



# A Record of Leadership

How Northeastern States are Cutting Global Warming Pollution and Building a Clean Economy



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Environment Maine  
Research & Policy Center

Rob Kerth, Frontier Group

Rob Sargent,  
Environment America  
Research & Policy Center

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# Executive Summary

Over the last decade, northeastern states have built a track record of successful action to reduce global warming pollution. By working together across state lines and partisan divides—and developing innovative new policies to hasten the transition to a clean energy economy—the Northeast has succeeded in cutting emissions while safeguarding the region’s economic health.

**Between 2000 and 2009, the 10 northeastern states<sup>1</sup> that participate in the Regional Greenhouse Gas Initiative (RGGI) cut per capita carbon dioxide emissions 20 percent faster than the rest of the nation—even as the region’s gross product per capita grew 87 percent faster than the rest of the United States.**

The region is on pace to achieve the ambitious emission reduction goals set over the last decade. Much more remains to be done to protect the region from the impacts of global warming, but the experience of the past decade provides hope that smart policies and an ethic of cooperation can result in a rapid reduction in global warming pollution even as the region’s economy continues to grow.

**Northeastern states have been pioneers in the effort to reduce fossil fuel pollution, leading the way in demonstrating effective policies to promote a clean energy economy and reduce emissions.**

- *Emission reduction goals:* The New England Governors/Eastern Canadian Premiers Climate Change Action Plan, adopted in 2001, set the first regional emission reduction target in the United States and was the first international, multi-jurisdictional agreement reached anywhere in the world. Outside New England, New Jersey and Maryland adopted enforceable caps on global warming pollution within their states, joining Massachusetts and Connecticut in doing so.
- *Cleaning up power plants:* Massachusetts was the first state in the nation to set mandatory limits on global warming pollution from power plants, in 2001, eventually leading to creation of the Regional Greenhouse Gas Initiative (RGGI), the nation’s first global warming cap-and-trade program.

RGGI's innovative auction of carbon dioxide emission allowances was the largest in the world when it began in 2008 and has funded clean energy programs that will curb global warming pollution.

- *Cleaning up cars:* New York, Massachusetts, Vermont and Maine were the first northeastern states to adopt the Clean Cars Program, which sets vehicle tailpipe emission limits for carbon dioxide and other pollutants. Eight of the 10 northeastern states eventually adopted the program, pushing the federal government to follow suit in 2009. In 2011, the Obama administration adopted even stronger standards that will deliver additional savings at the gas pump and reductions in global warming pollution.
- *Improving energy efficiency:* Six of the top 10 states for energy efficiency are in the Northeast, according to the American Council for an Energy-Efficient Economy. Northeastern states have set ambitious energy efficiency goals, created innovative energy efficiency “utilities,” helped drive the federal government to adopt new energy efficiency standards for appliances, and are among the leaders in implementation of strong building energy codes.
- *Expanding renewable energy:* Every northeastern state other than Vermont has adopted a renewable electricity standard designed to increase production of wind, solar and other forms of renewable energy. In 2000, the Northeast had only 25 megawatts (MW) of wind energy capacity; by 2010 it had 1,671 MW. The region also had 397 MW of solar energy capacity by the end of 2010, of which 70 percent was installed in either 2009 or 2010.

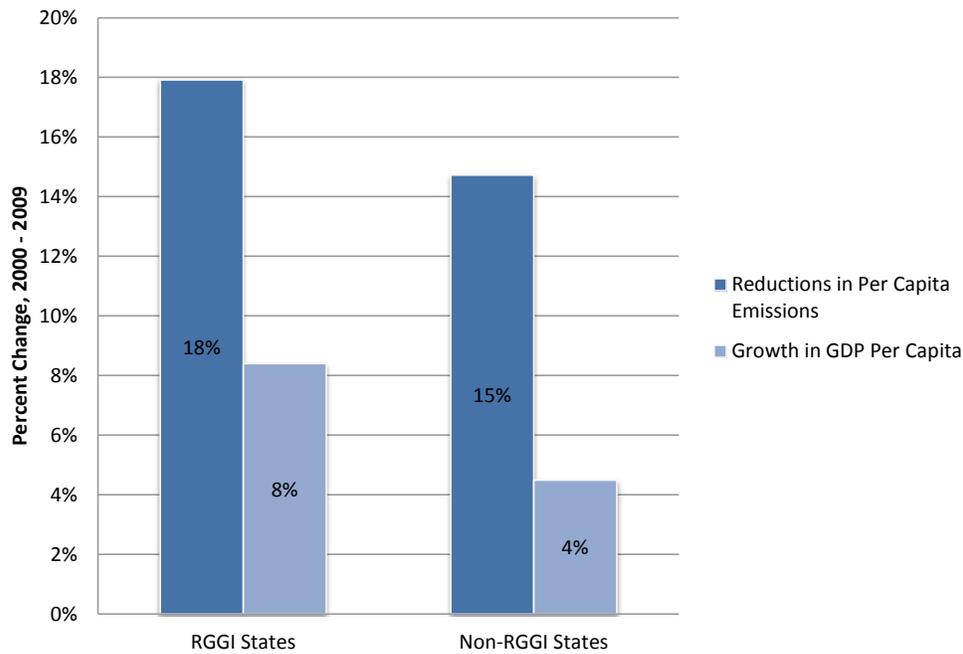
**The region's efforts have paid off in a significant reduction in carbon dioxide emissions from energy use, even as the region's per capita GDP has grown faster than the nation as a whole.**

- A 2011 study by the Analysis Group found that the RGGI program raised economic output by \$1.6 billion in the participating states.
- The 10 northeastern states participating in RGGI emitted 161 million metric tons of carbon dioxide from electricity use in 2009—15 percent less than in 2000 and 9 percent less than in 1990.
- These emission reductions put the northeastern states on track to meet their emission reduction goals. The six New England states, for example, committed to reducing their global warming emissions to 1990 levels by 2010, in concert with eastern Canadian provinces. By 2009, New England's carbon dioxide emissions were 7 percent below 1990 levels.
- On a per capita basis, the 10 northeastern states cut emissions 20 percent faster than the rest of the nation between 2000 and 2009, even as the region's gross product per capita grew 87 percent faster than the rest of the United States.

**The experience of the last decade shows that large reductions in global warming pollution are possible, that innovative regional collaborations can help make them happen, and that emission reductions can be achieved side-by-side with economic growth.**

**However, with global warming and fossil fuel dependence continuing to threaten the Northeast—and with even greater emission reductions needed**

**Figure ES-1: Change in Per Capita Economic Output and Global Warming Pollution Emissions, 2000-2009**



**in the years ahead—the region cannot afford to rest on its laurels. The northeastern states should build on the successes of the last decade by:**

- **Strengthening the Regional Greenhouse Gas Initiative**, a signature element of the region’s strategy to reduce global warming pollution. Northeastern states should strengthen RGGI’s emission cap to drive further emission reductions from power plants, and consider expanding the program to new jurisdictions and new sources of emissions.
- **Continuing to develop innovative regional policies**, especially a Clean Fuels Standard that can hasten the

region’s transition away from oil as a transportation fuel while ensuring that new fuels are less damaging to the climate.

- **Learning from success**, by ensuring that successful approaches are adopted by every state in the region and nationally.
- **Continuing to set aggressive goals and planning to reach them.** States with enforceable caps on global warming pollution should follow through on those commitments, while other states should redouble their efforts to identify and tap all available sources of emission reductions, and engage and inform the public about their efforts.

# Introduction

The courage to address difficult problems. The humility to forge coalitions across partisan lines. The boldness to try new solutions. The vision to imagine a path to a better world.

