WORLD RESOURCES INSTITUTE

*Working Paper*

# GHG MITIGATION IN THE UNITED STATES: AN OVERVIEW OF THE CURRENT POLICY LANDSCAPE

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## EXECUTIVE SUMMARY

In 2009, at the 15th meeting of the Conference of the Parties, President Barack Obama pledged to reduce U.S. greenhouse gas (GHG) emissions "in the range of a 17 per cent emission reduction by 2020 compared with 2005 levels." To date, this pledge is not enshrined in or supported by any domestic law. However, a variety of federal policies and programs are directly and indirectly reducing GHG emissions. In addition, U.S. state and local governments have authority to adopt GHG-reduction policies, and some are taking noteworthy actions.

In the context of the U.S. GHG reduction goal, this report examines key existing and emerging federal policies that are likely to reduce GHG emissions in the United States. Pages 10-12 also provide examples of policy actions being taken by U.S. states. For federal policies, our discussion focuses on those that are mandatory or provide a financial incentive, such as the American Recovery and Reinvestment Act of 2009 (ARRA), tax credits for renewable energy, and new standards for passenger cars and trucks. These programs, and others that are considered in the pages that follow, will drive significant reductions in U.S. GHG emissions.

Will this be enough to meet U.S. GHG reduction goals? Although this report does not provide an exhaustive assessment of U.S. policies, U.S. government GHG projections suggest that additional policy action is likely to be necessary for the United States to achieve the president's GHG reduction target and continue significant emissions reductions after 2020. At this time, no promising initiatives are being considered in the U.S. Congress to drive further reductions in GHG pollution.

## CONTENTS





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## About this Series

This working paper is part of a series that provides an overview of the current policy landscape that key countries have pursued in the interest of GHG mitigation. For each country, the series:

- Describes the country's international mitigation pledge (e.g., GHG reduction commitment, Nationally Appropriate Mitigation Action), including assumptions and conditions associated with the pledge, and in what respect – if any – it is codified domestically
- Outlines the country's key government institutions and legal authorities for mitigating climate change
- Outlines major policy instruments related to GHG mitigation, current, and under development
  - Explains what is known about the country's GHG trajectory
  - Identifies issues to watch in the coming years

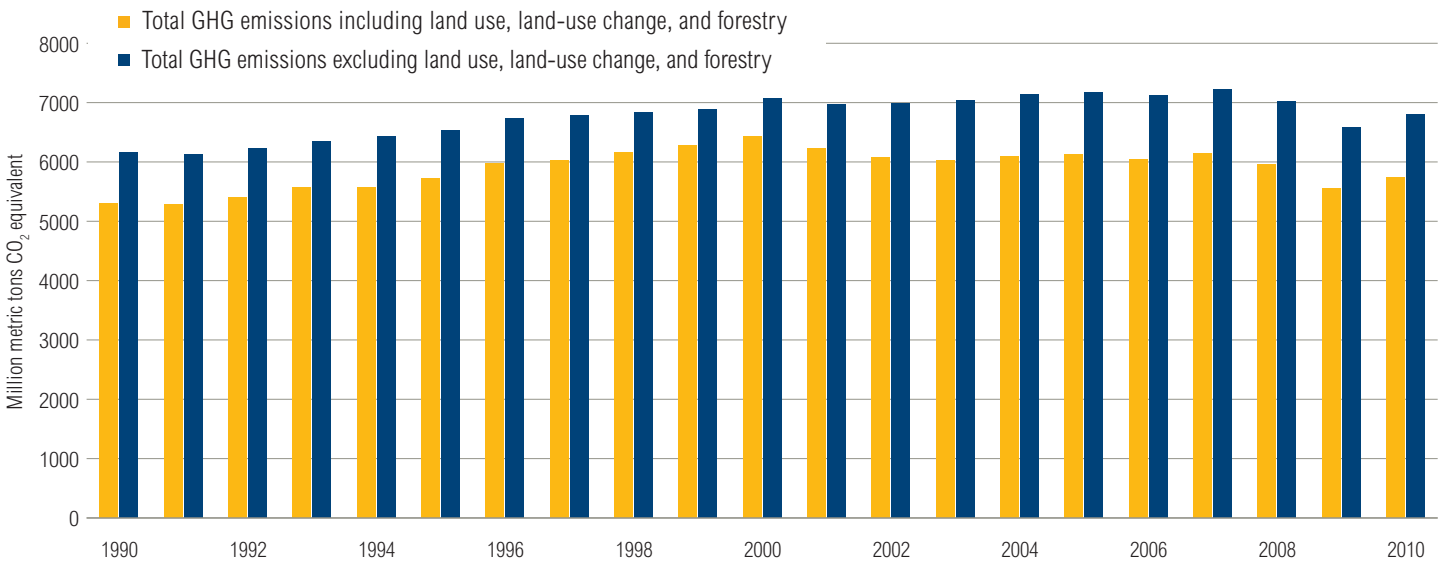
The series is intended to synthesize existing literature and expert opinion, help prioritize areas for further research, and lay a foundation for more detailed tracking and evaluation of climate policies. It can be found online at www.openclimatenetwork.org/analysis#policy.

However, federal agencies already have the authority to do more, and have begun to take action. Additional policies such as standards for existing power plants, additional energy efficiency standards for appliances and equipment, and policies that reduce HFC consumption, can drive additional reductions in 2020 and beyond. WRI is conducting a separate analysis to quantify the possible reductions from these policies and to examine their impact on the United States' 2020 reduction target.[1] Moving forward it will be important to track action on these and other policies.

## KEY METRICS

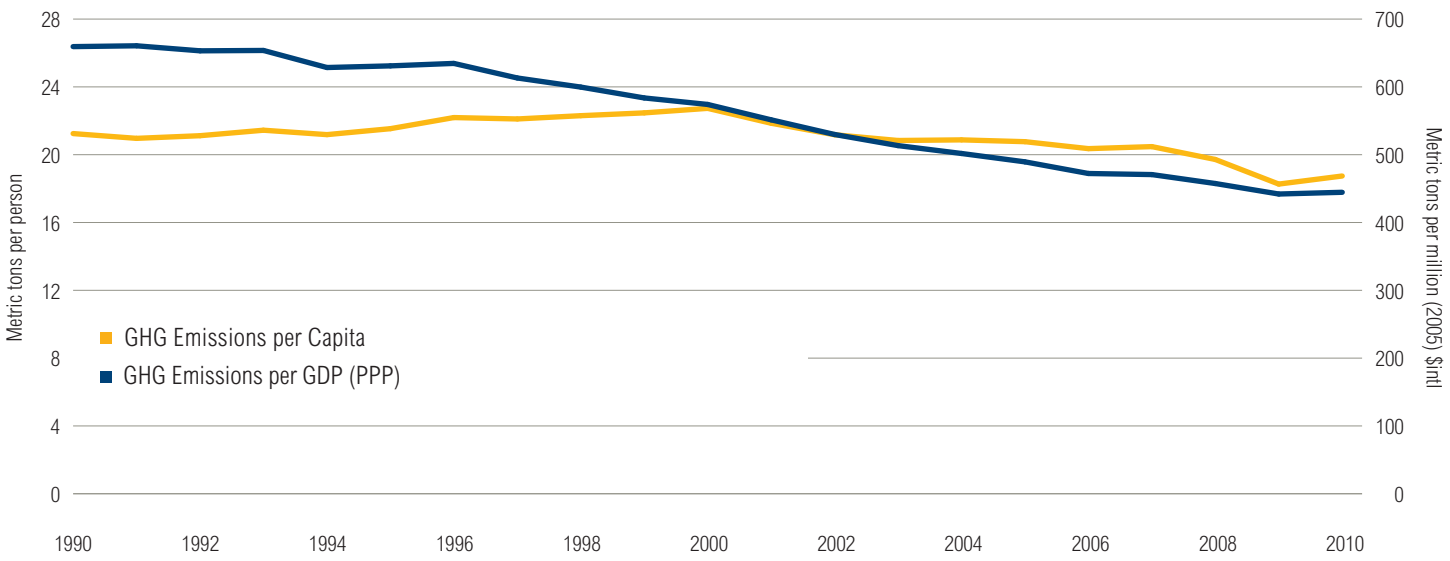
U.S. greenhouse gas (GHG)[2] emissions have increased 8 percent since 1990, peaking in 2000 at approximately 6,400 million tonnes carbon dioxide equivalent ($MtCO_2e$). Reported emissions for 2010 were 6 percent below 2005 levels (Figure 1).[3]

Figure 1 | **Total U.S. GHG Emissions**



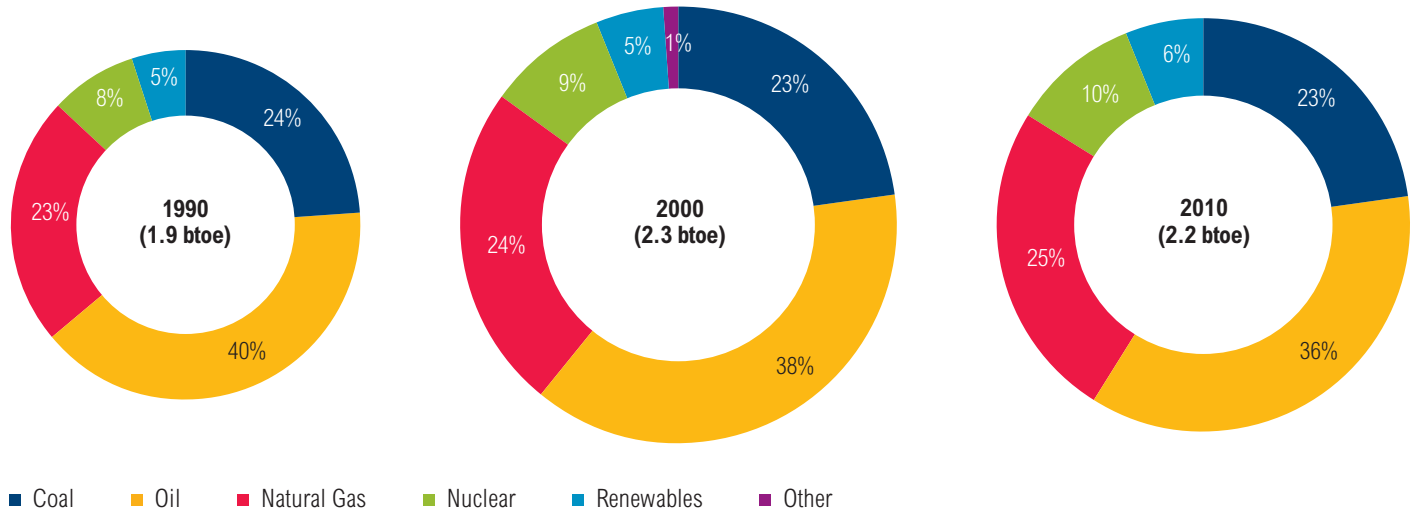

*Data Source:* UNFCCC 2012.
*Note:* Totals include GHG emissions of all "Kyoto" gases in each reported sector, where applicable, as required by the UNFCCC for Annex I countries.

