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Energy and Environmental Law

Joel B. Eisen
University of Richmond, jeisen@richmond.edu

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〔美〕丹·古德（Guttman, Dan）
〔美〕格伦·夏龙（Shive, Glenn） 主编
〔美〕约翰·内格尔（Nagle, John）

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10 Energy and Environmental Law

Joel B. Eisen[1]

I. Introduction

This chapter covers energy law, which focuses on the production, distribution, conservation, and development of energy resources. State and federal energy laws and regulations are designed to keep prices to consumers down (particularly in certain energy industries which state and federal governments monitor to keep markets as competitive as possible) and to address economic, environmental, and national security issues.

Energy sources consist of two groups: *nonrenewable* (sources used and depleted over time) and *renewable* (sources replenished in a short period of time). Today, the United States gets most of its energy from nonrenewable energy sources, which include fossil fuels—oil, natural gas, and coal. Renewable energy sources include solar energy, which comes from the sun and can be turned into electricity and heat, wind, geothermal energy from inside the earth, biomass from plants, and hydropower and ocean energy from water. Electricity generation and transportation account for a large share of the primary energy consumption in the U.S. The fuel mix is different for these two end uses: coal, natural gas, and nuclear power make up the majority of electricity generation, while gasoline and other petroleum products continue to power most transportation uses. The subject of energy law focuses on laws and regulations affecting all of these energy resources and end uses.

It is an exciting time to study energy law in the U.S.. Rapidly fluctuating oil prices have focused public attention on American dependence on imported oil and techniques for curbing consumption of petroleum. With competition increasingly taking the place of government laws and policies in many energy sectors, the state and federal regulatory environment for the electricity, natural gas, and other industries is changing rapidly. In recent years, the intersection between environmental and energy law has attracted increased attention, as the climate change debate has brought a national discussion of changing the energy sources used to generate electricity and power transportation and curbing our wasteful energy habits. Since 1973, the average amount of electricity each American uses has tripled, so there are many opportunities to improve the efficiency of the system and reduce energy use. However, there is no one solution to U.S. energy issues, and most policymakers (including President Obama) call for a sustained effort on a variety of fronts to diversify our energy sources and to improve our existing system's performance.

A. What Is Energy Law?

Laws and regulations involving the production and distribution of energy

1 University of Richmond School of Law, Richmond, VA, USA, jeisen@richmond.edu.

resources have existed for well over one hundred years in the U.S.. Until the 1970s, these laws focused on economic regulation. The dominant model of energy law was regulation of *public utility* industries made up of companies that served a public interest, such as electric and gas companies. The central question during this time was whether companies that produced and distributed energy resources should operate with government oversight to ensure that they served the public interest, or whether they should be allowed to operate in an unregulated market.

Economists believed that some regulation of public utilities was necessary because most energy industries can have *natural monopolies*, where a single company can exploit the energy resource at a lower average cost than two or more companies. There is a substantial body of literature on the economic case for regulating natural monopolies. Public utility regulation took place mostly at the state level, where administrative agencies known as *public utility commissions* (PUCs) regulated energy companies' rates and services. Regulation was designed to guard against monopolistic abuses.

A second historical component of U.S. energy law is natural resources laws that govern the granting and regulation of rights to produce minerals and other natural resources in the U.S. and abroad. For example, a web of state and federal laws governs the structure of leases for the extraction of oil and gas. The laws relating to production of individual energy resources are often the subjects of focused study in the law school curriculum. A school may offer a course in Oil and Gas Law, or one in Mining Law, for example.

Beginning in the 1970s, three major trends broadened modern energy law beyond its narrower base in public utility and natural resources laws.

1. Supply and Demand Fluctuations, and Clamor for an "Energy Policy"

In 1972, Americans paid an average price of $0.36 for a gallon of regular gasoline. This changed virtually overnight with the Arab oil embargo of 1973, which caused shortages and higher prices at the pump. Another supply shortage in 1979 caused further economic hardship in the U.S. As a result of these events, Americans demanded a national "energy policy." The 1970s saw the Department of Energy's creation and the enactment of several major energy laws, but no comprehensive laws or energy policy emerged.

This discussion also set a tone for decades to come. Popular attention to the need for energy laws tends to increase and decrease cyclically in direct relationship to public perceptions about energy supplies and prices. When prices are high or shortages exist, there is a public clamor to do something, and the result is often a law tailored to U.S. needs in the short term. On the whole, energy laws and policies have failed to meet many goals first articulated in the 1970s, most notably that of reducing American dependence on foreign oil. For the past several decades, environmentalists, governmental officials, public interest organizations, and politicians from both political parties have cautioned against America's increasing appetite for

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1 Nelson D. Schwartz, *Asleep at the Spigot*, N.Y. TIMES, Ju
nytimes.com/2008/07/06/business/06oil.html).

petroleum and called for "energy independence." The United States imports more of its petroleum from abroad than it did in 1970, so the goal of producing enough energy at home to meet domestic needs is further off than it was at the time of the Arab oil embargo.

Since the 1970s, there have been numerous proposals that might well have changed this outcome. However, in much of the 1980s and 1990s, prices were relatively low and supplies plentiful, so developing a national energy policy took a back seat to other concerns. This in turn led to difficulties in getting appropriate laws enacted. Unfortunately, good proposals also met fierce political resistance. The result is that ideas that might lead to a comprehensive energy policy have often been "ignored, missed or deliberately blocked, according to analysts, politicians and veterans of the oil and automobile industries."[1]

An example of the U.S.' lack of comprehensive energy laws is the fate of legislation to increase fuel economy standards for the automotive fleet (known as "Corporate Average Fuel Economy," or "CAFE" standards). Bills to increase these standards were proposed throughout the 1990s, but each failed to advance through Congress. A recent amendment finally passed and increased the standards gradually through the year 2020 to 35 miles per gallon. Two federal agencies issued a rule in 2009 increasing these numbers still further, but this gain would still leave the fuel economy of the U.S. fleet well behind its counterparts in Europe and elsewhere. Another example is that laws to encourage new technologies, such as electric vehicles, have not been widely adopted. At present, the vast majority of American drivers continue to rely on gasoline-powered vehicles that are not much more efficient than they were in 1985.

U.S. oil prices have at times exceeded $100 a barrel and gasoline has sold for as much as $4 per gallon. Although Americans pay less than those in other countries, high gas costs are still a shock to many Americans who purchased inefficient vehicles. The higher prices of petroleum products should not have come as a surprise given that, since the 1970s, there have been numerous warnings about the adverse consequences of Americans' overconsumption of oil. With energy policy once again attracting popular attention, there is considerable disagreement over what to do. Should there be increased offshore drilling for oil, drilling in the ecologically sensitive Arctic National Wildlife Refuge, rapid research and development of alternatives to gasoline-powered vehicles, increased funding and construction of public transit, higher fuel economy standards for new vehicles, or all of the above? Americans continue to disagree about the merits of these ideas, and predicting the ultimate national response to higher petroleum prices and demand is tricky at best.

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1 Nelson D. Schwartz, *Asleep at the Spigot*, N.Y. TIMES, July 6, 2008 at sec. 3, p. 6 (*available at* http://www.nytimes.com/2008/07/06/business/06oil.html).

2. Energy Law Intersects with Environmental Law

Beginning in the 1970s, the modern environmental movement, with its emphasis on conservation of resources and pollution control, brought Americans a fuller sense of society's responsibility for protecting the environment. Writers such as Garrett Hardin, who described the famous "tragedy of the commons"[1] resource paradigm, brought attention to the need for sustainable development of resources rather than unchecked extraction. As Americans demanded cleaner air and water, environmental laws had a dramatic impact on the energy sector. Energy extraction and use is responsible for a large share of environmental degradation, and environmental issues have become central to any study of energy law.

The federal and state environmental laws developed since the 1970s have had a profound impact on the extraction, production and distribution of energy resources. These laws include the federal Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, and numerous others administered by the Environmental Protection Agency, together with regulations that build on these statutes, and parallel state and local laws. Environmental laws have affected pollution emissions by energy facilities and controlled siting and operations of new and existing facilities. Other laws developed specifically to apply to energy industries (such as the Energy Policy Acts of 1992 and 2005 and the Energy Independence and Security Act of 2007) are not typically thought of as "environmental" laws. However, these laws often have an explicit environmental focus of their own. For example, federal policies promoting the use of renewable resources over polluting fossil fuel resources are usually found in energy policy acts.

The debate over national energy policy is likely to continue to feature sharp debate between advocates of increasing use of fossil fuels and those who propose addressing global warming through a transformation to a new clean-energy and post-carbon economy. As a result of all this activity, public awareness of the environmental impacts of the energy sector is likely to increase over time.

3. Movement toward Market-Based Mechanisms for Regulating Energy Industries

The third major trend in energy law and policy has taken place in roughly the past 20 years as several energy industries have moved away from the natural monopoly structure toward market-based mechanisms and increased competition. This movement challenged the underpinnings of the traditional model of regulating energy industries as natural monopolies. It required the development of a new system of regulation that frequently went beyond the narrow context of traditional public utility law.

Laws encouraging *restructuring* brought about an era of dramatic transformation of the natural gas and electric utility industries. Vertically integrated power companies

1 Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243 (1968) (*available at* http://www.jstor.org/stable/1724745).

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(where one company controlled the entire supply chain) began to break up into separate businesses. This created competition at most steps of the energy supply chain, from resource extraction to production to consumption. Restructuring, like other forms of deregulation, aims to increase market competition to bring consumers less expensive, more reliable energy. "Restructuring" is not "deregulation"; in restructuring, state and federal government oversight continue to play important roles.

Restructuring of the natural gas industry began to take shape in the mid-1980s with direction from the Federal Energy Regulatory Commission (FERC), the federal agency with jurisdiction over the industry. Today, the natural gas industry is largely deregulated, but FERC retains considerable regulatory powers. The transformation of the electric utility industry from a regulated monopoly structure to a partially deregulated industry began in the early 1990s after restructuring in natural gas was ongoing, but it has been far less successful than restructuring in the natural gas industry.

In summary, energy law in the U.S. is a unique hybrid of three types of laws: natural resources laws, public utility laws, and environmental laws. These laws and policies govern the extraction, production, transmission and distribution of energy resources. As individual energy industries arose, grew, and matured, the first focus of energy laws was on correcting abuses of the market by specific producers. Today, that justification for regulation remains strong, but is joined by concerns for environmental and other matters. Laws tailored to each specific industry (oil, coal, natural gas, and electricity) were developed separately. There is little overlap between laws or coordination, with the similarities between natural gas and electricity restructuring regulation being a somewhat notable exception.

B. Energy Laws, Agencies, and Jurisdiction

Energy laws include the following types of laws:

1. *Federal statutes and regulations* administered by the Department of Energy (especially the Federal Energy Regulatory Commission) and other federal agencies.

Until the 1930s, the federal government played a minimal role in regulating energy industries, with the states being the primary regulators. During the New Deal of the 1930s and early 1940s, the federal government began to enact statutes and regulations governing energy industries. One landmark statute of this time period, the 1935 expansion of the Federal Power Act, broadened a limited law first enacted in 1920 and gave greatly expanded regulatory powers to an existing federal agency, the Federal Power Commission. Another New Deal statute, the Tennessee Valley Authority Act, created a federally owned corporation to provide navigation, flood control, electricity generation, fertilizer manufacturing, and economic development in the Tennessee Valley. Today, the TVA is the nation's largest publicly-owned provider of electricity.