These are the qualities that Americans say they want in their political leaders—qualities that are too often noticeable in our political system only by their absence.

So when a region's political leaders get together across party lines to address a difficult challenge—and experience success—it's something worth celebrating.

That is exactly what has happened in the northeastern states over the past decade when it comes to addressing the challenge of global warming. Since 2001, working both individually and collectively, the northeastern states have taken bold actions to use energy more efficiently, switch to cleaner forms of energy, and rebuild our infrastructure and economy along more sustainable lines—all working toward the

goal of reducing the region's contribution to global warming.

The results of that work are now apparent: the Northeast has reduced emissions faster than the nation as a whole while simultaneously experiencing greater economic growth. In so doing, the Northeast has created a model for moving toward a clean energy economy that can be emulated by any region seeking to follow a similar path.

Of course, nothing the Northeast can do on its own is capable of preventing the worst impacts of global warming. And the emission reductions we have achieved to date are only a down payment on the more significant reductions the region and the world will need to make to avoid catastrophe.

But the Northeast can take pride in having begun to do our share—while demonstrating to the rest of the country and the rest of the world how to make it happen.

# Global Warming and Fossil Fuel Dependence Threaten the Northeast

The Northeast is vulnerable to the environmental and public health threats posed by global warming, as well as the economic threat posed by dependence on fossil fuels. These twin threats—both of which are rooted in our energy system—provide more than enough reason for the Northeast to take aggressive action to move toward a clean energy economy.

## Global Warming and the Northeast

Global warming is already having a significant impact on the Northeast. The average temperature in the Northeast has

increased by more than 2° F over the last 40 years, and temperatures could increase by an additional 4° F in the coming decades if global warming pollution worldwide continues unabated.<sup>2</sup>

In addition, the Northeast has experienced an increase in the number of heavy rain and snow events—a predicted outcome of global warming.<sup>3</sup> A 2007 Environment America Research & Policy Center analysis found that the number of extreme precipitation events had increased by 24 percent over the continental United States between 1948 and 2006, with the greatest increases coming in New England (61 percent) and the Mid-Atlantic region (42 percent).<sup>4</sup>

In just the last two years, extreme precipitation has led to a series of devastating disasters in the region, including:

### Defining the “Northeast”

In this report, the term “Northeast” is used as shorthand for the 10 states participating in the Regional Greenhouse Gas Initiative. It is a group of states that includes the six New England states, New York, New Jersey, Maryland and Delaware.

- In New Jersey, massive flooding caused by rains from Hurricane Irene damaged more than 2,000 homes.<sup>5</sup> Irene’s rains helped make August 2011 the wettest month in New Jersey since at least 1895—surpassing the previous monthly record for rainfall by nearly 40 percent.<sup>6</sup>
- In Vermont, Hurricane Irene’s soaking rains—which fell on already saturated ground—triggered the state’s second-worst natural disaster since 1900.<sup>7</sup> Rivers in parts of Vermont surpassed their record flood levels—some of them by several feet. Residents of 13 towns were cut off from the outside world for as long as several days as roads and bridges were washed away.<sup>8</sup>
- In September, the remnants of Tropical Storm Lee triggered the second “100-year” rainfall in two years in upstate New York. The rains sent the Susquehanna River to its highest flood level in more than 150 years of record-keeping, and inundated downtown Binghamton, NY, for the second time in five years.<sup>9</sup>
- The freak October 2011 snowstorm was the worst early-season snowstorm in at least two centuries. More than three-quarters of a million people in Connecticut and half a million in Massachusetts lost power due to trees felled during the storm—some of them for as long as 10 days.<sup>10</sup>
- In Rhode Island, back-to-back Nor’easters in March 2010 set an all-time record for monthly precipitation while triggering the worst flooding in approximately two centuries.<sup>11</sup> Cranston, Warwick and West Warwick were especially hard hit as floodwaters from the Pawtuxet River swamped sewage

treatment plants and flooded homes and businesses.<sup>12</sup>

Should emissions of global warming pollution continue unabated, the Northeast will be vulnerable to further impacts on our environment and public health, including:

- **Coastal Floods:** The Northeast’s largest cities—Boston, New York, Philadelphia and Baltimore—are located either along the Atlantic Coast or along tidally influenced waterways. Sea level rise caused by global warming will increase the vulnerability of these cities and other coastal areas to flooding. By the end of the century, coastal floods as large as today’s 100-year floods could occur once every one or two years in Boston and Atlantic City, and almost once every decade in New York City.<sup>13</sup>
- **Public Health Threats:** Higher temperatures, particularly in the summer, pose a danger to public health. By midcentury, Baltimore could see 10 additional days every summer where temperatures rise high enough to cause heat-related deaths, leading to almost 100 additional deaths every summer.<sup>14</sup> Hotter temperatures also aid in the formation of ozone smog, which damages the lungs, can trigger asthma attacks, and even cause premature death.<sup>15</sup>
- **Ecosystem Changes:** Global warming will bring about big changes in the Northeast’s ecosystems.

Maine’s spruce and fir forests—important to the state’s paper industry—could decline by the end of the century as temperatures warm. Sugar maples, the basis for New England’s maple syrup industry, could lose large amounts of habitat, pushing the

industry north into Canada.<sup>16</sup> Even the region's fisheries are likely to be affected as a result of warmer ocean waters and ocean acidification caused by rising carbon dioxide concentrations in the atmosphere.

- **Economic Threats:** The Northeast's \$7.6 billion winter recreation industry could be hard hit by global warming. By the late 21<sup>st</sup> century, winter weather could be too warm to sustain a ski season anywhere in the region outside of western Maine, and snowmobiling seasons could be cut dramatically in length.<sup>17</sup>

## Fossil Fuel Dependence

In addition to global warming pollution, fossil fuel combustion produces other forms of air pollution that threaten the environment and public health. Burning fossil fuels produces nitrogen oxides (which contribute to the formation of ozone smog), sulfur dioxide (the major contributor to acid

rain), and mercury (a neurotoxin that can impair the mental development of fetuses, infants and children).<sup>18</sup>

The region's dependence on fossil fuels also contributes to a host of other environmental ills, including oil spills in the region's environmentally sensitive bays, pollution of groundwater from leaking underground storage tanks, and habitat disruption from pipelines. Economically, the region's dependence on fossil fuels leaves us vulnerable to the fluctuations of world energy markets and results in billions of dollars being sucked out of the region's economy each year. The 10 northeastern states participating in the Regional Greenhouse Gas Initiative import 98.6 percent of their fossil fuels from other states or countries.<sup>19</sup>

The Northeast's dependence on fossil fuels is an environmental and economic dead end. Recognizing this, the region's leaders have worked over the last decade on a series of measures to improve the region's energy efficiency, increase production of clean, renewable energy, and curb emissions of global warming pollution.

# A Legacy of Leadership: The Northeast's Response to Global Warming

In 2001, the Intergovernmental Panel on Climate Change (IPCC)—the world's foremost authority on the science of climate change—issued its *Third Assessment Report*. The first comprehensive assessment of climate science since 1995, the IPCC report demonstrated the deepening scientific consensus on the dangers posed by global warming and the need for immediate action to cut emissions.

Leaders in the northeastern states took the scientific warnings about the impacts of climate change seriously, putting the region on a course to reduce global warming pollution by improving the efficiency with which the region uses energy and taking the first steps toward breaking the region's dependence on fossil fuels.

Northeastern states have been among the nation's leaders in taking action to curb global warming pollution. Over the last decade, northeastern states have pioneered new approaches to reducing global warming pollution that have put the region ahead of the curve in moving to a clean energy economy and served as an example for states in other regions to follow.

