Chapter 1

The Political Realities of Energy Policy

A small knowledge of human nature will convince us that, with the greatest part of mankind, interest is the governing principle; and that almost every man is more or less, under its influence. Motives of public virtue may for a time, or in particular circumstances, actuate men to the observance of conduct purely disinterested; but they are not of themselves sufficient to produce persevering conformity to the refined dictates and obligations of social duty.

—George Washington (quoted in Galston 2006 and Morgenthau 1978)

Public policy is a deeply paradoxical subject; this is particularly true for the subfield of energy policy. Our attempts to improve outcomes in the energy sector reflect noble aspirations: to provide energy sources that are cheaper, more reliable, provided equitably to all, and generate less pollution. U.S. performance has been respectable along many indicators, including the reliability and cost of our most important energy sources, and significant decreases in air pollution. Yet the specific actions intended to bring about the benefits we desire—the public policies—have on occasion led to results that were the opposite of what was intended, or brought about deeply injurious and unintended effects.

There are some clear reasons for this. One, which we will explore later in this chapter, is the systemic nature of energy phenomena. We intervene in energy markets because we are dissatisfied (and often, rightly so) with the outcomes, but our interventions push systems out of balance, in ways we don’t anticipate. Past attempts to set energy price ceilings, for example, often led to shortages, and even worse price pressures than existed initially.

Another challenge is that although energy use is fundamental to our civilization, most of us are buffered from its production, and its consumption is mostly indirect. We make few decisions directly to buy or consume it. Although most of us pay an electric bill each month, we don’t just decide to buy more kilowatts because we like them. We want goods and services that we value: homes with heat, cooling in the summer, light, refrigeration, computers, vehicles that move us where we want to go.
The energy cost, which is for most of us minimal relative to our incomes, comes along as we decide we want more of these things. For example: 26 percent of U.S. households and 41 percent of households with annual incomes of more than $80,000 now have a second refrigerator. But most people care little about how these are powered as long as their power sources are reliable and not expensive. We don’t buy coal, we buy electricity; we do buy gasoline, but it is mobility that we want. So although our lives are structured by energy-related products and decisions, indeed, as Nye (2003) suggests, energy creates the boundaries around our sense of possibilities, these decisions rarely take the energy implications into account. This has profound implications for policy making in this sector, as policy makers are forced to leverage their influence over other elements of the energy system.

Demystifying Energy Policy

Since one of our goals for this book is to demystify U.S. energy policy and policy making, we will begin with a brief case study that aims to explain a phenomenon that most of us take for granted, but few understand: electricity. In a 1978 study, Southern California Edison surveyed its customers and asked “Where does electricity come from?” The typical answer: “Out of the plug in the wall” (Sovacool 2006, 297). A more recent survey by the Harris Poll in June 2009 found only 9 percent of respondents identified themselves as “very knowledgeable” about sources of energy and energy efficiency, while another 50 percent self-identified as “fairly knowledgeable.” But 41 percent admitted they were “not that knowledgeable” or “not at all knowledgeable” (Gutacker 2009).

Yet, this poll did have good news. The responses suggest those polled had a reasonable understanding of the relative levels of risk from various sources of electricity. When asked, “Do you believe the benefits of each source outweigh the risks, or do the risks outweigh the benefits?” renewable sources such as solar (82%), wind/turbine (78%), and hydroelectric (73%) had a high proportion of those surveyed report that the benefits outweigh the risks. Nuclear energy was supported by 44% of respondents, while 34% felt its risks outweigh its benefits, and a substantial 22% were not sure. Only 28% believed the benefits from one of the country’s prime energy sources—coal—outweighed its risks; whereas 42% responded that its costs outweighed its benefits, and again 22% were not sure.

This is an important finding. Coal remains, literally, a cornerstone in the U.S. energy economy, a fundamental primary source of energy. But it appears that widespread public discussion of its contributions to climate change and other forms of air pollution has influenced its public perception. To gain a better understanding of coal’s importance and the problems associated with it, let’s examine what it is, and how it is used to generate electricity. In the process, we will also introduce some important concepts and show how public policy is intimately intertwined throughout all facets of the energy sector.