The energy crises of the 1970s prompted the federal government to create a more centralized regulatory framework for energy industries, compared to the piecemeal framework of the previous decades. In 1977, the Department of Energy Organization Act established the federal Department of Energy (DoE). The Federal Energy Regulatory Commission (FERC) was established within the DoE and took on the functions of several agencies, including the Federal Power Commission. FERC is an independent regulatory agency that oversees the natural gas, oil, and electricity markets in the U.S. FERC only regulates the transmission and sale of natural gas and electricity in *interstate commerce,* which means transactions that cross state lines. Transactions that arise wholly within the borders of one state are subject to regulation by state PUCs. FERC also issues licenses for hydroelectric plants, and addresses environmental matters that affect industries under its jurisdiction.

Some federal agencies with regulatory powers over energy industries are not based within the DoE. The nuclear power industry is regulated by the Nuclear Regulatory Commission (NRC), another independent regulatory agency. The NRC issues construction permits and operating licenses for nuclear power plants. Its mission is to protect the public health and safety at nuclear plants. As noted above, the Environmental Protection Agency (EPA) administers environmental statutes and regulations and has a major regulatory role in energy industries. A number of agencies within the Department of the Interior (DoI) also have jurisdiction over particular aspects of the energy sector.

A wide variety of federal statutes play central roles in energy law. These include (among many others) the Federal Power Act, Natural Gas Act, and Interstate Commerce Act, which give regulatory powers to FERC over electricity, natural gas, and oil shipments by pipelines. In addition to these federal statutes, several laws enacted in the past two decades attempted to create comprehensive national energy policies. These include the Energy Policy Act of 1992, the Energy Policy Act of 2005, and the Energy Independence and Security Act of 2007. These statutes are lengthy and their provisions affect every energy industry. The provisions of these statutes, among others, include sections promoting conservation and grants and tax incentives for development of renewable and non-renewable energy resources. While these laws fall short of creating a comprehensive energy policy, their impacts are far-reaching.

The federal agencies that regulate energy industries are administrative agencies subject to the federal Administrative Procedure Act (APA) and court decisions interpreting the APA. An agency' s own statutes or regulations can require additional administrative processes. The principal functions of administrative agencies are adjudication (deciding the rights and responsibilities of an individual litigant or class of litigants) and rulemaking (implementing broad policies). An example of a rule would be the procedures under SMCRA to be undertaken to reclaim a mine. An example of adjudication would be a trial-like proceeding against a mine operator for

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1 Charles River Bridge v. Warren Bridge, 36 U.S. (11 Pet.)
2 Munn v. Illinois, 94 U.S. 113 (1876).
3 *See, e.g.*, California Administrative Procedure Act, CAL.

failure to comply with reclamation requirements. The APA and relevant case law govern *how* these agency proceedings take place. For example, section 554 of the APA contains rules relevant to formal adjudications, requiring discovery, trial-like procedures and other means of trying the case similar to those used in the courtroom.

2. State laws and regulations, including those administered by PUCs.

The Constitutional foundation for state regulation of public utilities goes back to the early years of the U.S. In the famous *Charles River Bridge* case of 1837,[1] the U.S. Supreme Court rejected a challenge to a charter (governmental grant of authority) issued by Massachusetts to a bridge company that intended to build a second bridge over the Charles River in close proximity to an existing bridge also chartered by the state. The message of *Charles River Bridge* was that a state could confer privileges on monopoly companies, but could also adjust their grants of privileges to suit changing times.

In the equally famous 1876 case of *Munn v. Illinois*,[2] the U.S. Supreme Court held that states could regulate businesses "affected with a public interest," rejecting a claim that regulating grain warehouses in Chicago, Illinois was an impermissible "taking" of private property without just compensation. *Munn v. Illinois* made it possible for states to regulate public utilities, but it took many years thereafter for state regulation to come into existence.

States typically granted exclusive franchises to utilities to transmit and distribute electricity within state borders. When direct legislative regulation of franchises (as in *Charles River Bridge*) became too cumbersome, states began to establish separate administrative agencies, known as public utility commissions (PUCs). By the 1920s, most states had administrative agencies that regulated electric, gas, light, telephone, and/or railroad companies. The names of PUCs vary from state to state (to take just a few examples, the Texas Railroad Commission, California Public Utilities Commission, and Virginia State Corporation Commission), but most have similar powers and functions.

PUCs operate under state statutes that grant them authority to create franchises, issue "certificates of public convenience and necessity" (CPCNs, or operating licenses), and regulate rates and other terms of service. As an example, if an electric utility proposes to increase the rates it charges residential customers, it typically must apply to the state PUC for approval of the rate increase. Like the federal energy agencies, PUCs are also administrative agencies, with powers and responsibilities assigned to them under state administrative law statutes that are comparable to the APA,[3] and regulations and case law implementing these statutes.

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1 Charles River Bridge v. Warren Bridge, 36 U.S. (11 Pet.) 420 (1837).

2 Munn v. Illinois, 94 U.S. 113 (1876).

3 *See, e.g.*, California Administrative Procedure Act, CAL. GOV'T CODE § 11340 to 11365 (West 2008).

For example, a state statute may provide procedures that a utility company must use in submitting its application for a rate increase.

3. State and federal court decisions

State and federal courts often hear cases involving challenges to the decisions of agencies that regulate utility industries. Some significant cases of recent years, including several major decisions of the United States Supreme Court, have involved energy industries.

The availability and scope of judicial review are usually prescribed by the APA and comparable state laws. Certain categories of agency actions are reviewable, while others are not. For example, an agency action must typically be a final action to be reviewed, not a preliminary or intermediate action. A final rule is reviewable; a proposed rule is not. Plaintiffs must also satisfy threshold requirements before a court will hear a case challenging an administrative agency's decision. One of these is *standing*. Not everyone who wants to sue an agency may do so, and a litigant desiring to challenge an agency decision must demonstrate that it is an appropriate plaintiff. This has been the subject of a number of recent Supreme Court decisions, including *Massachusetts v. EPA*, the noted climate change case.[1]

State and federal courts make their decisions according to a number of legal constraints. First, and most important, are the limitations imposed by the U.S. Constitution. In energy law, the Constitution's Commerce Clause (and "dormant" Commerce Clause)[2] and Takings Clause[3] have been the subject of significant decisions that explore the boundaries between federal and state jurisdiction over energy industries, the states' powers to regulate in-state businesses to the disadvantage of out-of-state businesses, and the government's power to take private property or regulate it in a way that diminishes its value.

The Commerce Clause gives Congress, and therefore the federal government, the power to regulate commerce with foreign nations, among the states (that is, commerce crossing state lines), and with Native American tribes. It has been especially important in energy law, because energy resources are often produced in one state and distributed in another through regional or national networks such as natural gas pipelines and electricity transmission grids. For this reason, the federal government has considerable power over the entire system of extracting, producing, transmitting, and distributing energy resources, although in practice it often shares jurisdiction with state PUCs. The Supreme Court has confirmed this power in a number of decisions. In a 1927 case, *Public Utilities Commission of Rhode Island v. Attleboro Steam and Electric Co.*,[4] the Supreme Court limited states' power to

1 Massachusetts v. E.P.A., 127 S. Ct. 1438 (2007).
2 U.S. Const. art. I, § 8, cl. 3.
3 U.S. Const. amend. V ("[N]or shall private property be taken for public use, without just compensation.").
4 273 U.S. 83 (1927).

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(4) Reviewing capital expenditures.
(5) Determining whether a utility could aba

1 16 U.S.C. § 824.
2 U.S. Const. art. VI, cl.2.

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lic Utilities Commission of Rhode Island v.
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be taken for public use, without just compensation.").

regulate interstate sales of electricity, invoking the Commerce Clause as the justification. Congress responded to this decision by creating the Federal Power Act, which (among other functions) gave the federal government regulatory power over the "sale of electric energy at wholesale in interstate commerce."[1]

The Commerce Clause has also been interpreted by courts to have a "dormant" component that bars state regulatory activities favoring in-state companies over out-of-state entities. A state, for example, could not enact a statute that allowed only wind power developers based in that state to sell electric power there. Another important Constitutional provision in energy law is the Supremacy Clause (stating that federal law takes precedence over state law on the same subject).[2]

II. Traditional Principles of Utility Rate Regulation and Contemporary Challenges to Government Regulation

The traditional justification for public utility regulation was that some businesses, such as electric and gas companies, telephone companies, and railroads, acted in the public interest by providing an essential service to the public. If left unchecked by government regulation, these firms would exercise their natural monopoly position to set and obtain prices above fair market prices. They could do this because the large amounts of capital required to enter the market made it difficult, if not impossible, for other companies to provide the service. Once a company has built an electricity transmission network, for example, its cost of transmitting electricity is less than that of a company that would have to build its own network to serve customers. The rationale for regulating the prices these companies could charge was that they had a *duty to serve* all customers in a specific area at "just and reasonable" rates by virtue of their grant of an exclusive franchise (right to operate) from the government.

In return for the exclusive franchise, states control public utilities through five basic means:

(1) Assigning specific areas in which the utilities operate exclusively, or territories, through issuance of licenses (CPCNs.)
(2) Regulating utilities' rates, usually by means of *rate cases*. A rate case is a proceeding in which a utility applies to a state PUC for an increase in the rates it charges to consumers. The proceeding, as noted above, is governed by state administrative law. The PUC typically has the power, usually given to it by a statutory provision that requires the PUC to determine whether the rate requested is "just and reasonable," to approve, reject, or modify the rate request.
(3) Setting standards of service.
(4) Reviewing capital expenditures.
(5) Determining whether a utility could abandon or terminate service.

1 16 U.S.C. § 824.
2 U.S. Const. art. VI, c1.2.

Rate regulation is based on the *cost of service*: public utilities are allowed to charge their customers for the cost of providing service to them, plus a fair rate of return. Calculating this amount is difficult. There is no free market for utilities, and regulators must make their best estimates of rates and profits that would come from a competitive market. The most important standards that guide regulators in these decisions were articulated in two Supreme Court decisions in the 1940s, *Bluefield Water Works & Improvement Co. v. Public Service Commission*[1] and *Federal Power Commission v. Hope Natural Gas Co.*[2] "A public utility," said the Supreme Court, "is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures."[3] The Court also noted that the return on investment "should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and attract capital."[4]

Thus, a utility has no Constitutional right to whatever profit it believes it should make. Instead, the PUC must make a judgment about setting rates to ensure the survival of the utility and protect consumers. Another important Supreme Court case held that a company that can not survive without charging exorbitant rates has no right to do so.[5] In the large majority of cases, these legal principles do not determine precisely what rates should be charged. Every rate case involves difficult economic forecasting, because utilities make plans for long periods of time and build power plants they expect to last decades. Regulators have to make judgments about the cost of power plants, capital (through borrowing), fuels used to generate electricity, and a host of other variables. These judgments are typically developed after hearings before the PUC, in which the utilities and other interested parties present evidence. The result of a rate case (usually an increase in utility rates) may be challenged in court under the administrative law process discussed above.

Over time, this entire process of rate regulation came under criticism. Economists believed the rate-setting formula and the rates it generated were inefficient and did not reflect fluctuations in the costs of service as accurately as a competitive market would. A simple example will suffice to illustrate this idea. If a supermarket set the price of milk in 2003 for the next five years, by 2008 that price might be too high or low in prevailing market conditions. Yet the supermarket would be unable to change its prices to adjust to the market; it would have to apply

1 262 U.S. 679 (1923).
2 320 U.S. 591 (1944).
3 *Bluefield*, 262 U.S. at 692 - 93.
4 *Hope Natural Gas*, 320 U.S. at 603.
5 Market Street Ry. Co. v. R.R. Comm'n, 324 U.S. 548 (1945).

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1 Public Utility Regulatory Policies Act of 1978, Pub.
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2 Douglas Anderson, *State Regulation of Electric Utili*
(James Q. Wilson, ed., 1980).