## First Enforceable State Limits on Carbon Dioxide Emissions: Massachusetts (2001)

Massachusetts was the first state in the nation to adopt an enforceable limit on carbon dioxide pollution from power plants with the April 2001 adoption of regulations to limit emissions from the state's five dirtiest fossil fuel-fired power plants—known as the “Filthy Five.”

In the late 1990s, citizen activists petitioned the Commonwealth of Massachusetts to adopt regulations limiting emissions of four pollutants—nitrogen oxides (which contribute to smog), sulfur dioxide (which contributes to acid rain), mercury (which has contaminated fish in much of the United States), and carbon dioxide—from the Filthy Five. Responding to the campaign, Republican Gov. Paul Cellucci pushed forward with the process of adopting regulations limiting pollution from the plants. The regulations were finalized under his successor, Acting Gov. Jane Swift, in 2001. The rules limited both the rate at which the plants could produce

carbon dioxide pollution and the total amount of pollution they could emit.

The adoption of the Filthy Five regulations—coupled with similar campaigns to win strong public health protections in other states—led the region’s governors to pursue a regional approach to power plant pollution that eventually resulted in creation of the Regional Greenhouse Gas Initiative (RGGI).

## First Regional Climate Change Action Plan: New England Governors/Eastern Canadian Premiers (2001)

In 2001, the governors of the six New England states, as well as their counterparts in the eastern Canadian provinces, adopted a regional Climate Change Action Plan. The plan followed the example of previous efforts of regional cooperation on issues such as acid rain and mercury pollution, and was not only the first such regional plan in the United States, but also the first international, multi-jurisdictional effort on global warming anywhere in the world.<sup>20</sup>

The New England Governors/Eastern Canadian Premiers (NEG/ECP) plan included both concrete, measurable goals for emission reductions in the region and commitments to specific actions that could help the region achieve those goals.

Specifically, the NEG/ECP plan called for the region to:

- Reduce regional emissions of global warming pollution to 1990 levels by 2010;
- Reduce emissions to at least 10 percent below 1990 levels by 2020; and
- Reduce emissions in the long-term

“sufficiently to eliminate any dangerous threat to the climate.”<sup>21</sup>

The plan also called for the establishment of a regional greenhouse gas emissions inventory and regional emission reduction plan, committed state and provincial governments to “lead by example” in emission reduction efforts, called for emission reductions in specific sectors of the economy, and suggested the establishment of an emission trading mechanism.<sup>22</sup>

While the plan had no legal force, and many of the specific regional promises were left unmet, the adoption of the plan was significant for several reasons. First, it put the region’s governors on record in support of action to limit global warming pollution. Second, it laid out the general approach toward emission reductions—built on a foundation of improved energy efficiency and regional action on electricity and transportation emissions—that the region and states would follow over the course of the decade. Finally, and perhaps most importantly, it epitomized the spirit of regional cooperation that would sustain a variety of emission reduction efforts in the years to come.

## First Comprehensive, State-Driven Climate Action Plan: Rhode Island (2002)

Nearly every action of state government—from its procurement policies to its exercise of regulatory power—has some impact on global warming. Recognizing the many ways in which state policies could reduce global warming pollution—and the many stakeholders whose interests are affected by those policies—the state of Rhode Island convened a unique, multi-stakeholder process in 2001 designed to develop a policy

roadmap for meeting the emission reduction targets in the NEG/ECP plan.

The Rhode Island Greenhouse Gas Process sought to build consensus among business leaders, government officials, environmental advocates and others around a series of actions and policies to address global warming in the Ocean State. Such a process was not new—similar stakeholder processes had taken place in several other states, most notably Delaware, where an independent stakeholder process produced a Delaware Climate Action Plan with ambitious goals for global warming emission reductions and a menu of policies capable of achieving those goals.<sup>23</sup> Rhode Island's process was unique for the time, however, in that it was called into being by the state's governor, Lincoln Almond, and several state agencies—bringing with it the legitimacy of state government involvement.<sup>24</sup>

Published in 2002, the Rhode Island Greenhouse Gas Action Plan laid out 52 specific policy options—49 of which were endorsed by a consensus of all the stakeholders—that would, in combination, achieve Rhode Island's share of the NEG/ECP target.<sup>25</sup> The plan's detailed, thoughtful evaluation of policy options to curb global warming pollution helped guide Rhode Island's actions and served as a model for similar plans across the country. All northeastern states and most states in the U.S. have now undergone some form of comprehensive global warming or energy planning exercise, many of them following the Rhode Island stakeholder process model.<sup>26</sup> In several states, including Rhode Island, this process has led to the adoption of a non-binding goal for reductions of carbon emissions. Besides Rhode Island, those states are Maine, New Hampshire, New York and Vermont.<sup>27</sup>

## Early Adoption of Clean Cars Program: Massachusetts, New York, Vermont and Maine

Residents of northeastern cities have long suffered from the ozone smog created by emissions from cars and light trucks. It is no surprise, then, that several northeastern states were among the first to use their flexibility under the Clean Air Act to implement California's stronger vehicle emission standards for cars in their own states.

Massachusetts, New York, Vermont and Maine adopted California's strong Low Emission Vehicle standards shortly after their launch in 1990. Massachusetts took the additional step of adopting legislation requiring the state to adopt California's emission standards whenever they are more protective than the national standards.<sup>28</sup>

The Northeast's commitment to strong emission standards became particularly important when California adopted legislation in 2002 requiring that state to limit emissions of global warming pollution from cars. Over the next several years, every northeastern state except New Hampshire and Delaware would adopt the "Clean Cars Program," which called for a 30 percent reduction in per-mile emissions of global warming pollution from passenger cars and light trucks by 2016.<sup>29</sup>

The drive for cleaner cars in the Northeast created momentum that ultimately led to national action. As an increasing number of states (14 in all) adopted the Clean Cars Program—and a number of other states considering doing so—automakers faced pressure to develop a national solution. In 2009, President Obama moved to implement the Clean Cars Program standards for global warming pollution nationwide as part of an agreement negotiated with automakers.

The region's long battle with the George W. Bush administration over the Clean

Cars Program had one other important long-term impact: it provided the legal backdrop for the Supreme Court’s landmark decision in *Massachusetts v. EPA* that led the EPA to identify carbon dioxide as a pollutant requiring regulation under the Clean Air Act.<sup>30</sup>

As a result of the northeastern states’ leadership, every state in the region will enjoy the benefits of the Clean Cars Program. By 2016, the 10 states participating in RGGI will save 1.6 billion gallons of gasoline per year and reduce global warming pollution by the equivalent of taking more than 2.9 million cars off the road.<sup>31</sup> Those benefits will be magnified by new, national standards for global warming pollution from cars and trucks adopted by the Obama administration in 2011.

## First Regional Power Sector Global Warming Emissions Cap: Regional Greenhouse Gas Initiative (2005)

The northeastern states took the concept of regional cooperation to another level when they worked together to create the nation’s first global warming cap-and-trade system, the Regional Greenhouse Gas Initiative (RGGI).