Figure 2 | **United States GHG Emissions per Capita and GHG Emissions Intensity**




*Data Source:* Calculated using UNFCCC 2012 and World Bank 2012.
*Note:* GHG emissions totals include the land use, land-use change, and forestry (LULUCF) sector.

Figure 3 | **U.S. Fuel Mix: 1990, 2000, and 2010**




*Data Source:* IEA 2011.
*Note:* Other data sources, such as the U.S. Energy Information Administration, report a slightly higher percentage of energy from renewables (approximately 8 percent). See http://www.eia.gov/totalenergy/data/annual/showtext.cfm?t=ptb0101. Btoe = billion tonnes oil equivalent.

U.S. per capita emissions in 2010 were 12 percent and 10 percent below 1990 and 2005 levels, respectively. U.S. GHG emissions intensity, as defined on the basis of GDP,[4] declined 34 percent between 1990 and 2010 (Figure 2). Although partially attributable to changes in total emissions, these trends are also a result of a 24 percent increase in the population and a 64 percent increase in GDP[5] from 1990 to 2010.

The total consumption and share of coal and petroleum in the U.S. energy profile has decreased since 1990. In recent years, the economic recession, along with energy market dynamics, advancements in technology, and policy has influenced this trend. According to the International Energy Agency (IEA), in 2010, renewable energy (including hydro power, wind, solar, geothermal, and biomass) made up 6 percent of all energy consumption in the United States, increasing its share since 1990 (Figure 3). In addition to renewable energy, coal use in the United States is also increasingly being displaced by relatively lower-priced natural gas (i.e., fuel switching).[6] Forthcoming fuel mix charts for 2011 and 2012 should display this shift more prominently.

Box 1 | **Conditions Underlying the U.S. GHG Pledge**

**Conditions of International Reduction Goal:**
- Other Annex I Parties, as well as more advanced non-Annex I Parties, by 31 January 2010, associate with the Copenhagen Accord and submit mitigation actions for compilation into an information document in accordance with paragraph 4 or 5 of the Accord[15]

**Sectors Covered:**
- All sectors identified by the IPCC

**Gases Covered:**
- $CO_2$, $CH_4$, $N_2O$, HFCs, PFCs, $SF_6$, $NF_3$

**Use of International Carbon Credits:**
- Not clarified

# I: INTERNATIONAL STATEMENTS OF FUTURE GHG MITIGATION

## International Mitigation Pledge under the United Nations Framework Convention on Climate Change (UNFCCC)

In 2009, at the 15th meeting of the Conference of the Parties in Copenhagen, President Obama pledged a GHG emissions reduction target "in the range of a 17 per cent emission reduction by 2020 compared with 2005 levels."[7] The target reflects the level of reduction put forth in climate change legislation that was passed by the U.S. House of Representatives in June 2009, prior to the Copenhagen negotiations.[8] This legislation was not approved by the U.S. Senate.[9] Although this legislation failed to become law, U.S. State Department officials have reaffirmed the 17 percent reduction pledge at subsequent U.N. meetings.[10, 11]

Table 1 | **U.S. Pledged GHG Emissions Reductions by 2020**

| BASELINE OR BASE YEAR | ABSOLUTE CHANGE | PER CAPITA CHANGE[16] | GHG INTENSITY OF ECONOMY CHANGE[17] |
|---|---|---|---|
| 1990 | -4% including LULUCF<br>-3% excluding LULUCF | -29% including LULUCF<br>-28% excluding LULUCF | -47% to -54% including LULUCF<br>-47% to -53% excluding LULUCF |
| 2000 | -21% including LULUCF<br>-16% excluding LULUCF | -34% including LULUCF<br>-29% excluding LULUCF | -46% to -52% including LULUCF<br>-42% to -49% excluding LULUCF |
| 2005 | -17% including and excluding LULUCF | -27% including and excluding LULUCF | -37% to -43% including and excluding LULUCF |

*Note:* Data sources and calculation methodology based on Levin and Bradley 2010. Despite indications that the U.S. pledge will include an accounting of emissions/sequestration from the LULUCF sector, we also report totals excluding LULUCF here to facilitate comparisons to other countries' pledges.

### Conditions and Assumptions Underlying the International Pledge

Although this is not explicitly addressed in the text of the Copenhagen Accord, U.S. State Department officials have subsequently articulated that the U.S. pledge applies to all "Kyoto" gases ($CO_2$, $CH_4$, $N_2O$, HFCs, PFCs, $SF_6$), as well as $NF_3$, and all sectors and categories identified by the Intergovernmental Panel on Climate Change (IPCC), including land use, land-use change, and forestry (LULUCF).[12] This implies an estimated absolute GHG reduction "in the range of" 1,040 $MtCO_2e$ in 2020. If this level of reductions comes entirely from domestic sources,[13] then estimated total domestic GHG emissions in 2020 would be 5,078 $MtCO_2e$.[14]

It is also instructive to examine the relative magnitude of the pledge according to other base years and/or additional metrics (see Table 1).

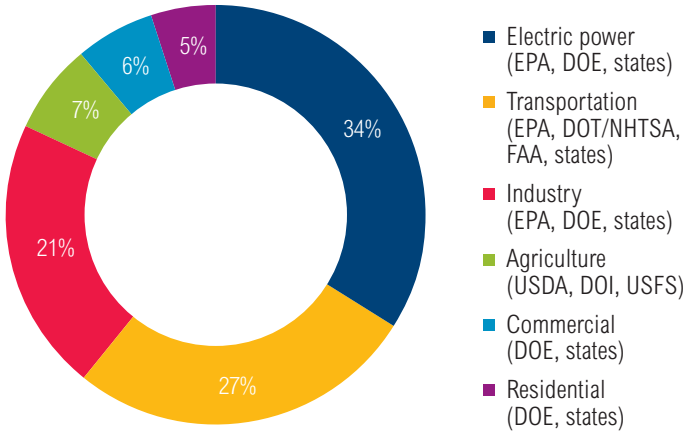
### Domestic Codification of the International Pledge

At this time, there is no legislation, executive order, regulation, or published plan with the explicit objective of ensuring that the United States will achieve its international emissions reduction pledge. The Obama administration has not publicly presented a plan detailing how the target will be achieved. However, policies and programs implemented by federal agencies and U.S. states according to provisions of existing U.S. laws and their own legal authorities are directly and indirectly reducing GHG emissions. These actions, and their implications for reaching the 17 percent reduction by 2020 target, are outlined in the following sections.

## II: RELEVANT GOVERNMENT INSTITUTIONS AND LEGAL AUTHORITIES

Any new national laws to reduce GHG emissions must pass both houses of the U.S. Congress and be signed by the president.[18] This applies to comprehensive programs aimed specifically at GHG mitigation such as H.R. 2454, the American Clean Energy and Security Act (also known as the Waxman-Markey bill), which failed to become law, as well as more targeted approaches such as a clean energy standard or renewable energy tax credits (examples of enacted tax credit legislation are discussed below). However, even in the absence of congressional action, a variety of existing laws provide authority to several federal agencies to protect public health and conserve energy, which can result in GHG emissions reductions. Figure 4 depicts these authorities

Figure 4 | **Key Sectors and Legal Authorities**




*Source:* Adapted from Bianco and Litz 2010, using EPA 2012.
*Note:* The LULUCF sector is excluded.

across the major GHG-emitting sectors. In addition, states and local governments have the ability to pass their own laws that can lead to reductions in GHG emissions.

At the federal administrative level, for example, the U.S. Department of Energy (DOE) has the authority to set energy efficiency standards for appliances and commercial equipment, the National Highway Transportation Safety Authority (NHTSA)[19] has the authority to improve the fuel efficiency of vehicles, and the U.S. Environmental Protection Agency (EPA) has the authority to regulate GHG emissions as well as other pollutants whose regulation would have implications for GHG emissions. Other federal agencies with authorities related to GHG emissions include the U.S. Federal Aviation Administration (FAA), which oversees air traffic; the U.S. Department of Agriculture (USDA), which develops programs related to agricultural and forested lands and practices; and the Department of the Interior (DOI), which stewards public lands.[20] It is important to note, however, that the governing statutes limit how each of the agencies can exercise its authority, and thus agency decisions are not directly coupled to the 17 percent target. While various rules have the effect of contributing to U.S. reductions, each agency's decisions on regulatory actions must be made according to the relevant provisions and decision-making criteria of U.S. domestic law.

The president can affect the speed and stringency with which regulations are issued, and the actions of agencies such as the EPA can be further constrained by the U.S. Congress, which can prevent a rule from going into effect through a variety of legislative vehicles. These include a joint resolution of disapproval under the Congressional Review Act, specific legislation designed to curtail or eliminate the agency's power to regulate, and riders (additional provisions) attached to spending and appropriations bills.[21] Congress can also change an agency's mandate or change the annual allocation of funds to federal agencies. Consequently, the U.S. Congress can have a significant impact on the effectiveness of various programs or policies. Indeed, during the 112th Congress, nearly 150 votes have been taken challenging the EPA's authority to regulate GHGs and other air pollutants.[22] However, to date, none of the legislative proposals to diminish the EPA's authority has become law. As with new climate change legislation, such actions would need to pass both houses of Congress and be signed by the president to become effective.

In addition to federal action, subnational entities, including counties and municipalities,, have some amount of autonomous authority to enact GHG-mitigation policies.[23] Each of the 50 U.S. states also has the authority to enact a range of climate- and energy-related policies that mitigate GHG emissions. Similar to federal policies, U.S. state initiatives may be economywide or can apply to a more limited number of sources or sectors.[24] U.S. states also have worked together to create regional initiatives. Finally, as noted below, for some policies such as building codes, the main decision-making and implementing authority (and therefore ability to reduce GHG emissions) rests with the states, and the federal government chooses to play a more limited role.