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to a government agency to do so, and by the time its prices (rates) changed they might be inaccurate again. A second criticism came from political scientists who believed in what came to be called the capture theory. Under this theory, regulated industries are believed to gain too much influence over the regulatory by "capturing" it. Over time, as they become familiar with one another, regulators and utilities stop working in their own self-interest and begin to work together in determining rates. As a result, the utility gets rate-of-return rulings that are much more favorable than it otherwise would. An extensive body of literature arose in which political scientists argued that this invalidated the basic premise of the rate-setting process. Much of this literature was developed in studies of the electric utility industry.

Finally, the rate setting process itself began to evolve in response to societal trends. Until the 1970s, electric utilities expanded their capacity as much as they could and saw their business selling as much electricity as they could to end users. PUCs largely aided in this process by keeping electric rates as low as possible for all consumers, and the low prices gave the rate-setting system an air of complacency. Starting in the 1970s, all this changed. The environmental movement brought new attention to the importance of conservation as a means of putting off the construction of expensive, polluting new power plants. Yet utilities were slow to catch on to this trend. In the 1970s, however they began to notice that plants were becoming much more expensive to build due to construction cost overruns and mandates to cut pollution that were imposed by new environmental laws.

Once utilities began to join environmentalists and others in promoting conservation, the rate-setting task of a PUC became much more difficult. A new federal law, the Public Utilities Regulatory Policy Act of 1978 (PURPA),[1] established conservation as a goal of federal law and set forth new standards for utility rate design to encourage it. PUCs began to take advantage of new tools, such as "integrated resource planning" (long-range planning by utilities) and "demand side management" (strategies to cut consumer demand for electricity) and incorporate them in rate orders. At roughly the same time, a consumers' movement arose in the U.S. and called for better, safer, less costly products. With electric rates increasing due to higher fuel costs and other factors, consumer advocates targeted utility rate increases and questioned utility decision-making. The result was a nearly chaotic upheaval in rate regulation: "Caught between the demands of utilities to raise rates, of consumers to keep them down, and of environmentalists and others to 'do something' about conservation and the energy crisis, [PUCs] have been asked to mediate some of the most rancorous of recent domestic political disputes and to take on planning and pricing tasks that are historically unfamiliar to them."[2]

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1 Public Utility Regulatory Policies Act of 1978, Pub. L. No. 95-617, 92 Stat. 3117 (codified in scattered sections).

2 Douglas Anderson, *State Regulation of Electric Utilities in* THE POLITICS OF REGULATION 3 - 41 (James Q. Wilson, ed., 1980).

In the electric utility industry in particular, these trends led many on both ends of the U.S. political spectrum to call for drastic changes to government regulation of electric utilities; some favored complete deregulation. This led to the restructuring of the 1990s and early 2000s, which is discussed below.

III. Regulation of Individual Energy Industries

This part of the chapter gives a brief overview of major statutes and regulations that govern the operations of individual energy industries. Environmental regulation is discussed separately in part IV due to its complexity and its importance to energy industries.

A. Coal

Coal is the most abundant primary energy resource in the U.S., and by some estimates there is over 150 years' worth of reserves remaining to meet current needs. Coal is mined in 27 states, but three areas account for virtually all production: the Appalachian region of the eastern U.S., a mountainous area stretching from southern New York state south to northern Alabama and Georgia; the interior states (especially Texas, Illinois and Missouri), and Western Rocky Mountain states. There are two different types of coal mining in the U.S.: surface mining and underground mining. In surface mining, giant machines remove the top soil and layers of rock to expose and mine large beds of coal. In underground mining operations, miners ride elevators down deep mine shafts where they run machines that dig out the coal. Many U.S. coal beds, particularly in the West, are near the ground's surface, and about two-thirds of coal production comes from surface mines. This reverses the historical trend: as recently as the 1970s, more coal was mined underground in the U.S. than on the surface.

Over 90 percent of the coal burned in the United States is used for electricity generation. Coal is mined, then processed in plants often located near the mines. Processed coal is transported by rail and other means to reach power plants, then stored and burned to generate electricity. All aspects of this process, including mining, transportation, and burning to generate electricity, are regulated by numerous federal statutes. Coal production also creates considerable environmental impacts, as described below in part IV of this chapter.

Federal statutes govern the process for leasing federal lands for coal mining. These statutes include the Mineral Lands Leasing Act, the Federal Coal Leasing Amendments of 1976, the Mineral Leasing Act for Acquired Lands, and the Federal Land Policy and Management Act of 1976 (FLPMA).[1] Different aspects of this

1 Mineral Lands Leasing Act, ch. 85, 41 Stat. 437 (1920) (codified in scattered sections of 30 U.S.C.); Federal Coal Leasing Amendments Act of 1976, Pub. L. No. 94-377, 90 Stat. 1083 (codified in scattered sections of 30 U.S.C.); Mineral Leasing Act for Acquired Lands, ch. 513, 61 Stat. 913 (1947) (codified at 30 U.S.C. §§ 351 - 60); Federal Land Policy and Management Act of 1976, Pub. L. No. 94-579, 90 Stat. 2743 (codified at 43 U.S.C. §§1701 - 82);

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Management (BLM) is the principal agency
mining production on public lands.

Health and safety have been import
American coal mining. Underground coal mi
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B. Domestic Petroleum

The amount of crude oil produced do
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producers. The oil fuel cycle consists of
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This entire process is regulated by state
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1 Federal Coal Mine Health and Safety Act of 1969, Pub.
sections of titles 15 and 30 of the U.S. Code).
2 Black Lung Benefits Act of 1972, Pub. L. No. 92-303, 86
C.); Coal Industry Retiree Health Benefit Act of 1992, P
U.S.C. §§ 9701 to 9722).
3 *See* Garrett Hardin, *The Tragedy of the Commons*, 162 SC

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Act of 1976, Pub. L. No. 94-579, 90 Stat. 2743 (codi-

process are handled by different agencies, but the federal Bureau of Land Management (BLM) is the principal agency in charge, as it administers leases for mining production on public lands.

Health and safety have been important issues throughout the history of American coal mining. Underground coal mining is one of the world's riskiest jobs, and its history is filled with fires, explosions, floods, cave-ins and other incidents that have caused numerous deaths. Safety measures have increased in recent years due to federal laws enacted to protect miners. The most significant of these statutes is the Federal Coal Mine Health and Safety Act of 1969 (and 1977 amendments), commonly referred to as the "Mine Act."[1] The Mine Act transferred responsibility for mine health and safety from the Department of the Interior to the Mine Safety and Health Administration (MSHA) in the Department of Labor. Mine operators are now required to follow stringent safety regulations or face lawsuits and heavy fines. Injury and death rates have fallen due to the tighter standards, but some would argue that recent incidents demonstrate that the federal government does not do enough to protect miners. The Black Lung Benefits Act of 1972 and the Coal Industry Retiree Health Benefits Act of 1992,[2] among other federal statutes, attempt to compensate coal miners who have suffered severe health problems while on the job.

B. Domestic Petroleum

The amount of crude oil produced domestically in the U.S. has been getting smaller each year, but the U.S. still ranks among the top ten world petroleum producers. The oil fuel cycle consists of exploration and production, refining, transportation, and marketing. Crude oil is usually found in underground reservoirs and removed by drilling using derricks that contain tools and pipes going into a well. After crude oil is removed from the ground, it is sent to a refinery by pipeline, ship or barge. At a refinery, different parts of the crude oil are separated into usable petroleum products.

This entire process is regulated by state and federal statutes. Because wells are drilled down into pools of oil in the ground that can be under the lands of many owners, one issue that has been prominent from the early days of regulation is ownership of underground oil. The early days of the oil industry featured the *rule of capture*: as long as a producer with property rights in the underground pool did not trespass on his neighbor's land, he could tap into a well and drain a pool. This brings up the familiar "tragedy of the commons" problem:[3] every producer has an

1 Federal Coal Mine Health and Safety Act of 1969, Pub. L. No. 91-173, 83 Stat. 742 (codified in scattered sections of titles 15 and 30 of the U.S. Code).
2 Black Lung Benefits Act of 1972, Pub. L. No. 92-303, 86 Stat. 150 (codified in scattered sections of 30 U.S. C.); Coal Industry Retiree Health Benefit Act of 1992, Pub. L. No. 102-486, 106 Stat. 3036 (codified at 26 U.S.C. §§ 9701 to 9722).
3 *See* Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243, 1244 (1968).

incentive to drill as much as possible and (as a result) deplete the pool. This issue is largely handled at the state level. Some - but not all - oil producing states have schemes that limit how much oil an individual producer can remove. One familiar regulatory system is *unitization*, in which oil producers agree either voluntarily or under a mandate to do so (compulsory unitization) to share the production and profits from a pool through a formula that determines the share of each participating producer.

Federal price controls on production of petroleum existed in the 1970s as a reaction to the energy crisis, but ended in 1981. Today, the price of petroleum products is not regulated by the federal government. The federal tax code offers incentives to oil companies for their investments in new equipment and for depletion allowances as they use up the oil and gas in specific fields. Oil companies also enjoy relief from their obligation to pay royalties to the government on oil and gas they produce on federal leases in the Gulf of Mexico.[1] This "royalty relief" can cost the government over a billion dollars per year in lost revenue, by some estimates. There is considerable public dissatisfaction with the tax breaks given to oil companies. Some bills pending in Congress would decrease or repeal this and other tax breaks, but for now, they continue in effect. Occasionally, there are proposals for a *windfall profits tax* on oil companies that are perceived to have earned excessive profits, but no tax is in place today.

A major issue in regulation of the oil industry involves drilling on lands owned by the federal government. These activities are regulated by statutes that govern onshore and offshore leases of federal lands. These include the Mineral Lands Leasing Act of 1920, the Federal Onshore Oil and Gas Leasing Reform Act, and Outer Continental Shelf Lands Acts.[2] Offshore oil exploration and production takes place off the Atlantic and Pacific coasts and in the Gulf of Mexico off the shores of Texas and Louisiana, some of the most environmentally sensitive lands in the U.S.. Over one-fourth of the crude oil produced in the United States is already produced offshore in the Gulf of Mexico.

There is considerable disagreement about whether more drilling for oil should take place on the Outer Continental Shelf ("OCS") (the term for the area in the ocean off the U.S. coast). At present, Congress has imposed a restriction each year on what areas the federal government can offer for OCS oil and gas leasing. This restriction, also called a *moratorium*, puts some areas of the OCS off limits to new oil and gas leases. This moratorium became an important issue in the 2008 U.S.

1 *See* 42 U.S.C. § 15905 (2008).

2 Mineral Lands Leasing Act of 1920, ch. 85, 41 Stat. 437 (codified at 30 U.S.C. §§ 181 to 229, 241, 251 to 263); Federal Onshore Oil and Gas Leasing Reform Act of 1987, Pub. L. No. 100-203, 101 Stat. 1330 - 256 (codified in scattered sections); Outer Continental Shelf Lands Act, ch. 345, 67 Stat. 462 (1953) (codified at 43 U.S.C. §§ 1301, 1331 - 1356); Outer Continental Shelf Lands Act Amendments of 1978, Pub. L. No. 95-372, 92 Stat. 629 (codified in scattered sections); Outer Continental Shelf Lands Act Amendments of 1985, Pub. L. No. 99-272, 100 Stat. 147 (codified in scattered sections).

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C. Natural Gas

Natural gas, like oil (with which it is c
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Unlike oil, there is enough supply in t
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The Energy Policy Act of 2005 streamlined
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The natural gas industry has three prin
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Natural gas companies are subject to st
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Presidential election, with Republican candidate John McCain calling for increased drilling and criticizing Democrats for largely opposing it. Another environmentally sensitive area of the U.S., the Arctic National Wildlife Refuge (ANWR) in Alaska, has been the subject of controversial proposals for oil exploration and production for many years. Opponents claim that production activities would harm a pristine wilderness area and would not yield enough oil to significantly reduce the amount of petroleum the U.S. imports; proponents call for development they claim would reduce American dependence on oil imports.

