opportunities. Multilevel political and societal actions are required, but individuals' actions as consumers and citizens are needed, as well. If the challenges posed by climate change are to be met, we must all take responsibility for our impact on the global climate system, using and expanding our influence over our own behavior and in our governments, the private sector and our local communities.

## Suggested Websites

Center for Climate and Energy Solutions ([www.c2es.org](http://www.c2es.org)) Offers information about international and U.S. climate change policymaking and private sector action.

Climate Ark ([www.climateark.org](http://www.climateark.org)) A portal, search engine, and news feed covering climate change issues.

Dot Earth (<http://dotearth.blogs.nytimes.com>) Blog run by *New York Times* reporter Andrew C. Revkin; focuses on climate change science and policy issues.

European Union ([http://ec.europa.eu/environment/climat/home\\_en.htm](http://ec.europa.eu/environment/climat/home_en.htm)) Provides information about European perspectives and policy initiatives to address climate change.

Intergovernmental Panel on Climate Change ([www.ipcc.ch](http://www.ipcc.ch)) Panel of international experts conducting periodical assessments of scientific and socioeconomic information about climate change.

Real Climate ([www.realclimate.org](http://www.realclimate.org)) Provides commentaries on climate change science news by scientists working in different fields.

UN Framework Convention on Climate Change (<http://unfccc.int>) Website operated by the UNFCCC Secretariat; contains information about meetings and other activities organized under the UNFCCC.

U.S. Environmental Protection Agency ([www.epa.gov/climatechange](http://www.epa.gov/climatechange)) Provides information about climate change science, U.S. policy, and what people can do to lower their personal GHG emissions.

## Notes

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