# III. OVERVIEW OF MAJOR POLICIES

## Introduction and Methods

In this report, we have elected to focus solely on two categories of national policies–mandatory requirements and financial incentives. We exclude voluntary initiatives, research and development programs, and awareness-raising efforts because, while they are also important, the GHG impact of many such programs is less certain than that of mandatory efforts. As a starting point for this analysis, we draw from the fifth National Communication of the United States of America (NC5), which was submitted to the UNFCCC Secretariat in May 2010, as required of Annex I countries under the U.N. Framework Convention on Climate Change, and summarizes many of the activities and initiatives currently underway or in development in the United States that have the potential to mitigate GHG emissions.[25] We have supplemented and updated the NC5 content with additional research.

In Part III, we have further classified this subset of policies. "Existing" policies are those where the policy has taken effect and its implementing regulations have been defined and adopted. We provide descriptions for those mandatory and financial federal policies that meet one of the following requirements: (1) they are estimated to reduce GHG emissions by at least 10 $MtCO_2e$ in 2020 according to figures reported in NC5, and (2) they have been enacted since 2005. Therefore, this is by no means a comprehensive assessment of U.S. climate-relevant policy actions. A summary of important U.S. state policies is also included.

If the policy has been enacted but is still awaiting implementing regulations, we have classified it as a policy "in development" and provide an overview of the steps required for these policies to be fully implemented. A summary list of the policies discussed in Part III is provided in Table 2.

## Existing Policies

### Cross-sectoral

The American Recovery and Reinvestment Act of 2009 (ARRA), otherwise known as the "stimulus package," was passed in an effort to spur economic growth and counter the effects of the global recession that began in 2008. ARRA injected more than US$800 billion into the U.S. economy through tax cuts and dedicated investments. It included an allocation of tens of billions of dollars in dedicated funding for energy efficiency and clean energy programs and incentives, as well as billions more to support related research, public land management, and public transportation activities. Among its allocations, ARRA included:

- US$14 billion for the extension and modification of renewable energy production and investment tax credits (see below) to promote and support the development of low-carbon energy sources;
- US$5 billion for the Weatherization Assistance Program to help low-income families improve the energy efficiency of their homes;

- US$3.2 billion to fund the Energy Efficiency and Conservation Block Grants program to provide funding for state and local governments to implement energy efficiency and conservation programs;
- US$3.1 billion to the State Energy Program to provide grants to states for renewable energy and energy efficiency projects; and
- US$300 million to fund Energy Efficiency Appliance Rebate Programs to provide payments to consumers who purchase energy efficient appliances.[26]

ARRA provided a considerable one-time increase in public investment in energy efficiency, clean energy, and other GHG-mitigation-related activities in the United States. It is critical to note that ARRA was passed under extraordinary circumstances and at this time nearly all funds have been dispersed. Comparable federal investments are not expected in the near future.[27]

## Electric Power

The electricity sector accounts for approximately one-third of total U.S. GHG emissions.[28] Although it is the largest emissions source in the United States, no comprehensive federal regulatory policy—such as a renewable electricity standard or renewable portfolio standard—sets definitive targets for the electricity sector to reduce GHG emissions. However, several policies are likely to lead to emissions reductions in this sector. These include financial incentive programs, such as tax credits and loan guarantees, and regulatory actions. This sector is also significantly impacted by market forces, such as the declining price of natural gas; these are discussed briefly in Part V.[29]

The production tax credit (PTC)—originally enacted in the Energy Policy Act of 1992—provides a federal tax rebate for wind, biomass, geothermal, and certain other technologies of 1.1–2.2 cents per kilowatt-hour (kWh) of renewable energy generated based on the generation technology.[30] Qualifying facilities can claim the PTC for the first 10 years of generation. Notably, the PTC has expired and been reauthorized by Congress several times during the last 20 years. These policies have supported the growth of renewable energy development and deployment, but at times their intermittency has led to volatility in the market.[31]

ARRA extended the PTC to wind facilities placed into service by the end of 2012 and to other qualifying renewable energy facilities[32] by the end of 2013. ARRA also enabled

Table 2 | **Selected Policies in the U.S. That are Likely to Reduce Domestic GHG Emissions**

| SECTOR | POLICY NAME |
|---|---|
| Cross-sectoral | ■ American Recovery and Reinvestment Act of 2009 (ARRA) |
| Electric Power | ■ Production Tax Credit and Investment Tax Credit for Renewable Energy<br>■ Loan guarantee programs for nuclear power<br>■ Regulations of $SO_2$, $NO_x$ mercury, and other air toxics<br>■ New source performance standards for new and existing power plants |
| Energy Supply | ■ New source performance standards for new and existing refineries |
| Buildings | ■ Commercial and residential building codes<br>■ New appliance and equipment efficiency standards |
| Transport | ■ Fuel economy and GHG emissions standards for passenger vehicles and light-duty trucks and medium- and heavy-duty trucks.<br>■ Renewable fuels standard |
| Other – Fugitive Emissions | ■ Regulations to reduce emissions of volatile organic compounds (VOCs), $SO_2$, and air toxics from oil and natural gas systems |

*Note:* Grey denotes policies currently under development.

PTC-qualifying facilities to claim the federal business energy investment tax credit (ITC)—a rebate based on project capital investment rather than electricity output—or a cash grant instead of the PTC.[33] This revision provided more flexibility for renewable energy developers than previous iterations of the PTC and ITC. However, those ARRA provisions expired at the end of 2011, meaning that projects started this year are not eligible for these specific benefits. Without congressional action, the PTC is currently set to expire at the end of 2012 for wind and at the end of 2013 for other resources.[34] The ITC is set to expire at the end of 2016.[35]

The NC5 reports an estimated 14.4 $MtCO_2e$ of GHG reductions from new nuclear power by 2020. Existing policy drivers for nuclear power include loan guarantee programs. For example, in 2010 the DOE offered a conditional commitment loan of US$8.33 billion to Georgia Power Company for the construction of two new nuclear reactors under Section 1703 of the Energy Policy Act of 2005.[36] When completed, the DOE estimates that this project would avoid the emission of approximately 9.3 $MtCO_2e$ (10.3 million short tons of $CO_2$) annually.[37] With recent approval by the Nuclear Regulatory Commission, Georgia Power's reactors—the first to be built in the United States in the 21st century—are expected to be commercially operational by 2016–17.[38]

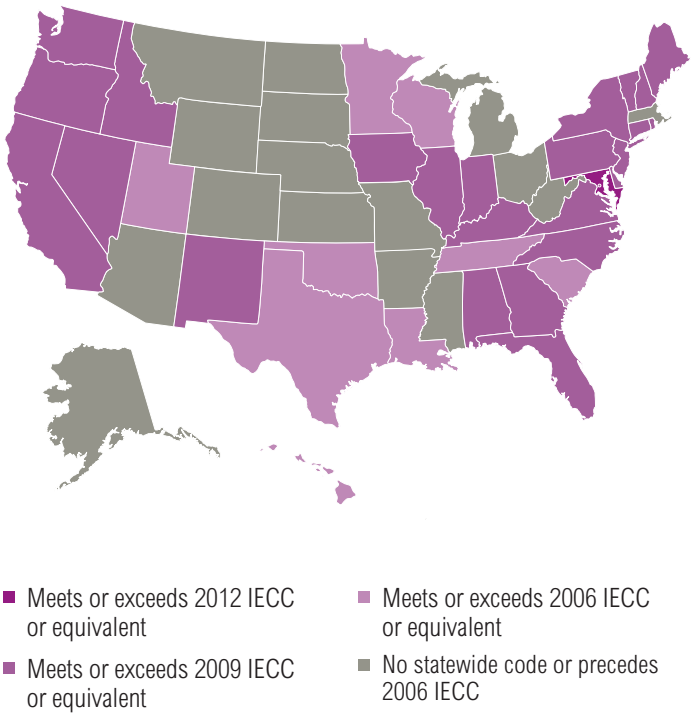
The EPA has also finalized a number of other non-GHG-related environmental regulations that are expected to result in a reduction in GHG emissions from power plants. This includes rules to reduce emissions of sulfur dioxide ($SO_2$), nitrogen oxides ($NO_x$), and mercury and other air toxics.[39] Some modeling has suggested that these rules could lead to the retirement of old, inefficient, coal-fired power plants.[40] However, the net GHG impact of such retirements is unclear and may be lessened by increased operation of remaining plants. In addition, the EPA recently proposed performance standards for new electricity sources. These standards are discussed below.

## Buildings

According to recent statistics, "buildings in the U.S. consume 39% of all energy use, 74% of electricity, and are responsible for 38% of carbon emissions."[41] Therefore, initiatives that reduce the energy consumed in residential, commercial, and government building spaces can lead to significant reductions in GHG emissions.

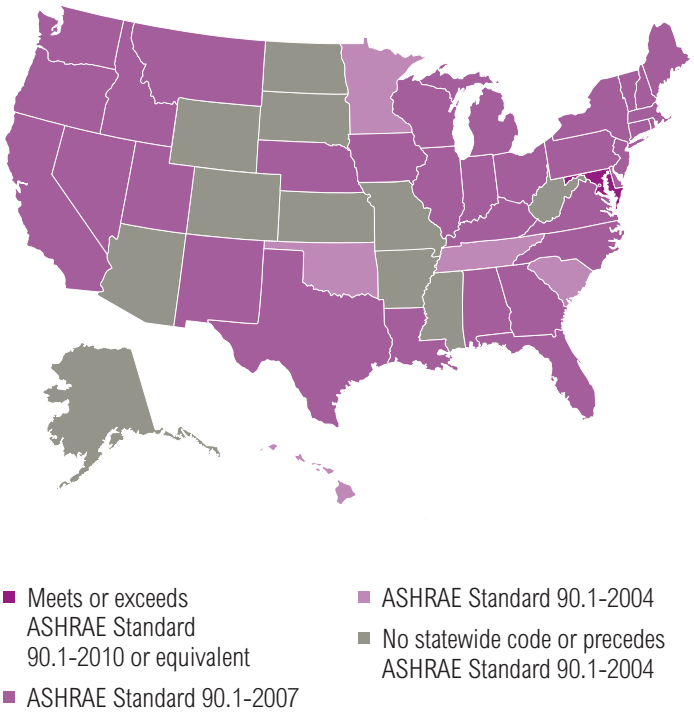
The Buildings Regulatory Program (BRP) of the DOE's Office of Energy Efficiency and Renewable Energy establishes "model" building energy codes. These model codes are largely based on building codes established by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) and the International Energy Conservation Code (IECC) for commercial and residential buildings, respectively. When new versions of commercial and residential building code standards are released by ASHRAE or the IECC, the BRP is obligated by law[42] to determine whether the new editions of these codes will improve energy efficiency in the U.S. built environment. If so, the BRP revises commercial and building standards accordingly. The most recently adopted model codes are the ASHRAE Standard 90.1-2010 code for commercial buildings (October 2011) and the 2009 IECC code for residential buildings (July 2011).

