# *In Brief:* What Pending Climate Legislation Does for Nuclear Power

Electricity generation accounts for more than one third of total U.S. greenhouse gas (GHG) emissions (Figure 1). Nuclear power is a virtually carbon-free source of reliable, baseload electricity which can play a very large role in decarbonizing the U.S. electric power sector. Existing government incentives have already spurred a renewed interest in building new nuclear plants, and comprehensive climate policy is expected to provide further impetus for a significant expansion of U.S. nuclear power generation (for an in-depth discussion of nuclear power and its role in climate mitigation see the Pew Center's Nuclear Power factsheet).

**Nuclear Power's Current Role**

In 2008, nuclear power provided one fifth of total U.S. electricity and constituted nearly 70 percent of total U.S. non-emitting electricity generation (see Figure 2). With 104 operating nuclear reactors at 65 plants in 31 states, the United States is the world's largest generator of nuclear power, accounting for about 30 percent of global nuclear generation.[1,2] 97 percent of current U.S. nuclear generating capacity was built and brought online between 1965 and 1990.[3] No new nuclear plants have been ordered in the United States since 1978, and no U.S. plant has been completed that was ordered after 1973.[4]

**Existing Incentives for Nuclear Power and Pending Climate Legislation**

The construction of much of the existing nuclear fleet saw significant cost overruns and delays, which makes financing new plants challenging.[5,6] Recent changes to the licensing process, standardized plant designs, and improved construction management and quality assurance offer the promise of avoiding the problems of past U.S. nuclear plant construction. The expansion of nuclear power, though, depends on demonstrated success in constructing and operating the first few new nuclear plants.

The Energy Policy Act of 1992 overhauled the nuclear licensing process and moved major regulatory risks to the front end of the process. The Energy Policy Act of 2005 provided financial incentives to promote investment in the first few new plants—most importantly federal loan guarantees.[7] In 2007, Congress authorized the Department of Energy (DOE) to grant $18.5 billion of loan guarantees. 17 applications for combined construction and operating licenses for 26 new reactors are under review by the Nuclear Regulatory Commission (NRC)—all submitted since 2007.[8]

The Waxman-Markey American Clean Energy and Security Act (ACES Act), H.R.2454, includes provisions likely to spur a major expansion of nuclear power. The energy bill passed by the Senate Energy and Natural Resources Committee, the American Clean Energy and Leadership Act (ACEL Act, S.1462) and the energy and climate bill, which includes a GHG cap-and-trade program, introduced by Senators Kerry and Boxer, the Clean Energy Jobs and American Power Act (S.1733), also include provisions related to nuclear power (see Table 1). This brief focuses on the ACES Act because it has been extensively modeled, but any legislation that puts a price on carbon is expected to have a similar effect on nuclear power. Future briefs will discuss the projected impacts of the Senate proposals.

**Putting a Price on Carbon**

The most important thing that pending climate legislation does for advancing low-carbon energy technologies, especially nuclear power, is to put a price on carbon via a GHG cap-and-trade program.[9] A carbon price guides investments toward a variety of low-carbon technologies and makes the cost of electricity from new nuclear power plants lower relative to traditional fossil fuel-based generation.

**Financing Low-Carbon Energy Technology**

The ACES Act amends the existing DOE nuclear loan guarantee program in order to make the program more effective, including providing the Secretary of Energy with more flexibility in setting the financial terms of the loan guarantees.[10] In addition, the ACES Act creates a new Clean Energy Deployment Administration (CEDA), an independent corporation wholly owned by the United States with a 20-year charter, with the mission of promoting domestic development and deployment of clean energy technologies, such as nuclear power, by making available affordable financing. The ACES Act instructs the U.S. Treasury to issue $7.5 billion in "green bonds" to initially capitalize CEDA. The Senate ACEL Act includes similar provisions related to the loan guarantee program and creation of a CEDA.