An Example: Coal, from Mine to Furnace

In the United States, the journey of electricity to your wall socket usually starts with coal. As shown in Figure 1.1, in 2008, slightly under 50 percent of U.S. electricity was generated from coal, about 19 percent from nuclear energy, 20 percent from natural gas, and 7 percent from hydro (see Box 1.1).


**BOX 1.1 COAL MAKES A COMEBACK**

Until the economic downturn that began in 2008, many of the nation’s utilities were retreating to an earlier technology as a way out of this dilemma. Nearly 100 new coal-fired electric power generating plants were planned in 36 states. If all are completed, they would add something like 62 gigawatts of low-cost electricity to the nation’s generating capacity. Illinois led the rush to coal with a total of ten new generating plants proposed. The retreat to coal is seen as the only way to keep electricity prices low while also adding to energy security by offering an alternative to foreign oil and gas. Coal already produces about half of all the electricity generated in the country. However, coal-fired generators also pump mercury and greenhouse gases such as carbon dioxide, nitrogen oxide, and sulfur dioxide into the air. The new plants are estimated to add roughly one-tenth of 1 percent to the world’s annual carbon-dioxide emissions. Environmental groups have filed suit to stop new construction. The United States, with more than 250 years worth of coal reserves, has been called the “Saudi Arabia of coal.” (From Clayton, M. 2004. The coal rush. The Seattle Times, February 27, A3.)

Why do we rely so much on coal? We do so in part because the United States has the world’s largest coal reserves, roughly 28 percent of the current world total. There are several varieties of coal, including anthracite, bituminous, sub-bituminous, and lignite. All are sedimentary rocks produced over eons through the decay of Carboniferous Era plant matter under heat and pressure, and in the absence of oxygen. As with other so-called fossil fuels, coal is thus a preserved form of solar energy.
Most of what is now burned in U.S. power plants is black or dark brown sub-bituminous coal. The different types of coal vary in their energy density, or energy per unit of weight, often expressed in megajoules per kilogram or mJ/kg. Sub-bituminous coal has an energy density of between 19 and 26 mJ/kg, depending on the grade. By comparison, higher-quality bituminous coal has an energy density of 27 to 29 mJ/kg; dry wood has an energy density of 16 mJ/kg; crude oil and gasoline energy densities are about 45 mJ/kg (Smil 1999; McElroy 2010).

A Good Fuel for Generating Electricity

The amount of energy packed into coal makes it a good choice as a fuel to generate electricity, but limits its usefulness for other energy services. You no longer see people loading coal into their steam engine cars, since gasoline has a much higher energy density, and can also be burned directly in an internal combustion engine.

U.S. coal deposits are located mostly in Appalachia, the Midwest, and the Intermountain West. Digging it up and transporting it to power plants is a carefully choreographed process of vast scale that begins with brute force: blowing off mountaintops in Appalachia or taking off 50 to 100 feet of dirt or overburden in Wyoming’s Powder River surface mines. Wyoming now leads the United States in coal production, with about 450 million tons per year—removed from some of the largest surface mines in the world. Although Wyoming coal has a lower energy density than Eastern bituminous coals (more must be burned to achieve the same power output), Powder River coal is prized for its relatively low sulfur content (Goodell 2006). The scale of the largest of the Powder River mines south of Gillette, Wyoming, is such that they are easily visible on satellite maps online. Given the advantages of coal as a fuel source for electricity, it is not surprising that its use has grown along with U.S. electricity output (Figure 1.2).

For a surface mine, the overburden is taken off in layers, loaded into enormous trucks, and transported to previously mined areas. The coal, often up to 100 feet thick in the largest mines, is thus exposed in seams. Explosives loosen the coal, which is then loaded into trucks and put into railcars for transport to power stations.

On average, coal is transported 500 miles to its final destination. Each railcar holds around 100 tons of coal, and often up to 100 cars are linked in a “unit train” that travels directly to one of the 976 power plants in the United States (as of 2007) that burn coal as their primary energy source. The amount burned depends on the quality; a 500-megawatt coal plant operating at full capacity requires roughly one unit train of sub-bituminous coal (10,000 tons) every three days; a lignite plant of the same output may require one such train per day.