Figure 5 | **Residential Building Codes**




*Note:* Building Code Maps adapted from the Online Code and Advocacy Network (OCEAN) (http://energycodesocean.org/code-status as of November 9, 2012).

Figure 6 | **Commercial Building Codes**




*Note:* Building Code Maps adapted from the Online Code and Advocacy Network (OCEAN) (http://energycodesocean.org/code-status as of November 9, 2012).

However, the BRP's model national building codes are not legally binding.[43] Instead, U.S. states and municipalities have historically controlled building code policies directly affecting new and existing buildings. As a result, the stringency of commercial and residential building codes adopted by U.S. states varies considerably (see Figures 5, 6), and the level of compliance at the state and local level is uncertain and uneven.

In an effort to improve state building codes, ARRA made state funding for the State Energy Program contingent upon states' adopting building energy codes that meet or exceed Standard 90.1-2007 for new commercial buildings and IECC 2009 for new residential buildings, and to develop a plan that achieves a 90 percent compliance with these target codes by 2017 (i.e., within 8 years of ARRA's passage).[44] As Figures 5 and 6 show, a number of states have yet to adopt these codes. With increasingly stringent commercial and residential building codes, the NC5 report estimates GHG emissions reductions of 11.3 $MtCO_2e$ by 2020.

## Transport

The transportation sector in the United States accounts for approximately 27 percent of total GHG emissions,[45] making it the second-largest emissions source (behind electricity generation). With approximately eight vehicles in the United States for every 10 people,[46] this sector is particularly critical for mitigation efforts. Recent actions have improved vehicle performance and reduced the carbon intensity of fuels.

### VEHICLE STANDARDS

In August 2012, the EPA and NHTSA finalized new fuel economy and GHG standards for passenger cars and light-duty trucks for model years (MY) 2017–25 that would equate to a fleetwide average of 54.5 mpg (23.2 km/liter) if they were met solely through fuel economy improvements. When combined with standards adopted in 2010 for MY 2012–16 passenger cars and light-duty trucks and previous standards set for MY 2005–11, these proposed regulations will result in MY 2025 light-duty vehicles with nearly double the fuel economy compared to MY 2010 vehicles and are estimated by the EPA to cumulatively save over 2 billion metric tons of $CO_2$ over the life of vehicles sold during the programs.[47] In addition, in 2011 the EPA and NHTSA finalized fuel efficiency and GHG emissions standards for MY 2014–18 medium- and heavy-duty vehicles.[48] These agencies report that this rule will reduce $CO_2$ emissions by approximately 270 million metric tons over the life of vehicles sold during the 2014–18 model years.[49]

### FUELS

The Energy Independence and Security Act of 2007 sets new targets for refiners and blenders to increase their use of ethanol and other renewable fuels for transportation, starting at 9 billion gallons in 2008 and increasing to 36 billion gallons by 2022. The vast majority of the biofuel produced in the United States today is corn-derived ethanol, on which the renewable fuels standard (RFS) places a cap of 15 billion gallons by 2015. By 2022, the remaining 21 billion gallons must include biofuels derived from cellulose and, to a lesser extent, biodiesel and "advanced biofuels" of unspecified origin. The law also provides for the EPA to adjust the required amount of renewable fuels on an annual basis in case cellulosic or advanced biofuel technologies and production capacities are not practically achievable. This is based on a determination of feasibility by the EPA (i.e., considering environmental and market factors). For example, the EPA expects that U.S. companies will have the capacity to produce nearly 10.5 million

gallons of cellulosic biofuel in 2012, a small fraction of the original goal of 500 million gallons. However, the EPA expects there to be sufficient volumes of other advanced biofuels and corn ethanol to meet this year's goal of 15.2 billion gallons of total renewable fuels.[50] The law also sets specific life-cycle GHG performance thresholds for all fuels covered under the RFS, requiring them to emit fewer greenhouse gases than the petroleum fuels they replace. However, the legislation grandfathered all production capacity under construction or already in place, effectively exempting all corn-based ethanol and biodiesel from GHG limits.[51] NC5 reports that the RFS will provide an estimated GHG mitigation impact for 2020 of 138 $MtCO_2e$.

### Other – Fugitive Emissions

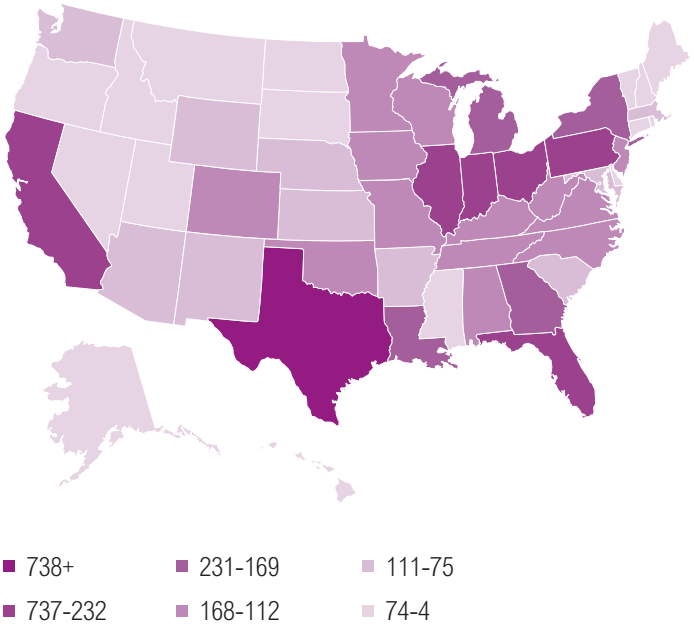
In April 2012, the EPA finalized a suite of four regulations that aim to reduce emissions of volatile organic compounds (VOCs), sulfur dioxide ($SO_2$), and air toxics from oil and natural gas systems.[52] These regulations include the first federal air standards for wells that are hydraulically fractured. The EPA estimates that the new standards will have the cobenefit of reducing methane emissions from wells, storage tanks, and other equipment by an estimated 19–33 $MtCO_2e$ annually (oil and natural gas production and processing accounts for approximately one-third of all U.S. methane emissions).[53]

## U.S. State Policies[54]

As is the case in other areas of public policy, U.S. states have often led the federal government in experimenting with and adopting climate and energy policies.[55] Although U.S. states' legislative and administrative/agency rulemaking processes are similar to those at the federal level (see Part II), a number of U.S. states have developed and implemented climate and energy policies to meet their own specific circumstances. Indeed, emissions reductions from U.S. state policies can be significant, especially if stringent policies are adopted in states with large economies and/or large populations, and therefore larger GHG contributions (Figure 7).

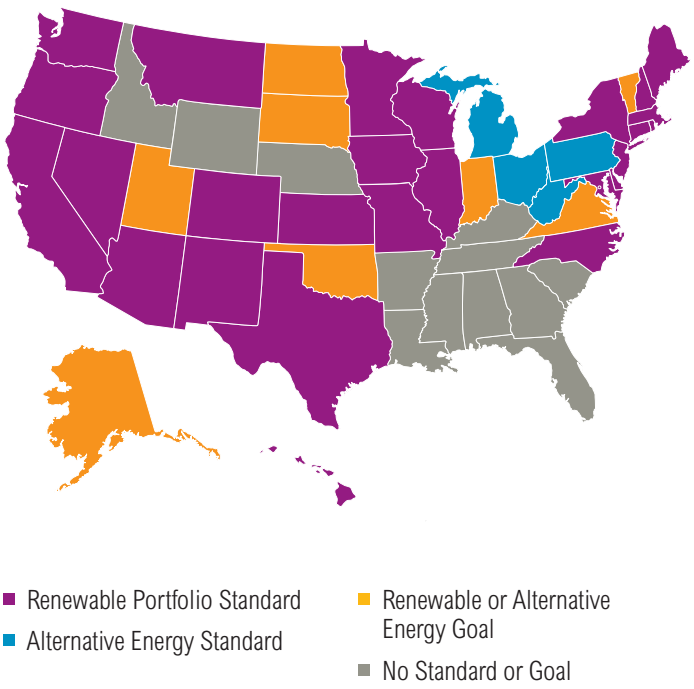
For example, some states have set GHG emission regulations for new fossil fuel–fired power plants and/or GHG emission reduction targets for 2020,[56] and more than half of U.S. states have established their own renewable energy or energy efficiency resource standards, albeit with varying levels of ambition (Figures 8 and 9).[57]

Figure 7 | **U.S. State GHG Emissions in 2009**



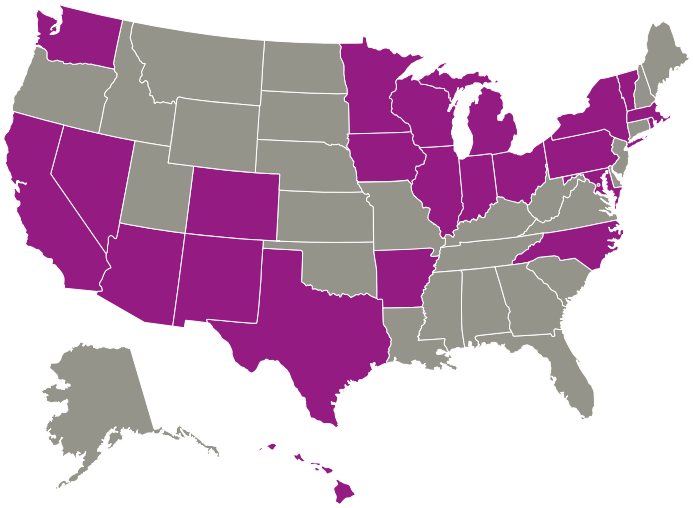

*Source:* WRI, CAIT – http://cait.wri.org/cait-us.php.
*Note:* Totals exclude emissions or sequestration of $CO_2$ from LULUCF.