C. Natural Gas

Natural gas, like oil (with which it is often associated, or found together), is a fossil fuel found underground in reservoirs. Natural gas is one of the most important fuels in the U.S. It is responsible for approximately 22 percent of the energy consumption of the U.S., and nearly two-thirds of the homes in the U.S. use natural gas as their main heating fuel.

Unlike oil, there is enough supply in the U.S. of natural gas to meet current needs, though by some estimates domestic consumption will outstrip supply in the next few years. Most natural gas consumed in the U.S. comes from wells in the U. S. and Canada, but domestic production is leveling off. New supplies are harder to find and imports of liquefied natural gas (LNG) are becoming an increasingly important source. LNG is gas turned into liquid form, then shipped to terminals where it is processed back into a gas and put into pipelines. By 2008, gas companies had proposed building dozens of new terminals off the coasts of the United States. The Energy Policy Act of 2005 streamlined the regulatory process for planning and construction of LNG terminals.

The natural gas industry has three principal parts: exploration and production, shipment via pipelines, and distribution by *local distribution companies* (LDCs, a form of utility). Once it is produced from a well by drilling, natural gas is processed for shipping and then moves by pipelines to LDCs for distribution to consumers. One aspect of this process is different from the electricity production cycle. Natural gas demand is greater in the winter, so, unlike electricity, which cannot be stored efficiently, gas is stored in large underground storage systems, such as old oil and gas wells or caverns formed in old salt beds. The gas remains there until it is added back into the pipeline when people begin to use more gas in the winter to heat homes. Also unlike the electric utility industry, the natural gas industry of the mid-20th century was not vertically integrated. Different companies controlled different parts of the cycle. Producers (typically "independents") sold gas to pipelines which then sold *bundled service* (a term for paying one price for the gas and cost of shipping) to LDCs which then sold bundled service to retail customers. This fragmentation of the industry eventually made it easier for restructuring to take place.

Natural gas companies are subject to state and federal regulation. LDCs, being utilities, are typically regulated by state PUCs under the system of traditional cost of

service rate regulation described above in part II. The story of federal regulation of the natural gas industry is frequently cited as an example of a successful transition from government regulation of an energy industry to a deregulated industry. Like the electric utility industry, the natural gas industry has the potential for control by natural monopolies. Pipeline companies can exercise power over the market by controlling the way natural gas goes from producers to consumers. For this reason and others, the federal government initially intervened to regulate the industry.

In 1938, the Natural Gas Act (NGA) gave the Federal Power Commission (now FERC) jurisdiction over the transportation and sale of natural gas for resale in interstate commerce, and the companies engaged in these activities.[1] The NGA did not apply to intrastate activities such as local distribution of natural gas. Section 4 of the NGA gave the federal government the power to ensure that rates and charges were "just and reasonable," with unreasonable rates and charges prohibited. In *FPC v. Natural Gas Pipeline Co.*,[2] the Supreme Court rejected several Constitutional challenges to this section. In addition, section 7 of the NGA gave federal authority to require a *certificate of public convenience and necessity* (CPCN)—a license—before a company could engage in, or abandon, activities subject to federal jurisdiction.

Until 1954, the federal government regulated interstate pipelines but did not regulate producers of natural gas. That year, in the important case of *Phillips Petroleum Co. v. Wisconsin*,[3] the Supreme Court gave the FPC jurisdiction over all wholesale sales of natural gas in interstate commerce. Because it regulated the sales, the FPC now had to set rates that companies could charge. The FPC did not have the administrative resources to set rates for every interstate sale, and it quickly developed a backlog of cases. Over time it turned to setting rates by gas producing regions (area rates), but by 1970 rates had been set for only two out of five areas. Another problem that developed between 1954 and 1978 was that two natural gas markets developed—interstate (regulated by the FPC) and intrastate (largely unregulated). There were different prices in the two markets, as intrastate rates were closer to those of a free market and therefore higher.

Due to this price differential, a serious shortage of natural gas took place in the mid-1970s, just as the nation was grappling with the oil embargo and energy crisis. The shortage led to calls for ending the system of federal regulation that had produced the two-tier pricing structure for natural gas. The Natural Gas Policy Act of 1978 (NGPA)[4] began a complex system of deregulating natural gas prices that was phased in over a period of years. Congress expected that full price deregulation of gas sales by producers at the wellhead would come in 1985, but it took until 1993,

1 Natural Gas Act, ch. 556, 52 Stat. 821 (1938) (codified at 15 U.S.C. §§ 717a to 717z).
2 FPC v. Natural Gas Pipeline Co., 315 U.S. 575 (1942)
3 346 U.S. 672 (1954)
4 Natural Gas Policy Act of 1978, Pub. L. No. 95-621, 92 Stat. 3350 (codified at 15 U.S.C. §§ 3301, 3361 to 3432).

four years after the enactment of the Natu
The phased deregulation experiment was
law, pipelines entered into long-term *take*
them with gas, which required the pipe
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mid-1980s, when pipelines were paying
rates because they were stuck with unfavo
prices had been wrong, and much of th
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With this disastrous situation in plac
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to carry gas from all producers on equal te
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allowing pipeline operators to buy out thei
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These Orders deregulated the wholes
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facilities, and market-based rates - were ado
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D. Nuclear Power

Nuclear power involves the use of fissi
generate electricity. Fission takes place inside
its core, which contains the uranium fuel.
during fission to turn water into steam an

1 Natural Gas Wellhead Decontrol Act of 1989, Pub. L. N
tions of 15 U.S.C.).
2 Regulation of Natural Gas Pipelines After Partial Wellh
("Order 436"); Regulation of Natural Gas Pipelines A
334-01 (Aug. 7, 1987) (codified at 18 C.F.R. pts. 2, 284
lines After Partial Wellhead Decontrol, 57 Fed. Reg. 1
284) ("Order 636").

four years after the enactment of the Natural Gas Wellhead Decontrol Act of 1989.[1] The phased deregulation experiment was hardly smooth. After the NGPA became law, pipelines entered into long-term *take or pay* contracts with producers to supply them with gas, which required the pipelines to either take gas or pay the full contract price. This attempt to lock in stable long-term prices backfired by the mid-1980s, when pipelines were paying as much as $9 billion more than market rates because they were stuck with unfavorable contracts. Predictions about market prices had been wrong, and much of the industry was on the brink of financial disaster.

With this disastrous situation in place, FERC had to act. It began a series of bold initiatives that led to the restructuring of the natural gas industry. The important events were three FERC Orders (rules made in rulemaking proceedings) between 1985 and 1992—Orders No. 436, 500, and 636.[2] Order No. 636 had many important features. First, it required interstate pipeline operators to *unbundle* their service, separating the sale of natural gas from the transportation. This meant that pipeline operators were prohibited from selling natural gas. Second, it gave FERC the power to allow pipelines to offer transmission services at market-based rates, and it required pipeline operators to offer *open access*, meaning that they had to carry gas from all producers on equal terms. Order No. 500 shared the excessive costs of take or pay contracts between pipeline operators and their customers, allowing pipeline operators to buy out their contracts and pass some of that cost on to their customers.

These Orders deregulated the wholesale market for natural gas, but end users do not have full access to a competitive market yet. Still, successful wholesale deregulation of the natural gas industry served as a template for the subsequent restructuring of the electric utility industry. The core principles - unbundling the component parts of the industry cycle, open access to interstate transmission facilities, and market-based rates - were adopted in similar but different forms in the electric utility industry.

D. Nuclear Power

Nuclear power involves the use of fission reactions of the element uranium to generate electricity. Fission takes place inside the reactor of a nuclear power plant at its core, which contains the uranium fuel. Nuclear plants use the heat given off during fission to turn water into steam and use the steam to turn a turbine to

1 Natural Gas Wellhead Decontrol Act of 1989, Pub. L. No. 101-60, 103 Stat. 157 (codified in scattered sections of 15 U.S.C.).

2 Regulation of Natural Gas Pipelines After Partial Wellhead Decontrol, 50 Fed. Reg. 42,408 (Oct. 9, 1985) ("Order 436"); Regulation of Natural Gas Pipelines After Partial Wellhead Decontrol, 52 Fed. Reg. 30, 334-01 (Aug. 7, 1987) (codified at 18 C.F.R. pts. 2, 284) ("Order 500"); Regulations of Natural Gas Pipelines After Partial Wellhead Decontrol, 57 Fed. Reg. 13,267-02 (Apr. 8, 1992) (codified at 18 C.F.R. pt. 284) ("Order 636").

generate electricity. In 2006, there were 66 nuclear power plants in the U.S., and their reactors generated about 20 percent of the total electricity in the U.S. However, the industry has not grown since the 1970s, when public opposition to the industry, cost overruns and delays at plants under construction, and the infamous and widely publicized Three Mile Island incident led to a complete halt in nuclear power plant construction and licensing. No new nuclear power plant has come online since then.

Today, there is renewed interest in nuclear power. Nuclear power plants produce no air pollution or carbon dioxide or other air pollution. Because of the increased interest in carbon-neutral power generation technologies, nuclear power has attracted new attention. Since the 1970s, nuclear power proponents claim, improved technologies make new plants safer and more reliable. Also, the Energy Policy Act of 2005 contained federal tax credits and subsidies for nuclear power development, including a loan guarantee for up to 80 percent of the project cost and a production tax credit of 1.8 cents per kilowatt-hour for 6,000 megawatts (MW) of capacity from new nuclear power plants for their first eight years of operation.[1] In September 2007, NRG Energy filed a proposal with the NRC to build a nuclear power plant in Texas, which if constructed would be the first new U.S. plant in over 30 years. Other companies have filed applications to build a total of as many as 32 new reactors.

Besides its impact on global warming, increasing the nuclear industry's share of electricity generated in the U.S. would also reduce U.S. dependence on fossil fuels. However, environmentalists and others are cautious about promoting renewed interest in nuclear power. The U.S. still does not have a long-term strategy for dealing with nuclear waste, which must be handled at the site of each reactor. Opponents dispute claims about safety and point out that a large number of nuclear reactors would have to be built to make a substantial reduction in carbon dioxide emissions. The scale and scope of the required construction program calls into question the viability of relying on more nuclear power. A nuclear power project given government approval today would not yield electricity for at least 10 years. Finally, opponents argue that nuclear power is not carbon-free if one takes into account the energy-intensive processes of mining and enriching uranium, constructing and dismantling the nuclear plant, and disposing of the radioactive waste. Additional environmental impacts of the nuclear cycle are discussed below in Part IV.

The federal government has been a central player in promoting civilian nuclear power and regulating the industry. The Atomic Energy Act of 1954, Price-Anderson Act and related statutes and subsequent amendments are the

1 *See* 42 U.S.C. §§ 16511 to 16515 (providing for the loan guarantee for up to 80 percent of the project); 26 U.S.C. § 45J(a) (providing for the production tax credit).

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reactor company through a mandatory pur
any claims above the $10 billion would be
Energy Policy Act of 2005 extended the Pric

E. Hydropower

Hydropower plants capture the energy
Hydropower plants range in size from smal
giant dams like the Hoover Dam near Las Ve
Most conventional hydroelectric plants inclu
raises the water level to create falling water a
that converts the kinetic energy of falling w
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1 Atomic Energy Act of 1954, Pub. L. No. 83-703, 68 Sta
2926b-7); Price-Anderson Act, Pub. L. No. 85-256, 71 S
U.S.C.).