The seeds for RGGI were sown in 2003 when New York Gov. George Pataki wrote to other northeastern governors asking them to join him to “develop a strategy that will help the region lead the nation in the effort to fight global climate change.”<sup>32</sup> Over the course of the next two years, a team of negotiators, including a wide range of different stakeholders, hammered out the details, with states signing a memorandum of agreement establishing the program in late 2005. RGGI was designed to limit

carbon dioxide emissions from the region’s power plants to projected 2009 levels until 2014, followed by a 10 percent emission reduction to be achieved by 2018.<sup>33</sup>

The RGGI states also took the innovative step of requiring most of the emission permits (called “allowances”) required under the program to be sold to polluters rather than given away, with most of the proceeds from those sales plowed back into programs that benefit the public—particularly programs to enhance energy efficiency and promote renewable energy. RGGI’s first allowance auction, which took place in 2008, was the largest carbon dioxide auction ever to occur in the world to that point.<sup>34</sup>

Between 2008 and the end of 2011, the program produced \$952 million for the participating states to invest in clean energy programs.<sup>35</sup> Those investments have proven to be an important source of environmental benefits—energy efficiency investments made from RGGI auction revenue in 2009 alone will avert approximately 10 million metric tons of carbon dioxide pollution over their lifetimes, with additional reductions to be expected from clean energy investments made in later years of the program.<sup>36</sup>

## Innovative Models for Energy Efficiency

Northeastern states have also been pioneers in finding ways to tap the promise of energy efficiency. Energy efficiency improvements are often the cheapest, cleanest and quickest way to reduce global warming pollution.

Northeastern states have made great strides in improving the energy efficiency of their economies through the use of innovative policy tools. Northeastern states

now occupy six of the top 10 spots in the American Council for an Energy-Efficient Economy's (ACEEE) annual rankings of state energy efficiency programs and policies. Massachusetts is rated as the top state for energy efficiency in the nation, followed by New York (third), and Vermont and Rhode Island (tied for fifth).<sup>37</sup>

### **Energy Efficiency Resource Standards and Efficiency Utilities**

Energy efficiency resource standards (EERSs) set specific targets for energy savings to be achieved by utilities within a state. Sometimes, the goals of an EERS are established by a state's utility regulators in keeping with broad statutory guidance: Rhode Island, Connecticut and Massachusetts, for example, require utilities to pursue all cost-effective energy efficiency opportunities.<sup>38</sup> In other states, specific energy savings goals are spelled out in statute: Maryland, for instance, reduce per capita consumption of electricity and gas by 15 percent between 2007 and 2015.<sup>39</sup>

Utilities can pursue a wide range of options to meet these standards. Efficiency programs can include subsidizing the purchase of more efficient light bulbs or appliances, helping customers insulate and weatherize their homes, and working with businesses to develop strategies for saving energy in industrial facilities. The flexibility offered by an overall efficiency target allows utilities to select the programs that offer the most cost-effective savings in their area.

Six of the ten states involved in RGGI have energy efficiency resource standards. They are Maryland, Delaware, New York, Connecticut, Rhode Island and Massachusetts.

Another innovative model invented in the Northeast is the "efficiency utility" or "sustainable energy utility." In Vermont (which pioneered the approach in 2000) and Delaware, independent non-profit organizations administer the state's energy efficiency programs, bringing a uniform

set of program offerings to all the state's residents and a single-minded focus on developing effective energy efficiency and/or renewable energy. (Maine has a similar statewide effort, but it is managed by a state agency.) These efforts are making a real dent in energy consumption: energy efficiency measures implemented by Efficiency Vermont over the last decade, for example, now account for 14 percent of the state's electricity requirements.<sup>40</sup>

Utility and state-run energy efficiency programs in the region are avoiding pollution and the need to add new power plants and transmission lines. In 2008, energy efficiency measures installed under utility-run programs saved 14,000 gigawatt-hours of electricity in the New England and Mid-Atlantic states—an amount roughly equivalent to 3 percent of the electricity consumed in those states in 2008.<sup>41</sup>

### **Appliance Efficiency Standards and Building Energy Codes**

Northeastern states have also led the nation in establishing strong minimum standards for the energy efficiency of new buildings and appliances.

Since the 1970s, states have adopted efficiency standards that set minimum performance levels for appliances and equipment. Historically, once several states adopt standards for an appliance, there has been strong pressure for the federal government to follow suit.

Over the last decade, northeastern states have taken the lead in setting a high bar for appliance energy efficiency. Since 2004, eight northeastern states (Connecticut, Massachusetts, Maryland, New Hampshire, New Jersey, New York, Rhode Island and Vermont) have adopted appliance efficiency standards.<sup>42</sup> In several cases, the adoption of state standards has already prompted the federal government to adopt similar standards—bringing the benefits of improved energy efficiency to the entire nation.

A good example of how the process works is the recent improvement in energy efficiency standards for residential furnaces. Beginning in 2005, several northeastern states—including Massachusetts, Vermont and Rhode Island—adopted strong efficiency standards for residential furnaces and boilers. But, because the federal government had a weaker efficiency standard in place, the states needed to request a federal waiver to implement their standards. After several years of back-and-forth with the Bush administration Department of Energy (DOE), and negotiations between efficiency advocates and industry, the DOE began the process of creating a stronger national standard in 2009.<sup>43</sup> Those new standards were finalized in 2011 and will ultimately save 31 billion therms of natural gas—eliminating 15.5 million metric tons of carbon dioxide pollution.<sup>44</sup>

Northeastern states have also helped lead the charge toward stronger building energy codes. Building energy efficiency technology and practice have advanced rapidly in recent years, allowing states to move ahead with energy codes that save large amounts of electricity and heating fuel even compared to the best practices of a few years before. For instance, a home constructed to the standards of the 2012 edition of the International Energy Conservation Code (IECC) will use 30 percent less energy than a home constructed to the standards of the 2006 edition of that code.<sup>45</sup>

Northeastern states have moved rapidly to take advantage of more efficient building practices, adopting some of the strongest building codes in the nation. As of January 2012, all of the northeastern states participating in RGGI have adopted codes at least as strong as the 2009 edition of the most popular residential energy code, and the 2007 edition of the most popular commercial energy code. (One state, Maine, requires only towns with populations greater than 2,000 to enforce these codes).<sup>46</sup>

Maryland has already moved ahead with one of the strongest energy codes in the country, adopting standards modeled on the 2012 model residential code and 2010 model commercial code.<sup>47</sup>

The Building Codes Assistance Project, a national advocacy group that works on energy codes, estimates that by 2020, the impact of using the 2009 residential model code and 2007 commercial model code for all buildings constructed between 2011 and 2020 across the Northeast will lead to annual savings of \$638 million and annual emissions reductions of 4.2 million metric tons of global warming pollution.<sup>48</sup> If other states follow Maryland's lead by adopting even stronger codes, the environmental and economic benefits will be even greater.

## Innovative Models to Spur Renewable Energy

Using energy more efficiently may be the cleanest and cheapest way to curb global warming pollution, but a transition to clean, renewable sources of energy is equally important for building a clean energy economy for the long haul.

Northeastern states have been pioneers in developing new models for encouraging renewable energy—and have achieved significant success in spurring the installation of solar power, wind energy and other forms of renewable energy within the region.

In the late 1990s, four northeastern states—Massachusetts, Connecticut, Maine and New Jersey—were among the first in the country to adopt renewable electricity standards (RES), which set minimum thresholds for the amount of renewable energy obtained by electric utilities.<sup>49</sup> The RES met a specific and pressing need in the region; the 1990s

saw the deregulation of the electric power industry in most of the Northeast, shifting the responsibility of determining how much and what type of generation capacity to build from regulators and utility executives to electric power markets. Leaders in the region recognized, however, that those markets had no mechanisms for ensuring a diverse and stable set of resources for the grid that included renewable energy.

The RES model quickly spread across the country, and an RES is now in place in every northeastern state except Vermont (which has a non-binding renewable energy goal with the potential to become binding in the future) and in 29 states nationwide. By establishing RESs, states with deregulated electric power industries can ensure that renewable energy has a place in their future energy mix.