Figure 8 | **U.S. State Energy Portfolio Standards**




*Note:* Adapted from C2ES (http://www.c2es.org/what_s_being_done/in_the_states/rps.cfm - as of October, 2012) and DSIRE (http://www.dsireusa.org/documents/summarymaps/RPS_map.pdf)

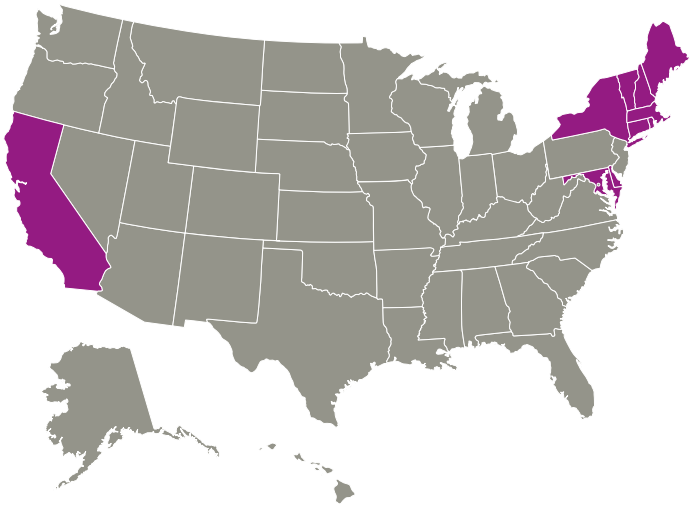
Figure 9 | **U.S. State Energy Efficiency Resource Standards**



■ State Energy Efficiency Resource Standard ■ No State Energy Efficiency Resource Standard

*Note:* Adapted from ACEEE (http://www.aceee.org/files/pdf/policy-brief/state-eers-summary-0912.pdf, as of September 2012). Energy efficiency provisions are included in the RPS for Hawaii, Nevada, and North Carolina.

Figure 10 | **U.S. States with Cap-and-Trade Programs**



■ Cap-and-Trade Program ■ No Cap-and-Trade Program

In addition, a consortium of northeastern U.S. states has implemented an electricity-sector cap-and-trade program to reduce electricity sector $CO_2$ emissions, and California is implementing an economywide cap-and-trade program (Figure 10).

## RGGI

The Regional Greenhouse Gas Initiative (RGGI) is a cap-and-trade program for the electric power sector in nine northeastern U.S. states.[58] It was the first GHG cap-and-trade program in the United States. The program commenced in 2009 with an annual emissions cap of 188 million short tons of $CO_2$ for the region. It was designed to stabilize emissions through 2015, and then to gradually reduce emissions so that they are 10 percent below baseline levels in 2018. These states' electricity sectors account for approximately 6 percent of U.S. electricity sector GHG emissions and 2 percent of total U.S. GHG emissions.[59]

Total GHG emissions from electricity production have fallen approximately one-third in the region since the program started.[60] A RGGI Inc. white paper concluded that this is primarily due to changes in relative fuel prices (31 percent), the available capacity mix (21 percent), and lower demand (48 percent). It further concluded that the economic downturn only accounted for 4.4 percent of the region's emissions reductions.[61] The RGGI retired most unsold allowances from the first compliance period[62] and is currently going through a program review that could lead to an increase in program stringency.[63]

A recent report by the Analysis Group suggests that the RGGI program has injected US$1.6 billion into the region's economy and created 16,000 jobs since it launched in 2009.[64] Much of this benefit has resulted from the region's heavy investment in energy efficiency. The RGGI states have auctioned over 90 percent of the distributed emissions allowances,[65] generating some US$952 million[66] through December 2011 for participating states, nearly one-half of which has gone to support energy efficiency programs.[67]

### California

In addition, the state of California is moving ahead on implementing a comprehensive climate program to comply with Assembly Bill 32, the Global Warming Solutions Act of 2006, which sets out to reduce state GHG emissions to 1990 levels by 2020. California currently accounts for approximately 14 percent of the national economy and 7 percent of U.S. GHG emissions.[68] California's approach includes, among other initiatives, a low-carbon fuel standard, a 33 percent renewable portfolio standard, expanding and strengthening energy efficiency programs and standards, and policies and incentives for meeting transportation-related GHG emissions targets for regions throughout California.

California is also working to implement a statewide, multisector cap-and-trade program as part of its strategy. When fully implemented, the cap-and-trade program will affect sources that cumulatively account for approximately 85 percent of California's GHG emissions. The regulations for the program are in place and underlying infrastructure for implementing the cap-and-trade program is being set up over the course of 2012, with the program taking effect January 1, 2013. The initial allowance auction for California's program was held on November 14, 2012. As part of the Western Climate Initiative,[69] California is expected to link its program with the program in the Canadian province of Quebec. California and Quebec are currently putting in place the rules for linking their programs, which they expect will occur in early 2013. Linkages may also be possible with programs being considered by the provinces of Ontario and British Columbia.

## Policies under Development

In addition to existing policies and programs, several major policies are currently under development that could have a significant effect on GHG emissions. As these regulations/policies are not yet finalized, they do not have legal status that would ensure compliance with their provisions or ensure emissions reductions. In addition, legal challenges to proposed rulemakings or standards could delay implementation.

### Performance Standards for Power Plants

In December 2010, as a result of a legal settlement agreement with U.S. states and environmental groups, the EPA announced that it would propose the first GHG performance standards for new and modified power plants and mandatory emissions guidelines for existing power plants using their authority under the Clean Air Act.[70] On April 13, 2012,[71] the EPA released a proposed set of performance standards for new power plants.[72] These standards are important because approximately one-quarter of fossil fuel–fired power plants in the United States are over 40 years old and reaching an age when they will be retired.[73] Replacement plants and the emissions they generate could be "locked in" for decades to come. The proposed standards establish an emissions rate of 454 $kgCO_2$/MWh (1000 lbs./MWh) for new power plant facilities larger than 73 megawatts. This is approximately equivalent to the emissions rate of a typical new combined cycle natural gas plant.[74] The standard itself does not prescribe particular technologies or fuels, and thus a coal plant could meet this standard through carbon capture and storage.[75]

The EPA has not yet proposed standards for existing power plants. This is important as previous analysis by WRI suggests that existing plants have the ability to make significant reductions in GHG emissions.[76] In the settlement agreement, the EPA announced that these standards would be proposed by July 26, 2011, and finalized by May 26, 2012. They have not met either deadline, and it is not clear when the EPA will propose regulations for existing power plants although such standards could be proposed in 2013 (Figure 11).

### Performance Standards for Refineries

In December 2010, the EPA agreed in a separate settlement agreement that it would also issue emissions standards for new and modified refineries, as well as guidelines for existing refineries.[78] These regulations would be proposed by December 10, 2011, and finalized by November 10, 2012. The EPA has not met these deadlines, and it is not clear when the EPA will release proposed regulations for these sources (Figure 12).

Figure 11 | **Process for Implementing Performance Standards for Power Plants**

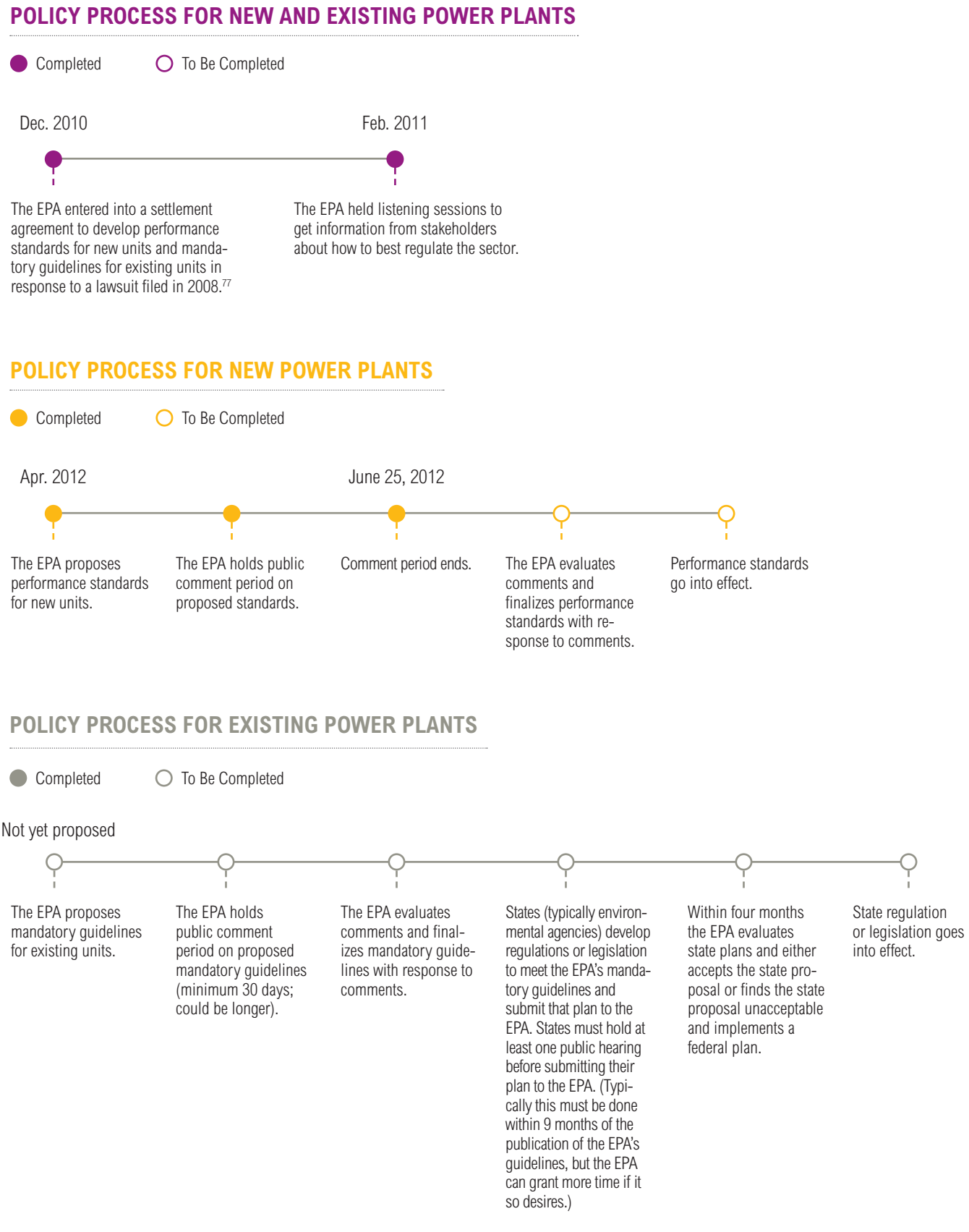
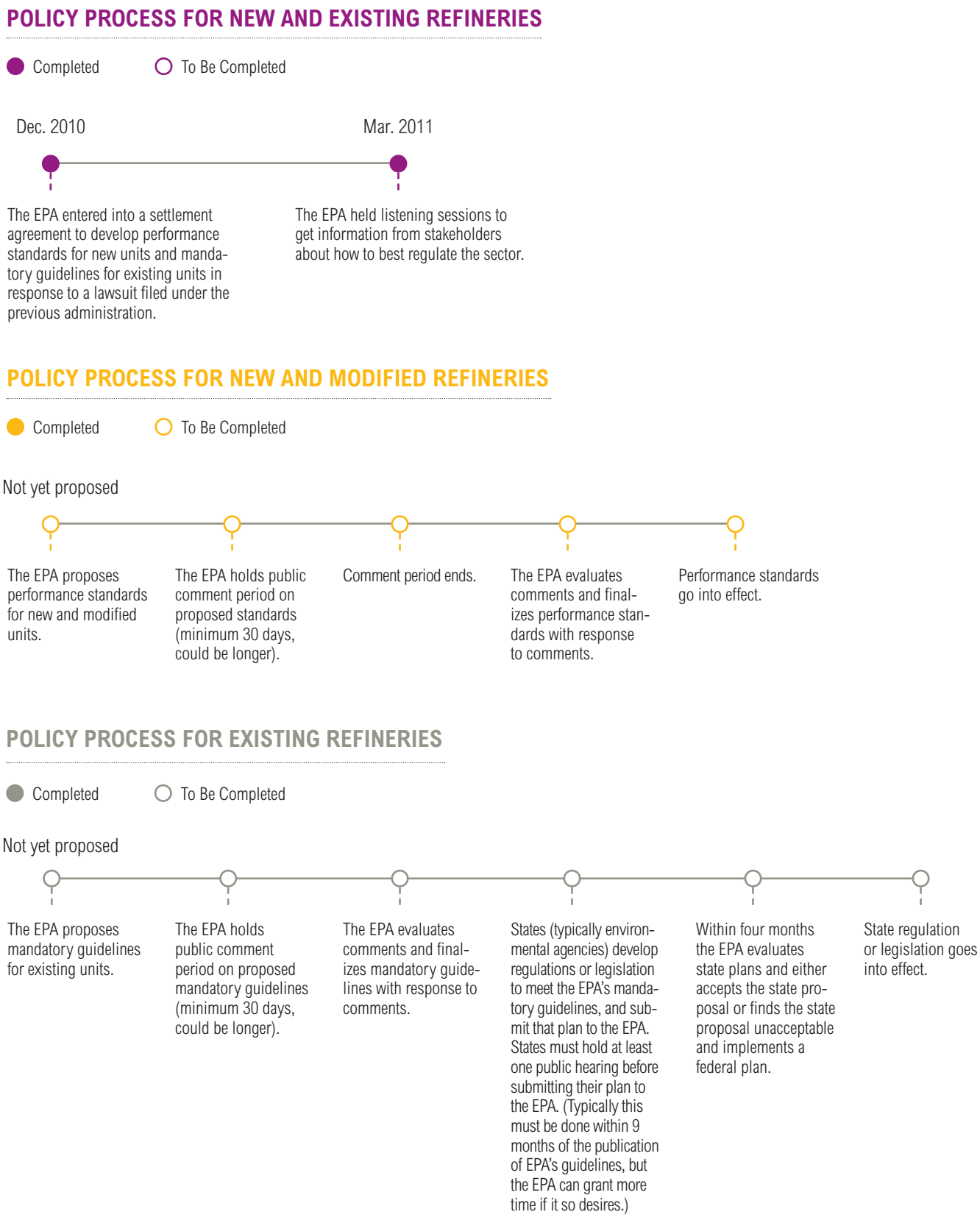