2 National Environmental Policy Act of 1969, 42 U.S.C. §

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primary federal laws,[1] and the Nuclear Regulatory Commission (NRC) is the principal federal regulatory agency. The NRC's primary function is licensing new nuclear power plants, which takes place in a two-step process: construction licensing and operating licensing. In deciding whether to grant these licenses, the NRC looks at a wide variety of issues, including financial, safety and environmental aspects of the new plant. One important part of this analysis is an Environmental Impact Statement performed by the NRC staff under the National Environmental Policy Act (NEPA)[2] to evaluate the potential environmental impacts and benefits of the proposed plant. In 1989, the NRC issued rules that established a new, more efficient process for licensing nuclear power plants, providing for certification of standardized designs of nuclear plants, early site approval and combined construction and operating licenses. The design certification process allows plant designers to secure advance NRC approval of advanced plant designs. Later, companies can order these plant designs, license them for particular sites and build them. An early site permit involves a discussion of site safety, environmental protection, and emergency preparedness issues before a utility has committed to a specific nuclear plant design.

The NRC also has responsibility for ensuring the safety of nuclear power plants and safeguarding them from terrorist attacks. Reactor safety standards issued by the NRC are designed to protect against meltdowns of the nuclear core, which, after Three Mile Island and Chernobyl, are viewed by the public as perhaps the worst possible environmental disasters. Outside observers dispute the NRC's claims that nuclear power has been made safer. If an accident does occur, the Price-Anderson Act limits the financial liability that utilities face as a result of nuclear plant accidents. In case of an accident, the first $10 billion would be funded by the nuclear power industry as described in the Act (at up to just under $100 million for any single reactor company through a mandatory purchase of insurance to cover losses), but any claims above the $10 billion would be covered by the federal government. The Energy Policy Act of 2005 extended the Price-Anderson Act to 2025.

E. Hydropower

Hydropower plants capture the energy of falling water to generate electricity. Hydropower plants range in size from small dams that power only a few homes to giant dams like the Hoover Dam near Las Vegas that provides much more electricity. Most conventional hydroelectric plants include four major components: a dam that raises the water level to create falling water and controls the flow of water, a turbine that converts the kinetic energy of falling water into mechanical energy, a generator that converts the mechanical energy from the turbine into electrical energy, and

1 Atomic Energy Act of 1954, Pub. L. No. 83-703, 68 Stat. 919 (codified as amended at 42 U.S.C. §§ 2011 to 2926b-7); Price-Anderson Act, Pub. L. No. 85-256, 71 Stat. 576 (1957) (codified in scattered sections of 42 U.S.C.).

2 National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321 to 4370f (2008).

transmission lines that transmit electricity from the hydropower plant to the electric grid. Because the source of hydropower is water, hydroelectric power plants must be located on a water source. Over one-half of the total U.S. hydroelectric capacity for electricity generation is concentrated in Washington, California and Oregon.

Hydropower is regulated by FERC under the Federal Power Act, and FERC issues permits and licenses to hydropower facilities that are in interstate commerce. NEPA and the Electric Consumers Protection Act of 1986 require environmental reviews of new hydropower projects. Local, state and other federal agencies also have jurisdiction under other laws to regulate hydropower projects. To take one example, section 401 of the Clean Water Act allows states to set water quality standards that affect hydropower projects.

Overall, hydropower is the nation's largest source of renewable source of electricity but is not without disadvantages. The plants can be impacted by drought. When water is not available, the plants can't produce electricity. The expansion of hydropower is limited by the small number of streams remaining on which new dams may be constructed. There are environmental disadvantages to hydropower, as discussed below, and for this reason it is usually considered separately from other renewable resources.

F. Renewable Energy Sources

Renewable energy resources have until recently been responsible for a small fraction of the energy used in generating electricity and powering transportation in the U.S. In 2006, about 3% of electricity generated in the U.S. came from renewable sources other than hydropower, including solar, wind, biomass, and other sources.

Solar and wind represent the fastest growing opportunities for renewable sources to contribute a larger share of electricity generation. Producing electricity with solar energy through the use of photovoltaic (PV) devices is pollution-free, except in the device manufacturing process, and relies on the sun, which will never be depleted. The U.S. had a total of less than 400 megawatts (MW) of solar capacity in 2002, or less than the output of one typical coal-fired power plant. One obstacle to widespread use of solar technology in electricity generation has been that solar power is expensive by contrast with other resources used in generating electricity (though that cost disparity has been decreasing in recent years). Solar power also has applications beyond electricity generation, especially in residential or commercial applications using rooftop solar panels, solar hot water heaters and the like, and a wide variety of entrepreneurs are attempting to capitalize on public interest in carbon-free technologies. Still, only a small fraction of the nation's homes and businesses use any kind of solar technology.

Wind now accounts for 1 percent of the nation's electricity generation, but that share could increase to 20 percent by 2030 according to a recent Department of Energy report. New projects coming on line totaled 5,244 MW in 2007, and there

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IV. Regulation of Electricity Generation

Electricity is a secondary energy reso
primary energy resource such as coal or natu
natural gas, or another resource creates stear
electricity. The electricity is then transmitt
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therefore consists of three distinct parts: genera

The U.S. electric industry began in
Thomas Edison's company delivered electr
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is strong interest across the nation in developing new projects. Texas, in particular, has been active in promoting windpower, and the state now gets 3% of its electricity from wind. However, because Texas has its own electricity grid, it may be difficult for other states to promote windpower as aggressively as Texas has. Also, public opposition to the perceived unsightliness of wind turbines has stymied some planned projects.

Renewable energy sources such as wind and solar face obstacles to more widespread use. Utilities view them as intermittent technologies (that work some but not all of the time) that require back-up fossil-fuel generation. The availability of renewable resources also varies among regions; not all areas of the country can generate electricity from wind and solar sources. The electric grid must be strengthened, through the transmission and distribution systems, to deliver electricity generated from renewable resources to homes and businesses. Getting transmission lines to the best sites for windpower—the remote and offshore places where the wind blows most consistently—is a special challenge that FERC is working to address with its recent rules on small power interconnection, but enterprising developers must be willing to pay for new lines.

The tax incentives and other governmental support available for solar and windpower producers are small by comparison to those provided to the oil and gas industries, but vital to the success of these industries. Governmental policies favoring solar, wind, geothermal and other renewable resources have been extremely modest compared to those for fossil fuel industries. For example, federal research and development spending on solar energy was $156 million in 2008, a miniscule amount compared to federal subsidies for the oil and gas industries. A production tax credit (now 1.8 cents per kilowatt-hour) has been in place for some, but not all, of recent years, and is continually in jeopardy because it is renewed in Congress for short terms. In recent years, state governments have adopted *renewable portfolio standards* (RPS) and other techniques for promoting renewable energy development. These are discussed below in conjunction with other legal techniques designed to address climate change.

IV. Regulation of Electricity Generation, Transmission, and Distribution

Electricity is a secondary energy resource that must be generated from a primary energy resource such as coal or natural gas. In an electric power plant, coal, natural gas, or another resource creates steam that turns a turbine shaft to generate electricity. The electricity is then transmitted from the power plant across long distances to utilities for distribution to consumers. The electric power system therefore consists of three distinct parts: generation, transmission, and distribution.

The U.S. electric industry began in 1882 when noted American inventor Thomas Edison's company delivered electricity to buildings in lower New York City from the nearby Pearl Street generating station. At that time, generation and distribution of electricity were unregulated and took place at the local level.

Electricity was made near where it was distributed, often on the same site. A mere ten years later, technology was discovered to remove the constraints that had kept electricity limited to local distribution areas. Electricity generated at a central station could be boosted to high voltage by a transformer for long-distance transmission and then stepped down (brought down in voltage) at local substations by transformers and convertors for distribution in the surrounding area.

Once the technology for sending electricity long distances was developed, utilities began to obtain electricity from plants located beyond their distribution areas. Over time, *economies of scale* took hold in power generation: it became less expensive on a per-unit basis to operate larger power plants than smaller ones. The central power station was born, and power plants became much larger. Because electricity cannot be stored easily, there must be enough supply (capacity) on hand to meet demand. This meant that utilities needed to build enough power plants to meet peak (highest) demand from consumers, and they built many large, expensive plants throughout the 1950s and 1960s.

The transmission system brings electricity from generators to end users. It consists of three interconnected networks of transmission lines and control systems: (1) the Eastern Interconnection (most of the Eastern U.S. and Canada), (2) the Western Interconnection (most of the Western U.S. and Canada), and (3) ERCOT (the interconnection for Texas). The distribution system includes substations that change voltage from "high-voltage" transmission lines to "low-voltage" current for local distribution. The distribution function also includes responsibilities that consumers typically associate with their electric company, such as billing, maintenance, and installation of equipment.

Before the restructuring of the 1990s, the electric utility industry was dominated by companies known as *investor-owned utilities* (IOUs) because they are owned by those who purchase a company's stocks or bonds. IOUs were *vertically integrated*, performing all of the functions of generating, transmitting, and distributing electricity in their service territories. As recently as 1998, the 239 IOUs in the U.S. generated roughly 2/3 of the nation's electric power. The remaining utilities were federally-owned utilities such as the Tennessee Valley Authority, rural electric cooperatives, and public (or "municipal") power systems. Today, there are also companies called *non-utility generators* that generate electricity but do not own transmission and distribution facilities. Still, the IOUs continue to dominate the industry.

The regulatory system for the electric utility industry is complex. Generally speaking, state PUCs regulate local utility operations, including distribution and rate-setting. Under the Federal Power Act, FERC regulates interstate wholesale power sales and interstate transmission. Much of the regulatory system has changed with the advent of restructuring.

Restructuring of the electric utility industry began after restructuring in natural gas was ongoing in the early 1990s. There were many reasons for the beginning of

this transformation. Policymakers viewed
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1 Public Utility Regulatory Policies Act of 1978, Pub. L.
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2 Otter Tail Power Co. v. United States, 410 U.S. 366 (19
3 Promoting Wholesale Competition Through Open A
Public Utilities, 61 Fed. Reg. 21540-01 (April 24, 19
888"); Open Access Same-Time Information System,
18 C.F.R. pt. 37) ("Order No. 889"); Regional Transm
1999) (codified at 18 C.F.R. pt. 35) ("Order No. 2000"

this transformation. Policymakers viewed the restructuring of the natural gas industry as largely successful. Advocates of free market economics viewed the electric utility industry's monopoly structure as inherently wasteful and inefficient and believed an industry made up of competitors could generate, transmit, and deliver electricity to consumers at a lower cost. Some environmentalists believed a competitive market could open up to include new firms dedicated to making "green" power. Finally, there was already some competition in the industry in the form of individual deals negotiated by large corporations with utilities to deliver power to them.

A number of federal statutes and regulations helped spur the transition to restructuring. First among these was the Public Utilities Regulatory Policy Act of 1978 (PURPA).[1] PURPA did not specifically call for competition in the electric utility industry. However, it did begin to bring it about with a statutory provision that required utilities to purchase power from cogenerators and other small power producers (those making power from solar, wind, hydropower and biomass) at their "avoided cost" (the cost of generating the power themselves that they avoided by buying it from other producers). This introduced a new class of electricity generators to the market, known as *qualifying facilities* (QFs), and put those QFs in competition with incumbent utilities.

By the early 1990s, there were more non-utility generators ("NUGs") because of PURPA's incentives, but one major barrier to true competition remained in place. NUGs did not own transmission lines and could not sell their power to consumers unless utilities owning transmission facilities transmitted ("wheeled") it to them. The famous *Otter Tail* Supreme Court decision[2] had held that FERC had limited authority to order utilities to wheel power. Congress began to change this situation with two provisions in the Energy Policy Act of 1992. The first provision excused NUGs (*renamed exempt wholesale generators*) from certain requirements applicable to utilities. The second provision gave FERC more power to order wheeling.

Armed with this new authority, FERC issued a series of regulations over the next several years, known as "Order No. 888," "Order No. 889," and "Order No. 2000."[3] These orders attempted to create a restructured electric utility industry. FERC called for *open access* to the nation's transmission grid. It believed utilities owning the transmission lines were engaged in *undue discrimination* under the Federal Power Act because they were refusing to carry power other than their own.