**The Role for Nuclear Power under Market-Based Climate Policy**

The U.S. Energy Information Administration (EIA) modeled the effects of the ACES Act and projected that $CO_2$ emission reductions from the electric power sector would comprise more than 80 percent of cumulative GHG emission reductions from sources covered under cap and trade through 2030.[11] EIA projects that new nuclear power plants will play a key role in providing these emission reductions. According to EIA, under "business-as-usual," between 2012 and 2030 only 11 gigawatts (GW) of new nuclear generating capacity would come online (compared to a current nuclear generating capacity of about 100 GW). By contrast, during the same time period under the ACES Act, EIA projects that new nuclear power would make up almost 40 percent of new generating capacity (96 GW) such that by 2030 nuclear power would provide one third of U.S. electricity (see Figure 3Figure 3).

**Conclusion**

The United States and the rest of the world cannot avoid dangerous climate change without reducing GHG emissions from electricity generation. Pending cap-and-trade legislation establishes a regulatory framework and long-term price signal to guide investments in low-carbon energy technologies, including nuclear power. In addition, pending legislation builds on existing incentives to overcome the hurdle of financing the first wave of new U.S. nuclear power plants. Under an aggressive global effort to reduce GHG emissions, the International Energy Agency (IEA) projects that nuclear power generation will increase more than three-fold by 2050 with the largest increases in the United States, China, and India.[12] The very large deployment of nuclear power projected under climate legislation with a price on carbon could revitalize the U.S. nuclear power industry and position the United States as a leader in a critical low-carbon technology industry.