Figure 12 | **Process for Implementing Performance Standards for Refineries**



### Additional Appliance and Equipment Efficiency Standards

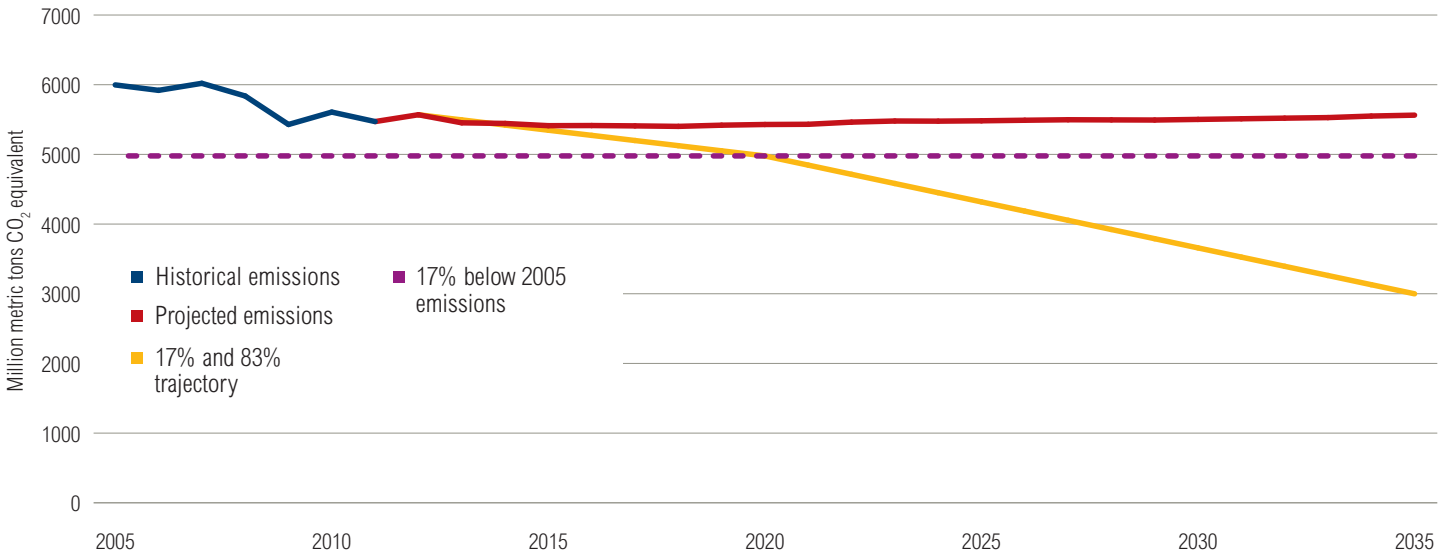
U.S. appliance and equipment standards are maintained under the purview of the DOE's Appliance Standards Program. These standards—issued through rulemakings—are updated periodically to set minimum efficiency standards for more than 30 commercial and residential products. In 2006, the DOE acknowledged that a significant backlog of rulemaking activities had accrued due to departmental priority-setting policies.[79] Since then, and with further mandates through the Energy Independence and Security Act of 2007, the frequency of rulemakings has increased as the Appliance Standards Program addresses the backlog and increases the overall number of annual product efficiency standard rulemakings. Although proposed deadlines continue to be missed on occasion, the DOE has articulated a clear schedule for forthcoming rulemakings across all existing product categories.[80] The DOE is also setting efficiency standards for new appliance and equipment categories. The status of appliance and equipment efficiency rulemakings are tracked by the Appliance Standards Awareness Project.[81] Between 2009 and 2011, the DOE established 17 new standards, which are expected to save 126.2 terawatt-hours (TWh) of electricity in 2025 and 146.8 TWh in 2035 according to the Appliance Standards Awareness Project.[82]

## IV: GHG PROJECTIONS

This section provides an overview of how existing policies and policies in development may affect the national GHG emissions trajectory.

In July 2010, the World Resources Institute (WRI) published a report that examined and quantified opportunities for reducing U.S. GHG emissions through existing federal authorities and state action.[83] The analysis produced three plausible scenarios that, together, provide a range of GHG emissions reductions that could be achieved by the administration acting through its agencies (e.g., EPA and DOE) using authorities granted by past Congresses. The analysis found that if federal agencies and states pursue an aggressive ("go-getter") path and move strongly to achieve the reductions that published literature suggests are feasible, the United States could achieve significant reductions in emissions. Those reductions approach, but fall short of, President Obama's pledge to reduce GHG emissions 17 percent below 2005 levels by 2020. Congressional actions or further actions to reduce emissions associated with land use and land-use changes, which were not considered in the report, could close the gap, and might enable the United States to meet its target.

Figure 13 | **Historic and Projected U.S. Energy-Related $CO_2$ Emissions**




*Data Sources:* EIA 2012a,b and WRI calculations.

In addition, the economic downturn significantly reduced energy consumption across all sectors and net GHG emissions fell approximately 9 percent between 2007 and 2009 (see Key Metrics).[84] WRI is currently working to update the report to examine how these and other recent economic trends, such as low natural gas prices, and the ambition of more recently finalized and proposed policies will impact the ability of the United States to meet the president's 17 percent reduction target.

At this time, the best assessment of where the United States is headed in terms of GHG emissions is provided by the U.S. Energy Information Agency.[85] Each year it publishes an Annual Energy Outlook (AEO), which projects U.S. energy-related $CO_2$ emissions out to 2035 based on policies already "on the books" and the latest economic projections.[86] The latest version, the Annual Energy Outlook 2012, was published in June 2012. It contains an emissions scenario that includes the recently finalized standards for light-duty vehicles (discussed in Part III, Existing Policies), which projects that energy related $CO_2$ emissions will fall 9.5 percent below 2005 levels by 2020 (Figure 13).[87]

Note that these projections do not include the EPA's proposed performance standards for new power plants (discussed in Part III, Policies in Development). However, the EPA's proposed performance standards for new power plants are not expected to significantly affect new GHG emissions through 2020, since a variety of factors (including natural gas prices, discussed below) have made it unlikely that additional new coal plants will be built in the near term. The latest AEO suggests that without the standards for new units, new, unplanned[88] coal plants would not be built until 2030. However, the EPA's proposal remains significant as it helps ensure that U.S. power plant emissions will not rapidly increase in the future as a result of new coal plants without GHG emissions controls.

The U.S. government does not annually publish projections of nonenergy and non-$CO_2$ GHG emissions, which accounted for 21 percent of U.S. emissions in 2010 (1,434 $MtCO_2e$). However, in August 2011, the EPA released draft projections as part of a global assessment.[89] Those projections estimated that in 2020 nonenergy and non-$CO_2$ GHG emissions would be 10 percent higher than 2010 levels (which according to the EPA's emissions inventory are comparable to 2005 emissions).[90] Since that time, the only major new regulations to go into effect that would impact trajectories of these emissions were the EPA's regulations for natural gas systems (discussed in Part III), which the EPA estimates will reduce methane emissions by 19 to 33 $MtCO_2e$ annually (1 to 2 percent of estimated 2010 emissions from nonenergy and non-$CO_2$ sources).[91]

This suggests that the United States will need to take further action if it is to meet its 2020 target of 17 percent below 2005 levels by 2020.