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1 Public Utility Regulatory Policies Act of 1978, Pub. L. No. 95-617, 92 Stat. 3117 (codified in scattered sections).

2 Otter Tail Power Co. v. United States, 410 U.S. 366 (1973).

3 Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities, 61 Fed. Reg. 21540-01 (April 24, 1996) (codified at 18 C.F.R. pts. 35, 385) ("Order No. 888"); Open Access Same-Time Information System, 61 Fed. Reg. 21737-01 (April 24, 1996) (codified at 18 C.F.R. pt. 37) ("Order No. 889"); Regional Transmission Organizations, 65 Fed. Reg. 810-01 (Dec. 20, 1999) (codified at 18 C.F.R. pt. 35) ("Order No. 2000").

If FERC finds undue discrimination, it can order remedies that include mandatory wheeling. Open access had a number of components. FERC did not order utilities to sell off their assets and break up into separate generation, transmission, and distribution companies. Instead, it required that utilities functionally unbundle (separate) their transmission divisions from their generation and distribution divisions. Eventually, Order No. 2000 contemplated that control of the nation's transmission grid would be changed completely, with new entities called *regional transmission organizations* (RTOs) operating transmission networks. In an even more dramatic transformation of the industry, RTOs would run new marketplaces in which electricity would be bought and sold at wholesale. FERC's Order No. 888 was largely upheld by the Supreme Court in the 2002 case of *New York v. FERC.*[1]

At about the same time as FERC was reshaping the nation's wholesale electricity marketplace, roughly half of the states created statutory frameworks for introducing *retail choice* (competition) into their retail electricity markets. By the mid-1990s, consumers in many states could choose their electricity suppliers. However, the promise of restructuring in the electric utility industry turned out to be largely illusory. In California, the U.S.' largest state, restructuring was a spectacular failure. The reasons for restructuring's failure in California are numerous (including manipulation of the new market by the Enron company and others), and have been chronicled in popular books and films.

FERC was widely criticized for failing to intervene promptly to stop manipulation of the California market for electricity. One reason among many that it appeared to act too late to stop adverse impacts on consumers was a well-settled rule dating to 1956 known as the *Mobile Sierra* doctrine (the names of the two companion cases[2] in which the Supreme Court had decided the rule). This rule states that the terms of a validly negotiated wholesale energy contract are presumptively "just and reasonable" under the Federal Power Act and that FERC has authority to set aside these contracts only in extraordinary circumstances. A number of buyers in the western electricity market in 2000-01 complained that their contract prices were much too high, that the market had been manipulated by some other parties (like Enron), and that the contracts were therefore not "just and reasonable." The buyers asked FERC to change their contracts and force some companies to refund excessive charges to them, which FERC refused to do, citing the Mobile Sierra doctrine. In 2008, the Supreme Court, in the case of *Morgan Stanley Capital Group Inc. v. Public Utility District No. 1 of Snohomish County, Washington*,[3] largely supported FERC's action.

1 New York v. F.E.R.C., 535 U.S. 1 (2002).
2 United Gas Pipe Line Co. v. Mobile Gas Serv. Corp , 350 U.S. 332 (1956); Fed. Power Comm'n v. Sierra Pacific Power Co., 350 U.S. 348 (1956)
3 128 S. Ct. 2733 (2008).

Restructuring's failure in California ma
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On the consumer level, however, retail choice
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V. Environmental Regulation of Energy

Since the advent of the modern environ
in the U.S. have been subjected to a wide
regulations. This is not surprising, as the ex
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environmental degradation in the U.S.. Enviro
are significant, as shown by the following list:

Nuclear Power: The cycle of producing n
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at present. The Department of Energy's long r
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1 Market-Based Rates for Wholesale Sales of Electric Energy,
ities, 72 Fed. Reg. 39,904-01 (June 21, 2007) (codified at 18

Restructuring's failure in California made other states cautious about their own deregulatory experiments. In those that tried to restructure their retail markets, the experience was mixed at best. In many states, few if any companies other than incumbent utilities offered to provide electricity to consumers, and there was little to no competition. There were many reasons for this, including state statutes that kept electric rates low during a transition to full competition and made it difficult for new companies to enter the market. Some states (such as Virginia) have abandoned restructuring and returned to traditional regulation. In others, such as Maryland, the transition period has ended, but consumers face much higher rates because utilities raised rates after being prohibited from doing so for a decade or more. Only in Texas, which is unique among American states in having a self-contained electricity market, can restructuring be said to have worked reasonably well.

In the past few years, the idea of bringing the free market to the electric utility industry has been largely discredited in its pure form. Yet some aspects of it survive. FERC is experimenting with market-based wholesale rate setting by utilities that it regulates (those that operate in interstate commerce), with Order No. 697 in 2007[1] introducing a system of standards for market-based rates for sales of electric energy. On the consumer level, however, retail choice is not viable in the vast majority of states.

V. Environmental Regulation of Energy Industries

Since the advent of the modern environmental movement, energy industries in the U.S. have been subjected to a wide variety of environmental laws and regulations. This is not surprising, as the extraction, processing, transportation, generation and distribution of energy resources accounts for a significant share of environmental degradation in the U.S.. Environmental impacts of energy industries are significant, as shown by the following list:

Nuclear Power: The cycle of producing nuclear power, from mining uranium ore through disposing of spent fuel from nuclear reactors, produces radioactive waste byproducts. While there have been discussions in Congress for a number of years about creating a permanent repository for disposing of spent fuel, there is none at present. The Department of Energy's long range plan is for this spent fuel to be stored deep in the earth in a geologic repository at Yucca Mountain, Nevada, but that project has faced substantial opposition for years. At present, then, licensees must store their waste onsite. Nuclear wastes have contaminated facilities used for national defense (such as Hanford River in Washington State and Savannah River in Georgia) and present some of the most difficult environmental problems the nation faces.

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[1] Market-Based Rates for Wholesale Sales of Electric Energy, Capacity and Ancillary Services by Public Utilities, 72 Fed. Reg. 39,904-01 (June 21, 2007) (codified at 18 C.F.R. pt. 35) ("Order No. 697").

Solar/Wind: Wind turbines can harm birds and bats, and are often criticized for being unattractive and detracting from the scenic or aesthetic appeal of their locations. The federal Endangered Species Act is a potentially powerful obstacle to construction of a windpower facility. When a species is listed under the ESA, all federal agencies must consult with one of two other agencies before taking any action that might harm the species. Other opponents of wind projects cite adverse effects on existing land uses and on airplane and vessel navigation. Critics of solar power find the panels unsightly, and solar arrays can also interfere with existing land uses. These concerns will be voiced more often as these renewable resources are developed more extensively. In many states and cities, opponents of solar and wind power projects use state laws, local land use laws, and neighborhood covenants to fight these projects.

Hydropower: Hydroelectric generation is generally thought to be more environmentally friendly than other forms of electricity generation, but it can have adverse environmental impacts. Dam construction and reservoir operation floods land and can uproot communities. Operating a dam changes the flow of a river or stream and can have negative impacts on wildlife habitat and commercial fishing. Applicants for hydropower licenses may be subject to the federal National Environmental Policy Act's requirement for an environmental impact statement for a "major federal action significantly affecting the quality of the human environment," and may face added restrictions under the federal Clean Water Act and Wild and Scenic Rivers Act. The famous Supreme Court decision in *TVA v. Hill*[1] involved a proposed dam project on the Tellico River in Tennessee and established that the Endangered Species Act[2] also applies to this type of project. Existing dams have faced numerous challenges in recent years under federal environmental laws such as the Endangered Species Act.

Coal: Burning coal to generate electricity has significant environmental impacts. Due to the importance of this subject, it is discussed more fully below. Surface mining and underground mining of coal also create serious environmental damage. Environmental laws that apply to mining include the Surface Mining Control and Reclamation Act (SMCRA), the Clean Air Act and Clean Water Act (CWA).[3] Mining can destroy land, and restoring the land damaged by surface mining processes spelled out in SMCRA is an important part of the mining process. The federal Office of Surface Mining, located within the Department of the Interior, implements SMCRA to insure that surface coal mines are operated in an environmentally protective manner and that closed or abandoned mines are reclaimed (brought back to a beneficial use). The Act specified that all mining sites

1 T.V.A. v. Hill, 437 U.S. 153 (1978).
2 Endangered Species Act of 1973, 16 U.S.C. §§ 1531 to 1544 (2008).
3 Surface Mining Control and Reclamation Act of 1977, 30 U.S.C. §§ 1201 to 1328 (2008); Clean Air Act, 42 U.S.C. §§ 7401 to 7671q (2008); Clean Water Act, 33 U.S.C. §§ 1251 to 1387 (2008).

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Oil: Public outrage over oil spills off t
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In addition to other environmental laws
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Hazardous Substances Pollution Contingency
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for preventing oil spills, including now-fami
operation of oil tankers, training of personnel,

1 Oil Pollution Act of 1990, Pub. L. No. 101-380, 104 Stat.

be restored to their original contours and requires operators to submit a plan for restoring the land and mitigating acid mine drainage before a permit is granted for mining operations. The law also provides a funding mechanism for helping to restore abandoned mines by adding a tax onto current coal production.

In recent years, the practice of mountaintop removal mining has come under legal attack. Coal companies use mountaintop mining to access the coal buried under rock and soil in the mountains of Appalachia. Massive machinery scrapes off the top several hundred feet of a mountain to yield the coal. The rock and dirt removed in this process are discarded into nearby stream valleys, often causing considerable damage. Under the Clean Water Act (CWA), the U.S. Army Corps of Engineers and the Environmental Protection Agency are called upon to prevent water pollution. The CWA is currently interpreted as keeping mine waste from being dumped within 100 feet of streams, though a new federal rule would allow the Office of Surface Mining to waive that requirement. The National Environmental Policy Act (NEPA), as noted above, also requires federal agencies to issue environmental impact statements for projects that may have significant environmental effects. Between 1998 and 2004, citizens and environmental groups brought a series of cases aimed at requiring compliance with the CWA and NEPA and protecting streams from mountaintop waste. In 2004, a federal court ruled that 11 mining waste disposal permits required environmental impact statements.

Oil: Public outrage over oil spills off the coasts of the U.S. in the 1960s and early 1970s was an important factor in the birth of the modern environmental movement. It contributed to the development of a number of federal environmental laws that affect the oil industry, including NEPA, the Marine Mammal Protection Act of 1972, and the 1978 revisions to the Outer Continental Shelf Lands Act.

In addition to other environmental laws that apply to the oil industry, there is a special environmental statute designed specifically for oil pollution, the Oil Pollution Liability and Compensation Act of 1990 (OPA),[1] enacted in response to the Exxon Valdez oil spill incident in Alaska. The OPA expanded the federal government's ability to respond to oil spills and provided necessary resources. It created the national Oil Spill Liability Trust Fund, which can provide up to one billion dollars per spill incident. It also established new requirements for contingency planning by government and industry to avoid future oil spills. This mandate builds upon the established framework of CERCLA, the federal statute authorizing cleanup of hazardous waste sites, by expanding the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) to direct all public and private response efforts for certain types of spills. The OPA also contains provisions for preventing oil spills, including now-familiar standards for improved design and operation of oil tankers, training of personnel, and emergency preparedness. The OPA

1 Oil Pollution Act of 1990, Pub. L. No. 101-380, 104 Stat. 484 (codified in scattered sections).

also increased penalties for oil companies that failed to comply with federal regulations.

Other environmental laws apply to various stages of the oil industry cycle. Refineries (factories where crude oil is processed into petroleum products) are major sources of air pollution and are regulated under the federal Clean Air Act. Subtitle I of the federal Resource Conservation and Recovery Act (RCRA)[1] regulates *corrective action* (response and cleanup) of buried underground storage tanks that have leaked their contents into the ground.