**Figure 1: Total U.S. Greenhouse Gas Emissions (2007)[13]**

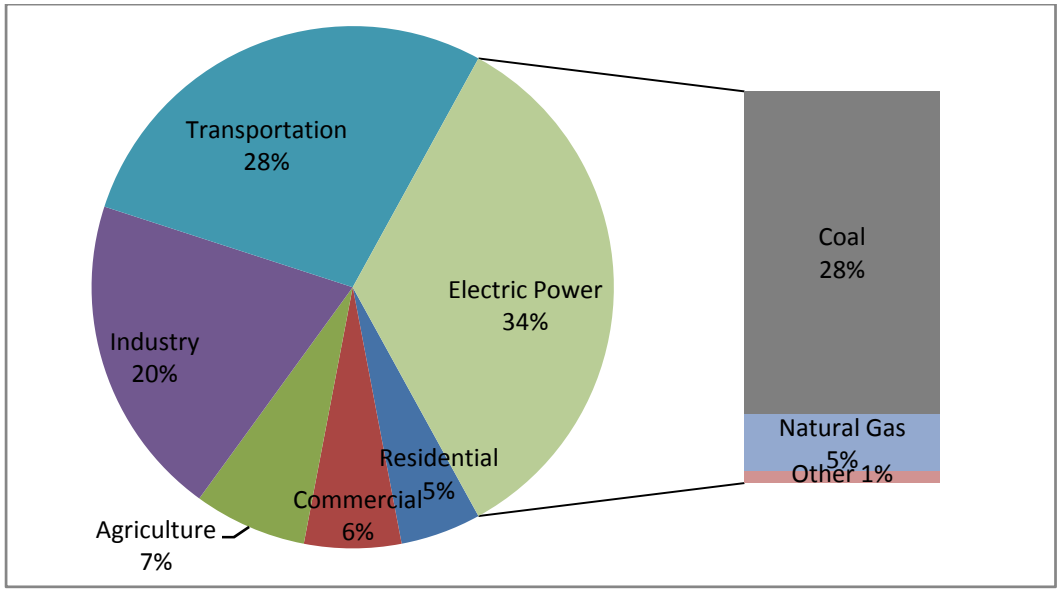



**Figure 2: U.S. Electricity Generation by Type (2008)[14]**

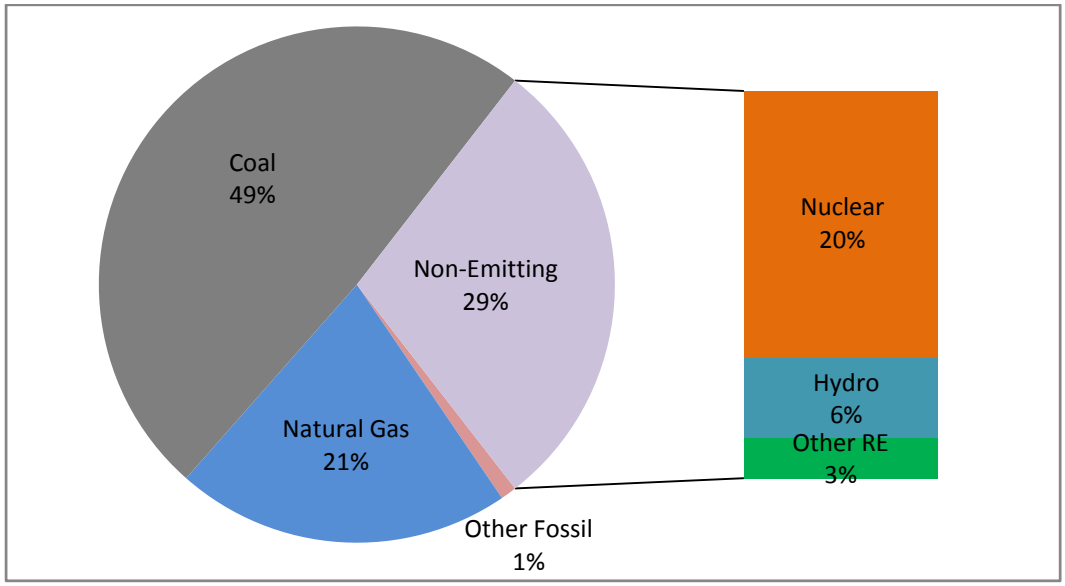
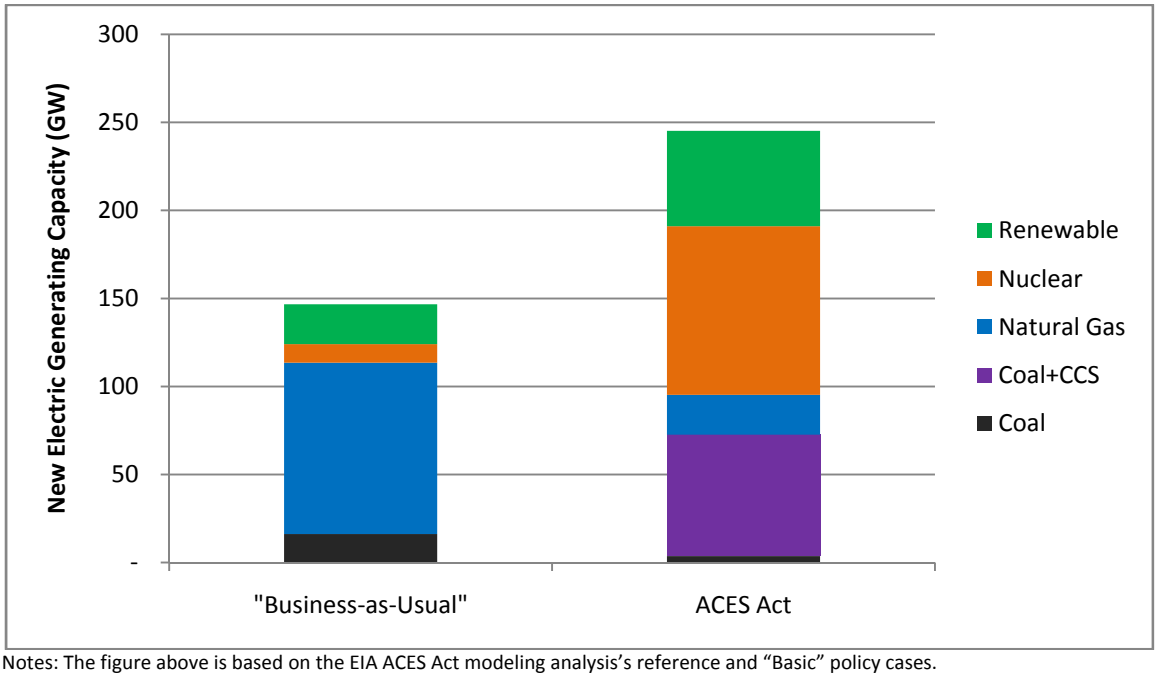