## V: LOOKING AHEAD

Despite the lack of comprehensive climate legislation to directly support President Obama's international emissions reduction pledge, Part III describes policies and programs that are being implemented in accordance with provisions of U.S. domestic law and are expected to mitigate GHG emissions. The question is whether these efforts will continue, and whether they will be sufficient for the United States to meet the 17 percent reduction target by 2020 and to shift more aggressively to a low-carbon economy after 2020. This uncertainty results partially from incomplete information regarding policy adoption timelines, stringency, financial support, and enforcement.

Coupled with these factors is the shifting dynamic in fossil fuel prices. For example, low prices for natural gas[92] have led to a recent shift in electric generation from coal to natural gas.[93,94] The percentage of electricity generated from coal in the United States has declined from approximately 50 percent in 2007 to approximately 40 percent in early 2012. Whether this is a permanent change is not yet clear, and how significant this change is for near-term emissions reductions is also uncertain. However, it seems likely that natural gas, in particular, will significantly influence GHG emissions out to 2020. At the same time, an increased supply of natural gas in the United States could signal potential "lock-in" of gas as a major energy source over the long-term, which could crowd out renewables.

## Additional Mitigation Policies

Several additional mitigation policies not described as "in development" in Part III could promote further emissions reductions and help the United States move closer to its 17 percent reduction target. These policies include:

- **REDUCTIONS OF HYDROFLUOROCARBON (HFC) EMISSIONS.** The United States is currently seeking to amend the Montreal Protocol and reduce emissions of high-global-warming-potential (GWP) HFC emissions. In April 2012, the United States, Canada, and Mexico resubmitted joint amendments to the Montreal Protocol on Substances That Deplete the Ozone Layer. These amendments would phase down consumption and production of high-GWP HFCs. According to analysis by the EPA, these amendments would lead to cumulative worldwide emissions reductions of 4,000 $MtCO_2e$ through 2020 and 98,000 $MtCO_2e$ through 2050.[95] The EPA currently has authority under the Clean Air Act to reduce emissions of HFCs and has already begun to take action. The recent vehicle standards include provisions to reduce HFC emissions. In addition, the EPA continues to approve new, low-GWP alternatives through its Significant New Alternatives Policy (SNAP) program.

- **ADDITIONAL STANDARDS FOR MEDIUM- AND HEAVY-DUTY VEHICLES.** Analysis suggests that greater improvements are possible over time.[96] Although these are not likely to have a significant effect on GHG emissions by 2020, standards set for model years 2019 and beyond could be important after 2020.

- **ADDITIONAL EMISSIONS REDUCTIONS FROM OTHER HIGH-GWP GASES, SUCH AS METHANE.** The EPA could move forward with additional standards for methane sources, such as natural gas systems, landfills, and coal mines.

For a more comprehensive list of policies that U.S. federal agencies can adopt without further action by Congress, see Bianco and Litz 2010.

## The U.S. Political Environment

At this time there are currently no bills before the U.S. Congress that would drive reductions in GHG pollution consistent with the president's 17 percent reduction target. During the most recent session of Congress, a number of legislators tried to repeal or limit the authority of agencies such as the EPA. To date, these efforts have been unsuccessful. More generally, many politicians continue to publicly deny the existence and causes of climate change, making broad-based political support for these efforts inadequate and the passage of new laws to limit GHG emissions extremely difficult. However, the majority of Americans do support renewable energy initiatives and efficiency measures.[97] The United States could therefore seek to implement more narrowly targeted legislation, such as a clean energy standard that would require a certain amount of electricity to come from low-carbon sources.[98] The contentious political environment in Congress has prevented this and other energy and climate legislation from moving forward in 2012, and the recent election results are unlikely to shift the dynamics in Congress. However, as we have noted, President Obama retains significant authority under existing laws such as the Clean Air Act to move forward with actions to reduce GHG pollution.

## ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| AEO | Annual Energy Outlook |
| ARRA | American Recovery and Reinvestment Act of 2009 |
| ASHRAE | American Society of Heating, Refrigerating, and Air-Conditioning Engineers |
| BRP | Buildings Regulatory Program |
| BTOE | billion tonnes oil equivalent |
| CAFE | corporate average fuel economy |
| DOE | U.S. Department of Energy |
| DOI | U.S. Department of the Interior |
| DOT | U.S. Department of Transportation |
| EPA | U.S. Environmental Protection Agency |
| FAA | U.S. Federal Aviation Administration |
| GHG | greenhouse gas |
| GWP | global warming potential |
| HFC | hydrofluorocarbon |
| IEA | International Energy Agency |
| IECC | International Energy Conservation Code |
| IPCC | Intergovernmental Panel on Climate Change |
| ITC | investment tax credit |
| kWh | kilowatt hour |
| LULUCF | land use, land-use change, and forestry |
| MPG | miles per gallon |
| $MtCO_2e$ | million tonnes (metric tons) of $CO_2$ equivalent |
| MWh | megawatt hour |
| MY | model year |
| NC5 | Fifth National Communication of the United States of America |
| NHTSA | U.S. National Highway Traffic Safety Administration |
| NSPS | new source performance standard |
| OCEAN | Online Code and Advocacy Network |
| OCN | Open Climate Network |
| OECD | Organisation for Economic Co-operation and Development |
| PTC | production tax credit |
| RFS | renewable fuels standard |
| RGGI | Regional Greenhouse Gas Initiative |
| SNAP | Significant New Alternatives Policy |
| TWh | terawatt hour |
| UNFCCC | United Nations Framework Convention on Climate Change |
| USDA | U.S. Department of Agriculture |
| USFS | U.S. Forest Service |
| VOC | volatile organic compound |
| WRI | World Resources Institute |

# ENDNOTES

1. For more information, see www.wri.org/federalclimateaction.
2. Figures reported in the text include GHG emissions from the land use, land-use change, and forestry (LULUCF) sector unless otherwise specified.
3. If emissions from the LULUCF sector are excluded, the percent change in total emissions between 1990 and 2010 increases to 10%, the peaking year is 2007, and 2010 emissions are 5% below 2005 levels.
4. GHG emissions intensity = total GHG emissions/total gross domestic product, PPP ($Intl).
5. In purchasing power parity terms using constant 2005 international dollars.
6. For additional analysis, see http://switchboard.nrdc.org/blogs/dlashof/closer_than_you_think_downward.html.
7. The entire statement, available at http://unfccc.int/resource/docs/2011/sb/eng/inf01r01.pdf, reads, "The United States communicated a target in the range of a 17 per cent emission reduction by 2020 compared with 2005 levels, in conformity with anticipated United States energy and climate legislation, recognizing that the final target will be reported to the secretariat in the light of the enacted legislation. In addition, the pathway set forth in pending legislation would entail a 30 per cent emission reduction by 2025 and a 42 per cent emission reduction by 2030, in line with the goal to reduce emissions by 83 per cent by 2050. The submission of the target by the United States was made on the assumption that other Annex I Parties, as well as more advanced non-Annex I Parties, would, by 31 January 2010, associate with the Copenhagen Accord and submit mitigation actions for compilation into an information document in accordance with paragraph 4 or 5 of the Accord, as the case may be." In an effort to provide comparability, clarity, and policy-relevant analysis, this report focuses exclusively on the 2020 pledge.
8. This bill was H.R. 2454, also known as the American Clean Energy and Security Act or the Waxman-Markey Climate Change Bill.
9. H.R. 2454 was passed by the U.S. House of Representative but was not voted on by the U.S. Senate. Proposed legislation must pass both houses of Congress by a majority vote and be signed by the president to become law.
10. For example, see remarks by Todd Stern, special envoy for climate change, at COP17 on 12/8/11, available at http://www.willstegerfoundation.org/climate-news/item/1387-us-perspectives-at-cop17-final-statements-to-the-un-plenary, and "US Mitigation Presentation" by Jonathan Pershing, deputy special envoy for climate change, at the UNFCCC presessional workshop in April 2011, available at http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/1-4-u.s._mitigation_presentation.pdf.
11. Throughout this report, when we refer to the "17 per cent" pledge or target, we are referring to the entire statement submitted by the United States to the UNFCCC, as quoted in endnote 7.
12. http://unfccc.int/files/bodies/awg-lca/application/pdf/20120517_usa_0940.pdf.
13. The use of international carbon credits or offsets is not articulated in President Obama's pledge. However, previous legislative proposals, such as the Waxman-Markey bill, which included a cap-and-trade system, would have counted carbon credits from international forestry projects and other nondomestic offset projects toward meeting the U.S. emissions reduction target.
14. Calculated using a U.S. base year (2005) emissions total of 6,118 $MtCO_2e$ (including LULUCF), as reported in the most recent (2012) U.S. national GHG inventory submitted to the UNFCCC: http://unfccc.int/ghg_data/ghg_data_unfccc/time_series_annex_i/items/3814.php. Emissions of $NF_3$ are excluded from this calculation.
15. All Annex I parties except Turkey have associated with the Copenhagen Accord and submitted mitigation actions. Of non-Annex I parties, all members of the Major Economies Forum and the OECD have done so, as have all members of the G20 except Argentina and Saudi Arabia. The adoption of the Cancun Agreement, which articulates a "shared vision for long-term cooperative action" on climate change (http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=2), as well as the fact that the U.S. pledge remains part of relevant UNFCCC documentation, signals that this condition has been met.
16. Per capita calculations assume a 35 percent increase in population between 1990 and 2020.
17. Calculated ranges are based on down-scaled GDP data for IPCC A1, A2, B1, and B2 emissions projection scenarios, published by the Center for International Earth Science Information Network (CIESIN). GHG intensity calculations assume an 82-107 percent increase in GDP between 1990 and 2020. For more information see Levin and Bradley 2010.
18. A presidential veto of legislation can be overridden by a two-thirds vote in both the House of Representatives and the Senate (unless it is a pocket veto, in which the president does not sign a bill while Congress is adjourned, effectively killing the bill).
19. The NHTSA is part of the U.S. Department of Transportation (DOT).
20. Bianco and Litz 2010.
21. http://usgovinfo.about.com/library/bills/blcra.htm.
22. See, for example, http://www.nytimes.com/2011/03/16/us/politics/16epa.html and http://democrats.energycommerce.house.gov.
23. A discussion of these actions is beyond the scope of this report.
24. There are a few constraints, however, on U.S. states' ability to develop their own climate policies. For example, only California may establish vehicle emissions standards that differ from federal standards. Once California establishes an alternative standard other states may choose to adopt the federal standard, or adopt the California standard. For a more comprehensive discussion of the boundaries of state authority, see Toward a Constructive Dialogue on Federal and State Roles in U.S. Climate Change Policy, http://www.c2es.org/statefedroles.
25. U.S. Department of State 2010.
26. For more information, please see the 2010 U.S. Climate Action Report, and ARRA summaries provided by the Alliance to Save Energy (http://ase.org/resources/recovery-act-summary-energy-efficiency-provisions) and C2ES (http://www.c2es.org/docUploads/Pew-Summary-ARRA-Key-Provisions.pdf).
27. http://www.recovery.gov/Pages/default.aspx.
28. EPA 2012, 2010 figures (Table ES-7), excluding emissions from LULUCF.
29. For a more involved discussion of the role of market forces on the electric power sector, see http://www.wri.org/publication/us-electricity-markets-increasingly-favor-alternatives-to-coal.
30. The Energy Policy Act of 2005 made solar facilities ineligible for the PTC if they were placed into service after 2005. For more information see http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=US13F and http://www.wri.org/publication/bottom-line-series-renewable-energy-tax-credits.
31. For example, see http://www.wri.org/chart/net-annual-installed-wind-power-capacity-united-states-1998%E2%80%932009. For an extended discussion of the history of the PTC, see the DSIRE database: http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=US13F. For more information on financial incentives for clean technology, see Jenkins et al. 2012.
32. These include biomass, geothermal, hydropower, landfill gas, municipal solid waste, and marine sources.
33. http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=US02F&State=federal%C2%A4tpageid=1=1=1.
34. Those sources include: closed-loop biomass, open-loop biomass,

geothermal, landfill gas, municipal solid waste, qualified hydroelectric, and marine and hydrokinetic 150 kW or larger.See http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=US13F.