Natural Gas: LNG terminal development faces a number of complex environmental issues. Among those issues can be concerns related to heating of sea water, air emissions, and seismic concerns, as well as the normal issues related to development of an infrastructure project of this size, such as concerns about impacts on wetlands, storm water discharge, and traffic.

Electricity: Electric generation has a greater impact on air quality than any other single industry in the U.S. other than the transportation sector. Burning coal to generate electricity produces emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x), and mercury. Seventy percent of the sulfur dioxide and twenty-three percent of the nitrogen oxides emitted in the U.S. are the byproduct of electricity generation, primarily from coal-fired power plants. Sulfur dioxide can affect trees and water when it combines with moisture to produce acid rain. Emissions of NO_x help create smog, and also contribute to acid rain. Mercury released into the air settles in water and can build up in fish and shellfish, becoming harmful to animals and people who eat them. Utilities burning coal to generate electricity also account for about a third of man-made greenhouse gas (GHG) emissions in the United States and contribute significantly to global warming. According to the EPA, electricity generation is the largest source of U.S. GHG emissions, accounting for a total of 2,381 million metric tons (MMT) of CO_2 in 2005.

In recent decades, the generation and transmission of electricity has been subject to intensive environmental regulation to reduce these adverse environmental impacts. In particular, the federal Clean Air Act (CAA) requires coal-burning power plants to reduce air pollution. Indeed, much of the law and regulations under Title I of the CAA (aimed at reducing pollution from stationary sources) has centered on efforts to clean up air pollution in electricity generation. The core of Title I is a system of *National Ambient Air Quality Standards* (NAAQS). These numerical standards determine how much pollution can be in outside air in specific regions. The NAAQS are set for specific pollutants, so, for example, the NAAQS for sulfur dioxide is different from the NAAQS for lead. Emissions of mercury from power plants are handled separately under Section 112 of the CAA, which establishes standards for hazardous air pollutants.

Once the EPA has established a NAAQS, CAA Section 110 requires each state

1 Resource Conservation and Recovery Act of 1976, Pub. L. No. 94-580, 90 Stat. 2795.

to develop a document called the *state* describes the measures that the state plans t will include controls that the state requires pollutants and must include the elements set and be approved by the EPA. This system is where the federal government sets overall sta decide how they are met. If the EPA deems impose penalties or even develop a federal im

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NSPS applies when a stationary source automobile) is built or modified after the EI the specific industry. Sources constructed pr but requirements can be imposed by a state new source performance standards for cert modified after 1971. Over time, EPA has n these standards still do not apply to older ur been modified.

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While these technology-based standards for utilities to continue to operate their old

to develop a document called the *state implementation plan* (SIP). The SIP describes the measures that the state plans to implement to meet the NAAQS. It will include controls that the state requires of industries in the state that emit air pollutants and must include the elements set forth in various sections of the CAA and be approved by the EPA. This system is an example of cooperative federalism, where the federal government sets overall standards and leaves it up to the states to decide how they are met. If the EPA deems the SIP inadequate, it may reject it and impose penalties or even develop a federal implementation plan.

Congress established this regulatory regime in 1970. In amendments to the CAA seven years later, Congress recognized that the NAAQS were not being met as quickly as predicted. It created a scheme of *nonattainment* areas (regions not meeting the NAAQS) and imposed additional air pollution control requirements for both attainment areas and nonattainment areas. These requirements were significantly expanded again in the 1990 amendments to the CAA. Two regulatory systems in the CAA are important to electric utilities: the system of *new source performance standards* (NSPS) and the requirement of *new source review* before utilities construct new plants or make major modifications to existing ones.

NSPS applies when a stationary source (as opposed to a mobile source, like an automobile) is built or modified after the EPA has issued regulations that apply to the specific industry. Sources constructed prior to 1971 are not subject to NSPS, but requirements can be imposed by a state as part of its SIP. The EPA has issued new source performance standards for certain electric generating units built or modified after 1971. Over time, EPA has made the standards more stringent, but these standards still do not apply to older units built before 1971 unless they have been modified.

The NSR program applies to new or modified major stationary sources, which are therefore subject to both NSPS and NSR. NSR requires all utilities to install modern pollution controls if they propose to build new generating units or modify existing units, including older ones, with physical or operational changes that result in a significant increase in emissions of a regulated pollutant. State or local air pollution authorities administer the NSR program in accordance with the EPA's NSR regulations, and require affected utilities to obtain permits before construction proceeds. The level of control required depends on the air quality in the area where the unit is located. A unit located in a nonattainment area must install more stringent controls than a unit located in an attainment area. These are *technology-based controls:* a specific level of technology must be used to reduce emissions. In nonattainment areas, sources must reduce emissions to achieve the lowest achievable emission rate; in attainment areas the program is known as prevention of significant deterioration (PSD) and requires lowering emissions using the best available control technology (BACT).

While these technology-based standards are stringent, they created an incentive for utilities to continue to operate their oldest, dirtiest plants, which Congress had

never wanted to happen. Utilities have continued operating old plants that never have been subject to NSPS and NSR requirements instead of building new plants that would require permits. More than half of the fossil-fuel units that generated electricity in 2000 began operating before 1972, and these plants were responsible for a large share of air pollution from electric power plants. Throughout the 1990s, the EPA also became aware that utilities were also making major changes at their power plants without securing permits. In 1999 and 2000, the U.S. Department of Justice filed lawsuits against eight utility companies, affecting 106 generating units, claiming violations of NSR. At the time, it was the largest environmental enforcement action ever untaken and generated enormous controversy for the next several years. In the 2007 case of *Environmental Defense v. Duke Energy Corp.*,[1] the Supreme Court unanimously upheld the EPA's interpretation of the important term "modification" in its PSD enforcement action against the utility Duke Energy.

The 1990 amendments to the CAA also saw the creation of the first market-based *cap and trade* pollution control scheme. The new scheme in Title IV of the CAA set a national goal of reducing SO_2 emissions from electric power generating plants by almost ten million tons. It directed the EPA to reduce SO_2 emissions by setting a limit, known as a "cap," on emissions from all units and establishing an emissions trading program. Under the trading program, each electric generating unit received emissions "allowances," each of which represented the right to emit one ton of SO_2. The allowances may be bought, sold, or banked for use in later years, but generating unit owners or operators must own enough allowances at the end of each year to cover their annual emissions. A national market in these allowances is administered on the Chicago Board of Trade. The principle behind a market-based scheme for reducing pollution is that utilities that can make pollution reductions at the lowest cost will make them and create a surplus of allowances that other utilities (whose costs of reducing pollution may be higher) will purchase. The SO_2 trading program has proven so successful that it has served as a model for other trading schemes, like the European Union's "Emissions Trading Scheme" and other schemes in place or proposed for reducing greenhouse gas emissions.

The ongoing controversy over NSR has led to calls for overhauling the CAA to use different approaches to control pollution from electric generating plants, and a number of bills have been considered in Congress over the past decade. In a related action in 2005, the EPA issued the Clean Air Interstate Rule (CAIR), designed to permanently cap SO_2 and NO_x emissions in the Eastern U.S. The CAIR proposed that 28 states and the District of Columbia incorporate a trading scheme into their SIPs for these pollutants. In July 2008, a federal court struck down this rule as incompatible with the CAA,[2] and its future is uncertain.

1 127 S. Ct. 1423 (2007)
2 North Carolina v. EPA, 531 F.3d 896 (D.C. Cir. 2008)

VI. Regulation of Energy Use in Tr

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1 Intermodal Surface Transportation Efficiency Act of 19
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2 42 U.S.C. § 7506(c) (2008).

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VI. Regulation of Energy Use in Transportation

Energy use in the transportation sector has attracted increasing public attention in the U.S., and state and federal legislators and regulators are taking actions designed to decrease energy use. The concerns motivating this renewed interest in transportation energy use are global warming, dependence on imported oil, and urban air pollution. Transportation fuels are a principal contributor to all three of these. Burning petroleum products to power cars, trucks, and buses emits a number of pollutants (carbon monoxide, nitrogen oxides, particulate matter, and unburned hydrocarbons), and when these fuels are burned, they also emit carbon dioxide. The burning of petroleum products in the U.S. is responsible for the largest contribution of any sector of the economy to climate change.

Because a considerable amount of the nation's air pollution comes from cars and trucks, many environmental laws (notably parts of Titles I and II of the Clean Air Act) have been aimed at curbing emissions. Three major federal laws setting national policies for the transportation sector have also addressed environmental and energy issues. These are the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), the Transportation Equity Act for the 21st Century (TEA-21), and the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU).[1] The three major energy policy acts have various provisions addressing energy use in transportation. Finally, the emerging state, regional, and national strategies for curbing GHG emissions address the transportation sector.

Title I of the CAA, as noted above, centers on the National Ambient Air Quality Standards approach and the requirement that states prepare SIPs (state implementation plans) that feature measures intended to reduce emissions of criteria pollutants. While this requirement applies to all sources of these pollutants, including stationary sources and mobile sources, Title I includes provisions designed specifically for reducing emissions in transportation. One such provision is *transportation conformity:* federal agencies may not fund or approve activities that do not conform (meet) to the standards set forth in a SIP or FIP and must demonstrate that their activities do not contribute to violations of NAAQS or prevent nonattainment areas from meeting the NAAQS.[2]

The 1990 Clean Air Act Amendments dramatically expanded Title I by adding lengthy and complex transportation-related provisions for states that continued to have nonattainment areas for ozone and carbon monoxide. States were required to adopt tougher anti-pollution measures in their SIPs, depending on the severity of the nonattainment status of the areas (areas with worse pollution were required to adopt stricter controls). For example, all areas that were nonattainment for either

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1 Intermodal Surface Transportation Efficiency Act of 1991, Pub. L. No. 102-240, 105 Stat. 1914 (codified in scattered sections); Transportation Equity Act for the 21st Century, Pub. L. No. 105-178, 112 Stat. 107 (1998) (codified in scattered sections); Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, Pub. L. No. 109-59, 119 Stat. 1144 (2005) (codified in scattered sections).

2 42 U.S.C. § 7506(c) (2008).

ozone or CO were required to adopt vehicle inspection and maintenance programs. Severe and extreme ozone nonattainment areas were required to put transportation control measures (TCMs) in place to reduce emissions from motor vehicles still further. TCMs include carpooling programs, expanded use of mass transit, and other means of reducing total vehicle trips.

Title II addresses vehicle emissions reductions. In particular, sections 202 and 203 of the CAA give the EPA the authority to set emissions limits for light-duty and heavy-duty vehicles and engines. Each U.S. manufacturer of vehicles or engines subject to these limits must test their equipment and certify to the EPA that they meet the standards. Manufacturers that sell equipment that does not meet the standards are subject to recall orders and stiff financial penalties.

Other provisions of Title II are designed to address emissions in transportation. One of Title II's best-known provisions allows the state of California to adopt its own emissions standards for motor vehicles. Other states have followed California's lead and adopted the California standards. The clean-fuel vehicle program added in the 1990 amendments encourages the development of entire fleets of vehicles running on cleaner fuels, and requires certain states to add a clean-fuel fleet program to their SIPs. Section 211 of the CAA gives the EPA the authority to regulate fuels and fuel additives. The EPA used this authority to require a complete phase out of lead in gasoline in the 1970s, which is one of the most successful environmental measures ever. Section 211 has also allowed the EPA to require changes in gasoline and diesel fuel so they produce fewer emissions. These "reformulated fuels" are much cleaner-burning than gasoline and diesel fuel were in 1990, but their production created other environmental problems. The additive MTBE created serious water pollution problems, and ethanol, adopted widely as a fuel component, has been criticized for diverting farm crops to fuel production.