**Table 1: Nuclear-Related Provisions in Congressional Climate and Energy Bills**

| H.R. 2454, the American Clean Energy and Security (ACES) Act | S.1462, the American Clean Energy Leadership (ACEL Act) | S.1733, the Clean Energy Jobs and American Power (CEJAP) Act[15] |
|---|---|---|
| • Puts a price on carbon via a GHG cap-and-trade program<br>• Addresses challenges to implementing the existing DOE loan guarantee program<br>• Creates a Clean Energy Deployment Administration (CEDA) to provide financing for low-carbon energy technologies | • Addresses challenges to implementing the existing DOE loan guarantee program<br>• Creates a Clean Energy Deployment Administration (CEDA) to provide financing for low-carbon energy technologies<br>• Establishes a national commission on nuclear waste<br>• Instructs DOE to develop advanced nuclear fuel recycling technology | • Puts a price on carbon via a GHG cap-and-trade program<br>• Provides for nuclear worker training<br>• Establishes nuclear plant safety and waste management research and development programs |

**Figure 3: Projected Cumulative New Electric Generating Capacity (2012-2030)**




Notes: The figure above is based on the EIA ACES Act modeling analysis's reference and "Basic" policy cases.

[1] Holt, Mark, *Advanced Nuclear Power and Fuel Cycle Technologies: Outlook and Policy Options*, Congressional Research Service (CRS), Jul 2008. All of the 104 U.S. nuclear reactors were ordered between 1963 and 1973.

[2] EIA, *International Energy Annual 2006*, 2008, see Table 2.7.

[3] EIA, U.S. Nuclear Statistics.

[4] National Commission on Energy Policy (NCEP), *Ending the Energy Stalemate: A Bipartisan Strategy to Meet America's Energy Challenges*, 2004.

[5] According to the 2003 *Future of Nuclear Power* report from the Massachusetts Institute of Technology (MIT), the "historical construction costs reflected a combination of regulatory delays, redesign requirements, construction management and quality control problems" (p. 38).

[6] See Table 2-1 and accompanying discussion in Congressional Budget Office (CBO), *Nuclear Power's Role in Generating Electricity*, 2008.

[7] The Energy Policy Act of 2005 also included a production tax credit (PTC) of $18 per megawatt-hour for 6,000 megawatts (MW) of new nuclear capacity for the first 8 years of operation and a form of insurance (called standby support) under which the federal government will cover debt service for up to six new reactors (subject to funding) if commercial operation is delayed.

[8] NEI, *Status and Outlook for Nuclear Energy in the United States*, May 2009.

[9] For explanation of how cap and trade works, see the Pew Center's *Cap and Trade 101*.

[10] For a detailed discussion of the challenges faced in implementing the DOE loan guarantee program, see the letter "Administrative Changes Necessary for a Workable Title XVII Loan Guarantee Program" sent to the Obama Administration and signed by several clean energy industry associations, including the Nuclear Energy Institute.

[11] EIA, Energy Market and Economic Impacts of H.R. 2454, the American Clean Energy and Security Act of 2009, August 2009. Unless otherwise noted, this document refers to EIA's "Basic" core policy case. EIA's modeling timeframe only extends to 2030. Abatement refers to the difference between covered emissions under climate policy and under "business-as-usual."

[12] IEA, *Energy Technology Perspectives 2008: Scenarios and Strategies to 2050*, BLUE Map Scenario, see Figure 8.1.

[13] EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007*.

[14] U.S. Energy Information Administration (EIA), *Annual Energy Review 2008*, 2009, see Table 8.2a.

[15] The summary of S.1733 is based on the version released September 30, 2009.