Northeastern states have also been innovative in encouraging the development of specific renewable energy technologies, particularly solar energy, which has great promise as a source of clean renewable energy generation in the densely populated Northeast. New Jersey has adopted the most aggressive solar “carve-out” in the nation and was the first state to rely largely on a market-based mechanism—solar renewable energy certificates (SRECs)—to provide financial incentives. New Jersey is now number two in the nation for installed solar energy capacity, trailing only California.<sup>50</sup>

The region’s focus on the development of renewable energy has resulted in a dramatic increase in solar and wind energy generation capacity in the Northeast. Wind generation capacity, for instance, expanded from just 24.7 megawatts (MW) in 2000 to 1,671 MW in 2010.<sup>51</sup> By the end of 2010, the Northeast had a total of 397 megawatts (MW) of solar photovoltaic capacity, of which 70 percent was installed in 2009 or 2010.<sup>52</sup>

## Statewide Global Warming Pollution Caps: Creating a Comprehensive Strategy for Reducing Pollution

In addition to policies such as RGGI that cap global warming pollution from a specific sector of the economy, four states have adopted economy-wide limits on global warming pollution. In each case, that cap sets targets for pollution reductions, and then orders state agencies to study the state’s economy and pollution sources and to take the regulatory steps necessary to bring emissions down to the target. The four states, and their respective caps, are as follows:

- **New Jersey** has set a goal of reducing emissions to 1990 levels by 2020, and 80 percent below 2006 levels by 2050, under the Global Warming Response Act of 2007. The state published a draft plan for meeting those goals in late 2009, but has fallen behind in taking other steps to achieve the state’s long-term emission reduction goals.
- **Massachusetts** aims to reduce emissions 25 percent below 1990 levels by 2020, and 80 percent below 1990 levels by 2050, under the 2008 Global Warming Solutions Act.<sup>53</sup> In January 2011, the state released its implementation plan, outlining how it will cut emissions moving toward 2020.<sup>54</sup>
- **Connecticut** aims to reduce emissions 10 percent below 1990 levels by 2020, and 80 percent below 2001 levels by 2050, under the 2008 Global Warming Solutions Act.<sup>55</sup> As of mid-2011, the state was studying emissions reduction options in preparation for formalizing a plan to hit those goals.<sup>56</sup>
- **Maryland** has a goal, under the 2009

Greenhouse Gas Reduction act, of reducing emissions 25 percent below 2006 levels by 2020.<sup>57</sup>

These comprehensive laws have the

benefit of linking the various efforts that states have made into an overall strategy, tied with emissions targets that are based on scientific evidence about the need to reduce pollution.

# Measures of Success: Less Pollution Amid a Growing Economy

The northeastern states set out in the early 2000s to reduce their contribution to global warming. They set ambitious goals, enacted innovative policies, and worked together with their neighbors to develop effective regional approaches.

Those efforts are working. The Northeast is on pace to meet or exceed the ambitious emission reduction goals it has set over the last decade. The region is reducing carbon dioxide emissions faster than the nation as a whole. At the same time, the Northeast has experienced faster economic growth per capita than the rest of the United States, demonstrating that actions to address global warming can be consistent with a prosperous economy.

## Emission Reductions Are on Pace to Exceed the Region's Goals

Northeastern states set ambitious goals for reductions in global warming emissions in the early 2000s. The six New

England states committed—in concert with neighboring Canadian provinces—to reduce emissions to 1990 levels by 2010.<sup>58</sup> Delaware, in its unofficial 2000 Climate Change Action Plan, set a goal of reducing emissions to 7 percent below 1990 levels by 2010.<sup>59</sup> New York, in its 2002 state energy plan, targeted emission reductions of 5 percent below 1990 levels by 2010.<sup>60</sup> (More recent plans in New York have called for long-term emission reductions of 80 percent by 2050, but have not revised the short-term goal.) New Jersey and Maryland did not establish goals for 2010, but did set binding emission reduction targets for 2020, with New Jersey aspiring to reduce global warming emissions to 1990 levels by 2020 and Maryland targeting a 25 percent reduction from 2006 levels by 2020.

It is still too early to evaluate states' compliance with those goals with 100 percent certainty. Detailed greenhouse gas inventories that include all the pollutants responsible for global warming have not yet been completed. The most recent data on emissions of carbon dioxide, the leading global warming pollutant, are for 2009. And states vary in how they define their emission targets—some count emis-

**Table 1: Comparison of State and Regional Emission Reduction Targets with Carbon Dioxide Emissions**

State/Region	Target	Actual 2009 Carbon Dioxide Emissions, production basis
New England	1990 emissions by 2010	7% below 1990 emissions
New York	5% below 1990 emissions by 2010	16% below 1990 emissions
Delaware ( <i>unofficial</i> )	7% below 1990 emissions by 2010	33% below 1990 emissions
New Jersey	1990 emissions by 2020	3% below 1990 emissions
Maryland	25% below 2006 emissions by 2020	8% below 2006 emissions

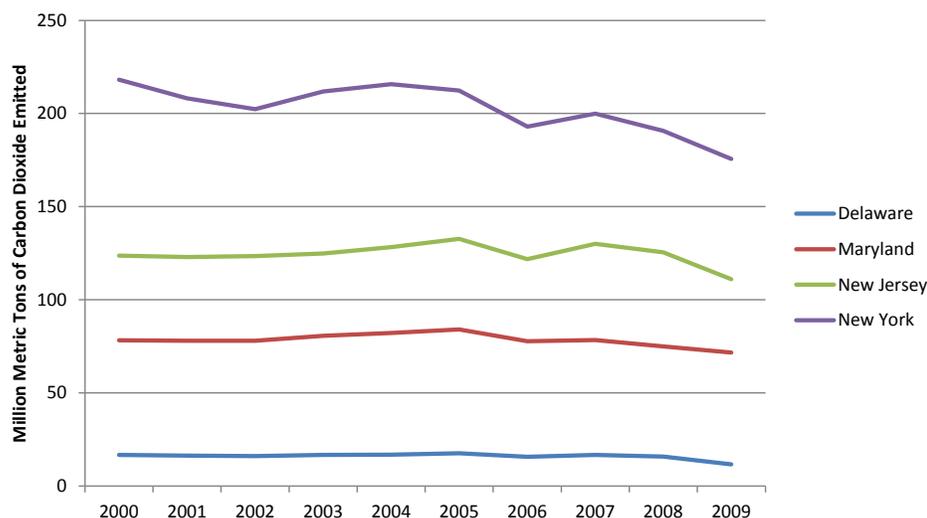
sions based on which fossil fuels are burned within their territory (production basis), while others include emissions produced in the process of generating electricity imported into the state (consumption basis).

The 2009 data for carbon dioxide emissions, however, paint a clear picture of a region that is on its way to achieving its emission reduction goals. Using a production basis for comparison, in the eight states with 2010 emission goals (the six New England states plus Delaware and New York), carbon dioxide emissions in 2009 were lower than the nominal level targeted for 2010. In New Jersey, carbon