Even with all these measures in place, improving air quality in the U.S.' largest cities remains a difficult challenge. Tighter emissions control standards have resulted in consistent improvement in air quality as automakers have added new technology to their cars and trucks to keep pace with them. American motorists are driving more miles each year, but as a result of tighter controls on emissions, pollution from mobile sources has decreased. However, many areas continue to be nonattainment areas for ozone, and more measures will be required to improve American urban air quality.

There are three basic sets of policy options to make more improvements in reducing energy use and transportation-related emissions, none of which will be sufficient alone. First is improving vehicle efficiency as it is known that gains in fuel efficiency could be made in cars and trucks through more widespread adoption of technologies available today or being developed in the near- and long-term. The best-known federal program aimed at improving vehicle efficiency, the Corporate Average Fuel Economy (CAFE) program, began in the mid-1970s. The purpose of CAFE is to reduce energy consumption by increasing the fuel economy of cars and

light trucks, and the standards require manufa
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[1] Barack Obama: New Energy For America, http://my.barac

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light trucks, and the standards require manufacturers' fleets to achieve specific mile per gallon (mpg) targets. Setting CAFE standards and making sure automakers achieve them is the responsibility of two federal agencies: the National Highway Traffic Safety Administration (NHTSA) and the EPA. After many years without an increase in the standards, the Energy Independence and Security Act of 2007 required an increase in combined (city and highway) CAFE standard to 35 mpg overall by 2020. The EPA and NHTSA increased the standards again in 2009.

Another set of policy options involves running cars and trucks on low- or zero-carbon fuels instead of petroleum products. Electric and hybrid vehicles are attracting more attention as the price of gasoline increases and Americans become more concerned about global warming. There are federal (and in some cases state) tax credits available for the purchase of electric and hybrid vehicles. A wide variety of alternative fuels are under consideration, including hydrogen, cellulosic ethanol, and biodiesel fuels made from different sources. Some alternative fuels are more environmentally benign than others, and most produce less air emissions and carbon dioxide per unit of energy than petroleum products. Gasoline and diesel products are supported by an extensive and well-functioning infrastructure, so governmental action would almost certainly be required to spur a transition to alternative fuels. As one example, California's Hydrogen highway initiative is intended to lay the groundwork for a statewide hydrogen-based transportation system.

In the decades following World War II, the U.S. became dependent on the automobile in large part through land use patterns that encouraged suburban sprawl (low-density housing in particular), and fostered one of the world's most energy-intensive transportation systems. As President Obama's energy plan puts it, "For the last 100 years, our communities have been organized around the principle of cheap gasoline."[1] Americans drive everywhere all the time, and have forsaken other means of transportation such as walking and public transit. This leads to the third set of policy options for decreasing energy use and emissions: increasing the efficiency of the transportation system itself. This would require both making it easier for Americans to have access to walking, transit, and other modes of transportation and building the infrastructure that would allow them to use more efficient transportation modes. Governmental policies that favor sprawl over higher-density development, such as a federal tax deduction for home mortgage interest but no comparable tax break for renters, would also require evaluation and changes. In recent years, the "smart growth" movement has brought attention to this disparity in governmental policies and has made many suggestions for addressing sprawl, such as implementing building codes and other laws that promote mixed-use development (development with housing, shopping, and workplaces in the same area), and encourage redevelopment of abandoned or underused urban sites known as brownfields. Other policy options for increasing transportation system efficiency

1 Barack Obama: New Energy For America, http://my.barackobama.com/page/content/newenergy

include funding mass transit and supporting "intelligent transportation" technologies.

VII. Climate Change Regulation

In recent years, a significant environmental focus has been on developing strategies to reduce greenhouse gas (GHG) emissions. Litigants in a recent Supreme Court case referred to climate change as "the most pressing environmental challenge of our time." [1] Because the energy sector (and electricity generation and transportation in particular) is responsible for a significant percentage of national GHG emissions, state, regional, and national strategies for curbing emissions will have significant impacts on energy industries.

Activities designed to reduce GHG emissions are underway at the national, regional, state, and local levels. The U.S. played an important leadership role in the development of the Copenhagen Accord, the most recent international agreement designed to reduce GHGs and set the framework for negotiations for a follow-on agreement to the Kyoto Protocol. At the national level, prospects for climate legislation improved in 2009 with the election of President Barack Obama. As a candidate for President, Obama pledged to reduce U.S. GHG emissions 80 percent by 2050 and to make the United States an international leader on climate change by "re-engaging" with the world community on climate issues.

Representatives Edward Markey of Massachusetts and Henry Waxman of California developed a comprehensive climate bill, the American Clean Energy and Security Act of 2009 ("ACES"). The ACES passed the House of Representatives on June 26. It was the first climate bill to pass a chamber of Congress, and has five titles. Title I contains provisions for a federal renewable electricity and efficiency standard, carbon capture and storage technology, performance standards for new coal-fired power plants, research and development support for electric vehicles, and support for deployment of smart grid technologies. Title II includes provisions related to building, lighting, appliance, and vehicle energy efficiency programs. Title III includes a comprehensive cap-and-trade carbon emissions reduction scheme. Title IV includes provisions to preserve domestic competitiveness and support workers, provide assistance to consumers, and support for domestic and international adaptation initiatives. In September 2009, Senators John Kerry and Barbara Boxer introduced their companion bill to ACES, the Clean Energy Jobs and American Power Act ("CEJAPA"), which differed from ACES in some respects. In early 2010, the future of the two main climate bills was uncertain.

A different idea for climate legislation that has attracted attention is imposing a "carbon tax" to reduce emissions. Some prominent public figures in climate change discussions have advocated putting a simple price on a ton of CO_2 emissions, including former U.S. vice president Al Gore, recipient of the Nobel Peace prize for his work on climate change, and noted climate scientist Dr. James Hansen.

1 Massachusetts v. E.P.A., 127 S. Ct. 1438, 1446 (2007).

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However, public resistance to this idea is likely to be strong. When the Clinton Administration proposed a "BTU tax" in the early 1990s, which would have taxed fuels based on their heat output, the negative reaction forced the Administration to withdraw its proposal.

On the regulatory side, the Supreme Court case of *Massachusetts v. EPA*[1] prompted the EPA to regulate GHG emissions. Massachusetts and several other states petitioned the EPA to use its authority under Title II of the federal Clean Air Act (CAA) to regulate emissions of carbon dioxide and other GHGs from new motor vehicles that contribute to climate change. Massachusetts argued that because the CAA requires the EPA to regulate any "air pollutant" that can "reasonably be anticipated to endanger public health or welfare," the EPA was required to regulate carbon dioxide emissions. In 2003, the EPA determined that it lacked authority to regulate GHGs under Title II of the CAA and that even if it had that authority it would decline to regulate. The EPA argued that, even if it had authority, it had discretion to defer a decision to regulate until more research could be done.

By a 5-4 vote, the Supreme Court ruled in favor of Massachusetts. The Court held that Massachusetts, due to its "stake in protecting its quasi-sovereign interests" as a state, had standing to sue the EPA over potential damage caused to its territory by global warming. The Court held that the CAA's definition of air pollutant included carbon dioxide because it was written with "capacious" language so that it would not become obsolete. The Court also held that if the EPA wishes to continue its inaction on GHG regulation, it was required by the Act to base the decision on a consideration of "whether greenhouse gas emissions contribute to climate change."

Responding to this decision, the EPA issued two findings in 2009 as prerequisites to regulating GHG emissions from vehicles under CAA section 202(a): the "endangerment finding" that GHGs in the atmosphere endanger the public health and welfare, and the "cause and contribute" finding that GHG emissions from new motor vehicles and new motor vehicle engines contribute to the atmospheric concentrations of GHGs and to the threat of climate change.[2] The EPA then issued three proposed rules in 2009 to regulate GHG emissions under the CAA. The CAA regulatory scheme distinguishes between "mobile sources" (cars, trucks, etc.) and "stationary sources" (factories, power plants, etc.). Accordingly, one new rule, made jointly between the EPA and the National Highway Traffic and Safety Administration, addressed GHG emissions from mobile sources. Another addressed emissions from major stationary sources that emit more than specified amounts of GHGs. A third rule addressed reporting of GHG emissions. The EPA also granted California's waiver to implement its own auto GHG emissions standards.

State and regional programs will have significant effects on energy industries.

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1 Massachusetts v. EPA, 127 S. Ct. 1438 (2007).

2 Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 18,886 (Apr. 24, 2009).

The state of California has developed a statewide cap on GHG emissions and is developing regulations that will decide how industries will be allocated allowances and trade them to meet that cap. Given the size and importance of California and its traditional role in influencing federal air pollution policy (its system of regulating pollutants from cars predated and influenced the CAA's development), how the state chooses to regulate GHGs may have a great influence on federal policy. A group of northeastern states have created the Regional Greenhouse Gas Initiative (RGGI) that features a GHG cap and trade scheme. This scheme applies in its first phase only to electric utilities, so its regional cap-and-trade system is going to be an important GHG reduction mechanism for electric power generation. Some electric utilities have recognized the merits of a cap and trade strategy, and some have even gone so far as to break with historical precedent and support these schemes.

Anther means of reducing GHGs in electric power generation is to improve the performance of existing generation through more conservation and energy efficiency improvements. As a partial response to its increasing environmental awareness, the electric utility industry saw the advent in the past few decades of "integrated resource planning" (planning for the long term) and "demand side management" (DSM) programs designed to curb demand so utilities could avoid building new facilities. An example of a DSM initiative is providing customers with more efficient light bulbs that use less electricity. In 1999, 848 electric utilities had DSM programs, and energy savings for the 459 largest electric utilities were 50.6 billion kilowatthours. While these programs still exist, they have been largely replaced in recent years by other state and federal initiatives designed to promote renewable energy and energy conservation. *Systems benefit charges* (also known as public benefit funds) began in the 1990s when state regulators were concerned, correctly so as it turned out, that electric utility industry restructuring would prompt utilities to discard their programs that promoted renewable energy sources. A SBC imposes a small charge on every kWh of electricity generation and uses the money from this charge to promote renewable energy and energy efficiency projects.

One popular type of new program that promotes the development of renewable energy is *renewable portfolio standards* (RPS), which as of 2010 was in place in 29 states, with another five having voluntary standards. An RPS requires electric utilities to obtain a specific percentage of their power from renewable energy facilities, either by generating it or purchasing certificates from generators that use renewable fuels. A number of the states with RPS also have mandated energy efficiency targets. The RPS in the ACES climate bill, which was passed by the House of Representatives in 2009, is a "Combined Efficiency and Renewable Electricity Standard" that would credit both energy efficiency and electricity produced from renewables.

Because qualifying renewable power sources under the states' RPS and the proposed federal RPS have few or no carbon emissions, they can be important components of state and federal climate change policies. An example is the proposal

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in 2008 by three companies to build a solar plant in California to produce up to 800 mW of electricity, far more than any existing plant. The power would be sold to a California utility that is required under California's RPS, one of the most aggressive in the nation, to get 20 percent of its electricity from renewable sources by 2010. If comprehensive climate legislation passes Congress, it will almost certainly feature other measures designed to promote renewables. For example, the ACES climate bill would empower states to establish utility rates that would provide incentives for development of renewables.

By 2010, GHG regulation in the U.S. involved a large number of federal, regional, state, and local initiatives imposing a variety of different restrictions on energy industries. With the focused attention on climate change and reducing carbon emissions from the energy sector, it is likely that the U.S. will make significant changes to the regulation of energy industries. More developments are almost certain to take place as a result of new legislative and regulatory actions, and numerous cases brought in state and federal courts that aim to force governments, corporations, and individuals to take action to control emissions. These changes would relate to (and, in many cases, modify) one or more of the legal regimes described above.