35. The following sources qualify for the ITC: solar, fuel cells, small wind turbines (up to 100 kW in capacity), geothermal systems, microturbines, and combined heat and power. See http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US02F.
36. https://lpo.energy.gov/?page_id=45.
37. https://lpo.energy.gov/?projects=georgia-power-company.
38. http://www.google.com/hostednews/ap/article/ALeqM5jV2IIkdZPwOkxK7sh1CgZwljekPA?docId=b400fa591a7c4be99bc8523be40a1a5b.
39. Regulations to reduce the impact from power plant cooling systems and improve the handling of coal ash have yet to be finalized.
40. See Bipartisan Policy Center, Environmental Regulation and Electric System Reliability, June 2011, http://bipartisanpolicy.org/sites/default/files/BPC%20Electric%20System%20Reliability.pdf, and EPA, IPM Analysis of the Final Mercury and Air Toxics Standards (MATS), December 2011, http://www.epa.gov/airmarkets/progsregs/epa-ipm/toxics.html.
41. DOE 2010. Note that these figures are calculated using a "consumption-based" approach for emissions accounting, as opposed to a "production-based" approach. The latter would consider emissions associated with the direct combustion of fossil fuels for electric power separately from the sectors where it is consumed (i.e., residential and commercial buildings). The former – which totals so-called end-use based emissions – does not. Therefore these figures are not directly comparable to emissions totals reported elsewhere in this report.
42. Section 304 of the Energy Policy and Conservation Act (EPCA, Public Law 94-163), as modified by the Energy Policy Act of 1992 (EPAct 1992).
43. The DOE does have an obligation and authority to support the adoption, implementation, and enforcement of new building codes within states through technical assistance and incentives. The DOE's building energy codes program was allocated US$10 million in FY 2010 and, according to DOE documents, requested a similar financial authorization for FY 2011. See http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/regulatory_programs_mypp.pdf (p. 87).
44. http://naseo.org/codes/documents/NASEO-ARRA_Codes_Compliance_Handout.pdf.
45. EPA 2012, 2010 figures (Table ES-7), excluding emissions from LULUCF.
46. See Transportation Energy Data Book: http://cta.ornl.gov/data/download31.shtml
47. http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/CAFE-GHG_Fact_Sheet.pdf; http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/CAFE_2017-25_Fact_Sheet.pdf; http://www.whitehouse.gov/the-press-office/2012/08/28/obama-administration-finalizes-historic-545-mpg-fuel-efficiency-standard.
48. http://www.epa.gov/otaq/climate/documents/420f11031.pdf.
49. http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/2011-20740.pdf.
50. http://www.gpo.gov/fdsys/pkg/FR-2012-01-09/pdf/2011-33451.pdf and http://yosemite.epa.gov/opa/admpress.nsf/0/A7CE-72844710BE0A85257973006A20F3.
51. http://www.epa.gov/osp/regions/rfs_webinar_080509.pdf.
52. http://yosemite.epa.gov/opa/admpress.nsf/d0cf6618525a9efb85257359003fb69d/8688682fbbb1ac65852578db00690ec5!OpenDocument.
53. http://insights.wri.org/news/2012/05/how-epas-new-oil-and-gas-standards-will-reduce-greenhouse-gas-emissions.
54. As in our discussion of federal policies, we focus here only on a subset of existing state policies, primarily those that constitute mandatory requirements.
55. For example, see Aulisi et al. 2007.
56. http://www.c2es.org/us-states-regions and http://www.dsireusa.org/.
57. State residential and commercial building codes are discussed in Part III.
58. New Jersey was previously a member of the RGGI. Governor Chris Christie pulled New Jersey out of the program in 2011 (http://www.nj.com/politics/index.ssf/2011/05/gov_christie_to_announce_nj_pu.html). However, a recent lawsuit brought against the state of New Jersey claims that this action did not follow state law (http://www.thenewamerican.com/tech/environment/item/11658-nj-being-sued-for-rejecting-cap-and-trade). How this issue will be resolved is currently uncertain.
59. WRI, CAIT – http://cait.wri.org/cait-us.php. Totals exclude emissions or sequestration of CO2 from land use, land-use change, and forestry.
60. http://www.env-ne.org/public/resources/pdf/ENE_RGGI_Emissions_Report_120110_Final.pdf.
61. http://rggi.org/docs/Retrospective_Analysis_Draft_White_Paper.pdf.
62. http://rggi.org/market/co2_auctions/allowance_allocation.
63. http://rggi.org/design/program_review.
64. http://insights.wri.org/news/2011/11/report-finds-regional-greenhouse-gas-initiative-rggi-creates-jobs-and-stimulates-econom.
65. http://rggi.org/market/co2_auctions/allowance_allocation.
66. http://rggi.org/docs/RGGI_Proceeds_in_Brief.pdf.
67. http://www.analysisgroup.com/uploadedFiles/Publishing/Articles/Economic_Impact_RGGI_Report.pdf.
68. WRI, CAIT – http://cait.wri.org/cait-us.php.
69. http://www.westernclimateinitiative.org/index.php.
70. http://www.epa.gov/carbonpollutionstandards/settlement.html. In its initial announcement, the EPA committed to issuing these proposed regulations by July 26, 2011, and finalizing the standards and guidelines by May 26, 2012. The EPA has not kept to this timeline.
71. Published in the Federal Register 77FR 22392.
72. http://epa.gov/carbonpollutionstandard/pdfs/20120327proposal.pdf.
73. http://insights.wri.org/news/2012/04/epa-insurance-cleaner-future.
74. "EPA believes that nearly all (95%) of the NGCC [natural gas combined cycle] units built recently (since 2005) would meet the standard." http://www.epa.gov/airquality/cps/pdfs/20120327factsheet.pdf.
75. http://pdf.wri.org/wri_summary_of_standards_of_performance_for_ghgs_for_new_stationary_sources_electric_utility_generating_units.pdf.
76. Bianco and Litz 2010.
77. http://www.epa.gov/carbonpollutionstandards/settlement.html.
78. Ibid.
79. http://www1.eere.energy.gov/buildings/appliance_standards/pdfs/congressional_report_013106.pdf.
80. http://www1.eere.energy.gov/buildings/appliance_standards/pdfs/multi-year_schedule_aug_2011.pdf.
81. See, for example, http://www.appliance-standards.org/sites/default/files/doe_schedules/DOE_Schedule_by_Product_3.pdf; and http://www.appliance-standards.org/sites/default/files/doe_schedules/DOE_Schedule_by_Date_3.pdf.
82. Lowenberger et al. 2012.
83. Bianco and Litz 2010. The effects of policies on GHG emissions were modeled using assumptions of stringency and implementation effectiveness based on the literature and expert assessment (see report for more details).
84. Calculated from EPA 2012.
85. The U.S. Energy Information Administration (EIA) is a nonpartisan statistical agency within the U.S. Department of Energy (http://eia.doe.gov).
86. The AEO 2012 includes the effects of the economic recession; the American Recovery and Reinvestment Act of 2009 (ARRA); the medium- and heavy-duty vehicle standards and light-duty vehicle standards through 2016; new regulations for toxics, $SO_2$, and $NO_x$ emissions from

the power sector; the renewable fuels standards in EISA2007 (though it assumes that the United States does not fully meet the advanced biofuel standards); some anticipated appliance efficiency standards; and existing state policies such as the RGGI, California's cap-and-trade program, and state renewable portfolio standards. It also assumes that the PTC for renewables is not extended and thus expires at the end of 2012.

87. The AEO 2012 Early Release modeling results and a detailed explanation of methods can be found at http://www.eia.gov/forecasts/aeo/er/.
88. Unplanned units are new power plants builds projected by the model. This stands in contrast to planned units, which are those that have already commenced construction.
89. "DRAFT: Global Anthropogenic Non-$CO_2$ Greenhouse Gas Emissions: 1990–2030," available at http://www.epa.gov/climatechange/Downloads/EPAactivities/EPA_NonCO2_Projections_2011_draft.pdf
90. Recent improvements in inventory calculations have led to a considerable increase in emissions from natural gas systems. This makes it impossible to directly compare historical emissions from the inventory to unadjusted future projections performed back in 2009. We are working to address this in the update to our report Reducing Greenhouse Gas Emissions in the United States Using Existing Federal Authorities and State Action.
91. http://www.epa.gov/airquality/oilandgas/pdfs/20120417fs.pdf.
92. http://www.eia.gov/dnav/ng/hist/n9190us3m.htm.
93. http://www.eia.gov/totalenergy/data/annual/showtext.cfm?t=ptb0709.
94. http://www.eia.gov/todayinenergy/detail.cfm?id=6990.
95. http://www.epa.gov/ozone/intpol/mpagreement.html.
96. http://www.wri.org/federalclimateaction.
97. For example, see http://www.worldpublicopinion.org/pipa/articles/btenvironmentra/707.php; http://greentechadvocates.com/2011/10/24/consumers-want-energy-efficiency-poll-finds/; and http://www.pollingreport.com/energy.htm.
98. The Obama administration has called for a nationwide clean energy standard that would result in 80% of U.S. electricity being met by "clean" sources in 2035. See http://www.whitehouse.gov/sites/default/files/uploads/InnovationStrategy.pdf (p. 25).

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