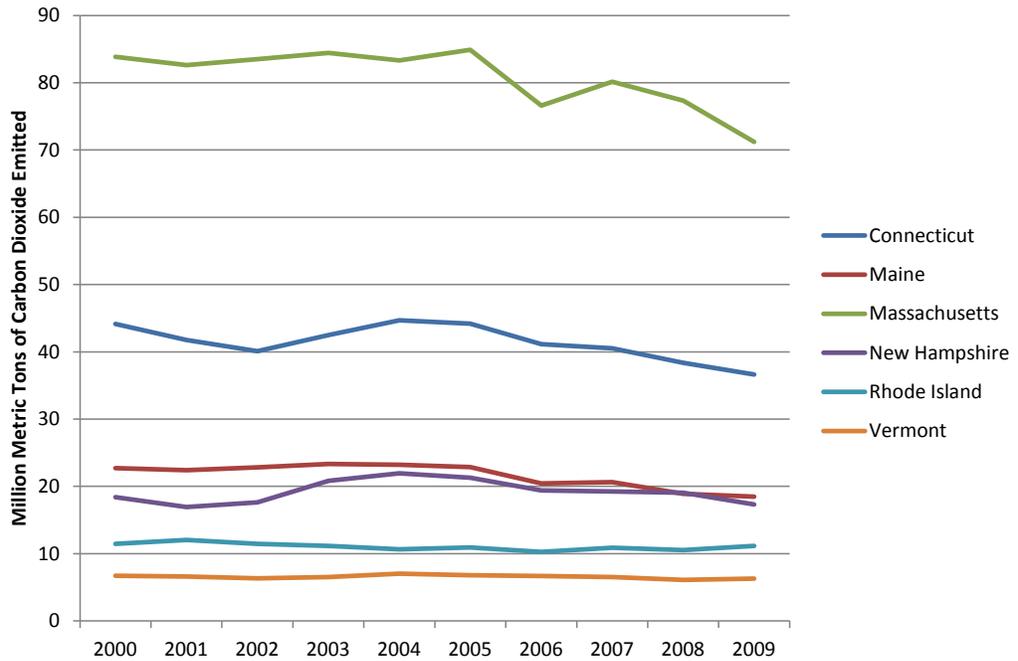
dioxide emissions in 2009 were below the level targeted for 2020. And in Maryland, 2009 emission figures demonstrate significant progress toward their goal. (See Table 1.)

Overall, the 10 northeastern states that have participated in RGGI emitted 9.2 percent less carbon dioxide from energy use in 2009 than they had in 1990, and 15 percent less than they did in 2000.<sup>61</sup> The 26 million metric tons of emission reductions achieved between 2000 and 2009 is greater than the total amount of emissions produced annually by New Hampshire and Vermont, combined.

**Figure 1: Global Warming Pollution in the non-New England RGGI States (Million Metric Tons)**



**Figure 2: Global Warming Pollution in the New England RGGI States (Million Metric Tons)**



Emission reductions in the Northeast have taken place throughout the region's economy. While the largest emission reductions have taken place in the industrial and electric power sectors, significant emission reductions have also occurred in the commercial and residential sectors

since 2000. Emissions have increased since 2000 only in the transportation sector, but the more recent trend has been toward declining emissions there as well, with transportation sector emissions down by nearly 7 percent between 2007 and 2009. (See Table 2.)

**Table 2: Change in Energy-Related Carbon Dioxide Emissions by Sector of the Economy for all Northeastern States**

	Change in Emissions 2000-2009 (Million Metric Tons)	Percent Change in Emissions 2000-2009
Residential	-11.9	-12%
Commercial	-8.7	-13%
Industrial	-33.1	-51%
Transportation	4.9	2%
Electric Power	-44.2	-28%

## Northeastern States Have Led in Both Pollution Reductions and Economic Progress

The success that the Northeast has thus far enjoyed in reducing global warming pollution has not come at the expense of the economy. Indeed, over the last decade, the Northeast has both cut emissions faster and seen its per capita economic output grow faster than the rest of the nation.

On a per capita basis, the 10 northeastern states participating in RGGI reduced their emissions of carbon dioxide from energy use by 17.9 percent between 2000 and 2009—cutting emissions 20 percent faster than the nation as a whole.<sup>62</sup>

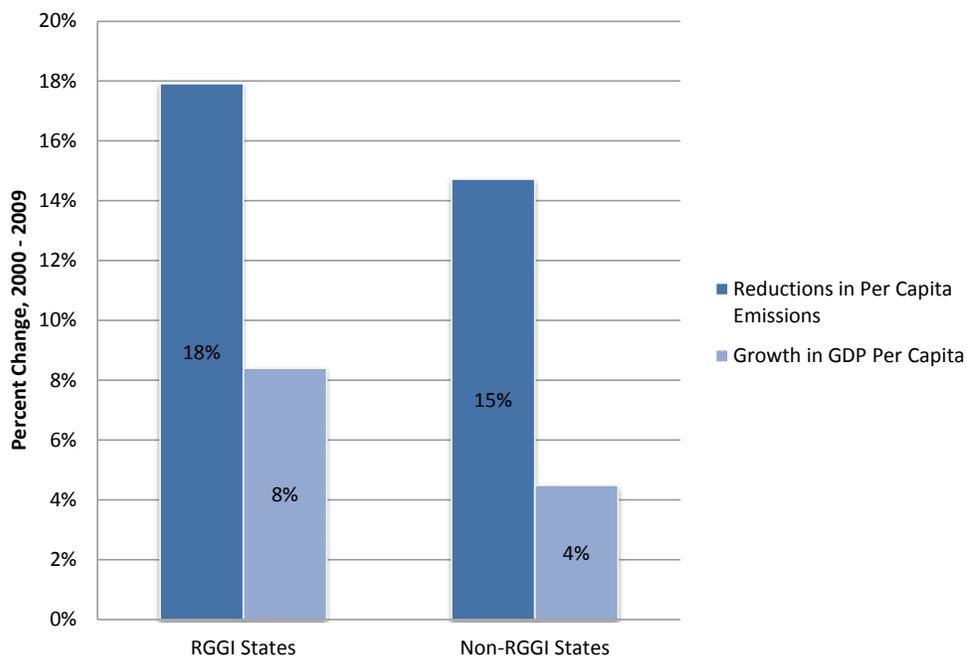
During that time, the Northeast’s economy became significantly cleaner—producing more economic output with less pollution. The “carbon intensity” of the region’s economy fell by 24.3 percent between 2000 and 2009—that is, the region produced nearly one-quarter less carbon

dioxide per unit of economic output in 2009 than it did in 2000.<sup>63</sup> The rest of the nation saw its carbon intensity decline by only 18.7 percent.

Over the same period, per capita gross domestic product (GDP) in the 10 RGGI states increased by 8.4 percent—meaning that the region’s per capita economic output grew 87 percent faster than the rest of the nation (which saw a 4.5 percent increase in GDP per capita).

A report by the Analysis Group published in late 2011 found that RGGI had a beneficial impact on the region’s economy and environment. Most states invested their RGGI funds in renewable energy and energy efficiency, thereby generating economic activity; efficiency programs also offer customers the chance to reduce the amount of money they spend on energy derived from out-of-region fossil fuels. In total, the researchers found that the RGGI program as a whole had produced economic benefits worth \$1.6 billion as of the end of 2011.<sup>64</sup>

**Figure 3: Change in Per Capita Economic Output and Global Warming Pollution Emissions, 2000-2009**



In short, the Northeast achieved both greater emission reductions per capita and greater economic growth per capita than the rest of the nation, showing that action to curb global warming is not inconsistent with sustained economic growth. This was reflected within states: eight of the ten RGGI states outperformed the rest of the nation at reducing their carbon intensity from 2000 to 2009 (see Table 3).

By counting only emissions that take place within the borders of each state—and excluding emissions of other greenhouse gases—these data on carbon dioxide emissions provide an incomplete picture of the region’s progress in fighting global warming. For example, these figures do not count the emissions created in the production of products that might once have been

manufactured in the Northeast that are now made overseas.

But the data, while imperfect, lead to three inescapable conclusions:

- The Northeast has shown that significant reductions in carbon dioxide emissions can be achieved within a relatively short period of time.
- The region’s legacy of innovative policy and interstate cooperation has contributed to the emission reductions that have occurred in the region to date.
- Significant reductions in carbon dioxide pollution can be achieved in a growing economy.

**Table 3: Changes in Per Capita Emissions and Growth, RGGI States and Average of Other States**

State	Change in Carbon Intensity	Change in Per Capita Emissions	Change in GDP Per Capita
Delaware	-39%	-37%	3%
New York	-29%	-22%	10%
Maine	-26%	-21%	6%
Maryland	-25%	-15%	14%
RGGI average	-24%	-18%	8%
Connecticut	-23%	-20%	4%
Massachusetts	-22%	-18%	6%
New Jersey	-19%	-13%	7%
Vermont	-19%	-8%	12%
Non-RGGI average	-18%	-15%	4%
New Hampshire	-15%	-12%	3%
Rhode Island	-13%	-3%	11%

# Taking the Next Steps

The Northeast has made great strides in addressing global warming and has adopted policies and implemented practices that will reduce emissions for years to come. But the scientific imperative to reduce global warming pollution is unyielding, with the region needing to reduce emissions by at least 80 percent by 2050 in order to do its share to prevent the worst impacts of global warming.

We should be proud of our progress, but this is no time to rest on our laurels.

The model of close regional cooperation and policy innovation that the Northeast has developed over the last decade should serve as the groundwork for even more ambitious action in the decade ahead. Specifically, northeastern states should:

- **Strengthen the Regional Greenhouse Gas Initiative.** RGGI is the centerpiece of the Northeast's efforts to curb global warming pollution. But while the innovative model of auctioning pollution allowances and spending the proceeds on clean energy programs has yielded significant emission reductions, the program's emission cap has proven to be too

weak. The first step the region should take is to reset the level of the emission cap—which had been set based on erroneously high projections of 2009 emissions—at actual 2009 emission levels. The region should also consider setting stronger emission reduction targets, inviting other states and regions to join the program, and expanding the program to include imported power and other sectors of the economy.

- **Continue to develop innovative regional policies.** The northeastern states have a long track record of cooperation in environmental protection. That cooperation will become even more important as the region tackles difficult issues that cross state lines. The northeastern states should continue to work toward adoption of a Clean Fuels Standard, which will hasten the region's transition away from oil as a transportation fuel while ensuring that new fuels are better for the climate. The states should also continue to work collaboratively to develop the region's offshore wind resource,

which is among the largest native sources of clean, renewable energy. Finally, states should work together to coordinate the development of the infrastructure needed to support a clean energy economy—from smart grids to high-speed rail.

- **Learn from success.** Not every Northeast state is moving at the same speed toward a clean energy economy. Some states that excel in one area—for example, the development of renewable energy—might be lagging in another. Policy-makers in the Northeast should continually evaluate the success of programs in neighboring states and work to emulate those with the greatest results.
- **Continue to set aggressive goals and plan to reach them.** While

regional emission reduction goals and state global warming stakeholder process have helped to catalyze action on global warming and create a foundation for common action, states have not always followed through aggressively on the recommendations made through these planning processes. Setting goals is important, but it is also important to measure progress, report back to the public on that progress, and create mechanisms for following through on key policy proposals. State and regional leaders should look back at the plans created over the last decade, identify areas in which progress has lagged, and redouble their efforts to identify and tap all available sources of emission reductions throughout the Northeast's economy.

# Notes

- 1 Includes New Jersey, whose governor, Chris Christie, is attempting to remove it from the program. The other RGGI states are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island and Vermont.
- 2 Thomas R. Karl, et al. (eds.), U.S. Global Change Research Program, *Global Climate Change Impacts in the United States*, 2009.
- 3 Ibid.
- 4 Travis Madsen and Emily Figdor, Environment America Research & Policy Center, *When it Rains, it Pours: Global Warming and the Rising Frequency of Extreme Precipitation in the United States*, December 2007.
- 5 Federal Emergency Management Agency, *Preliminary Damage Assessment: New Jersey – Hurricane Irene, FEMA-4021-DR*, downloaded from [www.fema.gov/pdf/news/pda/4021.pdf](http://www.fema.gov/pdf/news/pda/4021.pdf), 16 December 2011.
- 6 David A. Robinson, New Jersey State Climatologist, *Waterlogged Nj: August 2011 and Summer 2011 Summary*, 5 September 2011.
- 7 National Weather Service, Burlington, VT, Forecast Office, *Preliminary Hurricane/Tropical Storm Irene Weather Summary for the North Country*, downloaded from [www.erh.noaa.gov/btv/events/Irene2011/](http://www.erh.noaa.gov/btv/events/Irene2011/), 16 December 2011.
- 8 Dirk van Susteren, “Vermont Officials Assess the Risks in Towns Lacking Water and Power,” *New York Times*, 31 August 2011.
- 9 100-year rainfall: Jeff Masters, “1-in-100 Year Rains Cause Extreme Flooding in NY, PA; Nate, Maria, and Katia,” *Weather Underground*, 8 September 2011.
- 10 Lauren Keiper, “Millions Without Power After U.S. Northeast Snowstorm,” *Reuters*, 31 October 2011.
- 11 National Oceanic and Atmospheric Administration, National Climatic Data Center, *State of the Climate: Global Hazards: March 2010*, April 2010.
- 12 Oren Dorell, “R.I. Flooding: ‘It Makes You Want to Cry,’” *USA Today*, 5 April 2010.

- 13 Union of Concerned Scientists, *Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions*, July 2007.
- 14 Laurence S. Kalkstein and Scott J. Greene, *An Analysis of Potential Heat-Related Mortality Increases in U.S. Cities Under a Business-As-Usual Climate Change Scenario*, September 2007.
- 15 Elizabeth Martin Perera and Todd Sanford, Union of Concerned Scientists, *Climate Change and Your Health: Rising Temperatures, Worsening Ozone Pollution*, June 2011.
- 16 See note 13.
- 17 Ibid.
- 18 Union of Concerned Scientists, *The Hidden Costs of Fossil Fuels*, 29 October 2002.
- 19 Department of Energy, Energy Information Administration, "Table P3: Energy Production and Consumption Estimates in Trillion BTU by State, 2008," in *State Energy Data System 2008*, 30 June 2010.
- 20 New England Governors' Conference, *Climate Change: NEG/ECP Climate Change Program*, downloaded from [negc.org/main/?do=page&id=39](http://negc.org/main/?do=page&id=39), 20 January 2012.
- 21 Conference of New England Governors and Eastern Canadian Premiers, *New England Governors/Eastern Canadian Premiers Climate Change Action Plan 2001*, April 2001.
- 22 Ibid.
- 23 Center for Energy and Environmental Policy, University of Delaware, *Delaware Climate Change Action Plan*, prepared for Delaware Climate Change Consortium, January 2000.
- 24 Rhode Island Department of Environmental Management, Greenhouse Gas Project, downloaded from [www.dem.ri.gov/programs/bpoladm/stratpp/greenhos.htm](http://www.dem.ri.gov/programs/bpoladm/stratpp/greenhos.htm), 20 January 2012.
- 25 Rhode Island Greenhouse Gas Stakeholder Process, *Rhode Island Greenhouse Gas Action Plan*, 15 July 2002.
- 26 Center for Climate and Energy Solutions, *Climate Action Plans*, updated 31 October 2011.
- 27 Center for Climate and Energy Solutions, *A Look at Emissions Targets*, downloaded from [www.c2es.org/what\\_s\\_being\\_done/targets](http://www.c2es.org/what_s_being_done/targets) on 24 February 2012.
- 28 Massachusetts Department of Environmental Protection, *310 CMR 7.40: The Massachusetts Low Emission Vehicle Program: Background Document and Technical Support for Public Hearings on the Proposed Amendments to State Implementation Plan for Ozone; and Public Hearing and Findings Under the Massachusetts Low Emission Vehicle Statute*, May 2005.
- 29 California Air Resources Board, *Clean Car Standards – Pavley, Assembly Bill 1493*, downloaded from [www.arb.ca.gov/cc/ccms/ccms.htm](http://www.arb.ca.gov/cc/ccms/ccms.htm), 20 January 2012.
- 30 U.S. Supreme Court, Opinion of the Court in *Massachusetts v. EPA*, 549 U.S. 497 (2007).
- 31 Elizabeth Ridlington, et al., Environment America Research & Policy Center, *State Leadership and the National Clean Cars Program*, March 2010.
- 32 Maine Department of Environmental Protection, *States Reach Agreement on Rules for the Nation's First Cap-and-Trade Program to Address Climate Change* (press release), 15 August 2006.
- 33 Regional Greenhouse Gas Initiative, *Memorandum of Understanding*, 20 December 2005.
- 34 Regional Greenhouse Gas Initiative, *The Regional Greenhouse Gas Initiative*

- (RGGI) Is ..., downloaded from [www.rggi.org/docs/RGGI\\_Executive\\_Summary.pdf](http://www.rggi.org/docs/RGGI_Executive_Summary.pdf), 20 January 2012.
- 35 Regional Greenhouse Gas Initiative, *Auction Results*, downloaded from [www.rggi.org/market/co2\\_auctions/results](http://www.rggi.org/market/co2_auctions/results), 23 February 2012.
- 36 Max Chang, et al., Synapse Energy Economics, *Electricity Energy Efficiency Benefits of RGGI Proceeds: An Initial Analysis*, 5 October 2010.
- 37 Michael Sciortino, et al., American Council for an Energy-Efficient Economy, *The 2011 State Energy Efficiency Scorecard*, October 2011.
- 38 Tim Stout, "Avoid Backlash from Mandates to Achieve All Cost-Effective Energy Efficiency Potential," *E News*, April 2011.
- 39 U.S. Department of Energy and North Carolina Solar Center, "Maryland Empower Maryland Efficiency Act" in *Database of State Incentives for Renewable Energy*, downloaded from [www.dsireusa.org/incentives/incentive.cfm?Incentive\\_Code=MD16R&re=1&ee=1](http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MD16R&re=1&ee=1), 23 February 2012.
- 40 Efficiency Vermont, *Year 2010 Savings Claim*, 1 April 2011.
- 41 "14,000 gigawatt-hours": Monica Nevius, Richard Eldridge and Johanna Krouk, Consortium for Energy Efficiency, *The State of the Efficiency Program Industry: Budgets, Expenditures and Impacts 2009*, 5 March 2010. States included are ME, MA, NH, VT, CT, RI, NY, NJ and PA; "3 percent" based on comparison with data from U.S. Department of Energy, Energy Information Administration, *Electric Power Annual 2010 Data Tables*, 9 November 2011.
- 42 Appliance Standards Awareness Project and Northeast Energy Efficiency Partnerships, *Energy Efficiency Standards Adopted and Pending by State*, November 2010.
- 43 Northeast Energy Efficiency Partnerships, *Furnace Efficiency Standards Timeline*, downloaded from [neep.org/uploads/NEEPResources/id808/Furnace%20Standards%20Timeline%20grid-%20Oct2011Update.pdf](http://neep.org/uploads/NEEPResources/id808/Furnace%20Standards%20Timeline%20grid-%20Oct2011Update.pdf), 20 January 2012.
- 44 American Council for an Energy-Efficient Economy, *U.S. Sets First Regional Energy-Saving Standards for ACs and Furnaces, Upgrades National Heat Pump Standards* (press release), 10 June 2011. Conversion based on 0.005 metric tons of carbon dioxide per therm from: U.S. Environmental Protection Agency, *Clean Energy: Calculations and References*, downloaded from [www.epa.gov/cleanenergy/energy-resources/refs.html](http://www.epa.gov/cleanenergy/energy-resources/refs.html), 20 January 2012.
- 45 Z.T. Taylor and R.G. Lucas, U.S. Department of Energy, *An Estimate of Energy Savings From IECC Change Proposals Recommended for Approval at the ICC's Fall, 2009, Initial Action Hearings*, May 2010.
- 46 Building Codes Assistance Project, Online Code Environment & Advocacy Network, *Code Status: Commercial*, downloaded from [bcap-ocean.org/code-status-commercial](http://bcap-ocean.org/code-status-commercial), 16 January 2012.
- 47 Building Codes Assistance Project, Online Code Environment & Advocacy Network, *Maine*, downloaded from [bcap-ocean.org/state-country/maine](http://bcap-ocean.org/state-country/maine), 16 January 2012.
- 48 Based on figures from Building Codes Assistance Project, Online Code Environment & Advocacy Network, *Energy Code Calculator*, 9 February 2010.
- 49 Union of Concerned Scientists, *Renewable Electricity Standards Toolkit: Timeline of Adoption of Renewable Electricity Standards*, downloaded from [www.ucsusa.org/clean\\_energy/res/overviewadoption.html](http://www.ucsusa.org/clean_energy/res/overviewadoption.html), 20 January 2012.
- 50 Mireya Navarro, "The Top 10 Solar States," *New York Times Green* blog, 29 April 2011.

- 51 Ryan Wiser and Mark Bolinger, Department of Energy, Energy Efficiency and Renewable Energy, *2010 Wind Technologies Market Report*, June 2011.
- 52 Larry Sherwood, Interstate Renewable Energy Council, *U.S. Solar Market Trends 2010*, June 2011.
- 53 Massachusetts Department of Environmental Protection, *Overview of the Global Warming Solutions Act (GWSA)*, downloaded from [www.mass.gov/dep/air/climate/gwsa.htm](http://www.mass.gov/dep/air/climate/gwsa.htm), 20 January 2012.
- 54 Massachusetts Executive Office of Energy and Environmental Affairs, *Massachusetts Clean Energy and Climate Plan for 2020*, 29 December 2010.
- 55 Connecticut Department of Energy and Environmental Protection, *Climate Change*, downloaded from [www.ct.gov/dep/cwp/view.asp?a=2684&q=322070](http://www.ct.gov/dep/cwp/view.asp?a=2684&q=322070), 20 January 2012.
- 56 State of Connecticut, Connecticut *Climate Change: Greenhouse Gas Reduction Strategies*, downloaded from [ctclimatechange.com/index.php/ct-happenings/progress-in-meeting-ghg-goals/](http://ctclimatechange.com/index.php/ct-happenings/progress-in-meeting-ghg-goals/), 20 January 2012.
- 57 Maryland Department of the Environment, *Facts About the Greenhouse Gas Reduction Act of 2009*, downloaded from [www.mde.state.md.us/assets/document/Air/ClimateChange/GGRA\\_factsheet.pdf](http://www.mde.state.md.us/assets/document/Air/ClimateChange/GGRA_factsheet.pdf), 20 January 2012.
- 58 See note 21.
- 59 See note 24.
- 60 See note 27. Note that New York Gov. David Paterson later, by executive order, established a goal of reducing emissions to 80 percent below 1990 levels by 2050. This long-term goal has guided the state's recent planning efforts.
- 61 Based on data from Department of Energy, Energy Information Administration, *State CO<sub>2</sub> Emissions*, October 2011. All data presented on emissions and the economy in this section comes from this source, unless otherwise noted.
- 62 Department of Energy, Energy Information Administration, *State-Level Energy-Related Carbon Dioxide Emissions, 2000-2009*, 9 January 2012.
- 63 Ibid.
- 64 Paul J. Hibbard, Susan F. Tierney, Andrea M. Okie and Pavel G. Darling, Analysis Group, *Economic Impacts of the Regional Greenhouse Gas Initiative on Ten Northeast and Mid-Atlantic States*, 15 November 2011.