A Big Footprint

A typical coal-burning power plant, including the actual generation facility and related infrastructure (coal storage, rail siding, etc.) has a “footprint” of 1,000 or more acres. Most of these facilities are located away from population centers and are rarely seen by the public. Although this sounds like a large area, it is relatively small in relation to the power generated. Centralized utility systems powered by fossil fuels thus have a high power density, generating large quantities of power and then distributing them for a variety of end uses. Renewable means of generating power such as solar, wind, or even hydropower, have much lower power densities—they take up far more space per watt of power generated (Smil 2003). This may have significant implications for how the country organizes a renewable-based energy system.

After arrival, the coal is removed from the cars and placed in a holding area. It is usually washed, pulverized into powder, and pulled by conveyor belt into the facility, then air-blown into the furnace, where it is burned at 1500 to 1700°C. More advanced plants use a fluidized bed combustion process in which the coal is burned on a bed of air created by blowers. This allows more complete combustion at lower temperatures with fewer emissions. Coal is transformed into heat and a series of by-products, including ash, sulfur dioxide, nitrogen oxides, carbon dioxide, particulates, plus small but measurable amounts of mercury and uranium.

The Rankine Cycle Process

The burning or oxidation of coal is used to power the Rankine cycle. Pressurized water in pipes running through the furnace is boiled and becomes steam, which is superheated to 1,000°F and blasted into turbines. Using Faraday’s principle of induction, the mechanical energy of the steam driving the turbine is converted into electricity, when the rotor on the turbine shaft (spinning at 3000 or 3600 revolutions per minute as required by the power grid), passes through the magnetic field of the stator (large magnet) surrounding it. This electricity is transformed to higher voltage and whisked away on transmission lines, eventually transformed to lower voltages at local substations, then distributed to households and businesses. At the plant, the superheated steam exiting the turbines completes the Rankine cycle as it is condensed into water, cooled, and cycled back to the furnace for reheating.

This somewhat simplified account provides a rough description of the process that generates almost half of the electrical energy in the United States; most of the rest is also generated in thermal power plants, but as noted, with natural gas or nuclear energy used to heat the steam that moves the turbine generators. Many aspects of this account are critical to the topic of this book: how the United States approaches the complex task of crafting its energy policy.
Understanding the Scale of Energy

To understand the scale of resources involved we will clarify how electrical energy is measured. First, the scale of energy production and consumption is vast. For example, consider electricity, fast becoming the favorite of energy policy makers. Electricity—the flow of electrons—is measured in watts; watts are the rate of electricity flow at a given moment (literally, joules per second). Power is the rate at which this energy is both generated and consumed—an important fact about the electricity system is that it must constantly equalize production and consumption.

At the household level, power is usually measured in kilowatt (1,000 watts) hours; the capacity of a power station is usually measured in megawatts or gigawatts (million or billion watts; the United States as a whole typically uses 4 terawatt hours (4,000 billion kilowatt hours) per year. Total global electricity use is about 16 terawatts per year. So, the United States with about 5 percent of global population uses about one-quarter of all electricity generated in the world.

Electricity keeps our lights, computers, space heaters, and flat screen televisions on. We must move huge quantities of our preferred primary energy sources to produce this electricity. We must then move that electricity through the country's 157,000 miles of high-voltage transmission lines. Our landscape is crisscrossed with these transmission lines because power generation usually takes place far from population centers.

As of 2007, the 476 coal power plants in the United States operated 1,470 coal-fired generators, producing a total of 2 billion megawatt hours of energy per year. In 2008 those plants consumed 1.042 billion tons of coal (EIA 2009f). How much coal is that? Enough to cover roughly 445,000 football fields with coal one foot deep, or 918 square miles of coal—a square about 30 miles per side.

Coal is only one primary source of energy used for generating electricity. We also use 7.2 trillion cubic feet (TCF) of natural gas per year to generate electricity in the United States, plus another 5.3 TCF for other residential uses—mainly space and water heating, plus cooking, and another 7.2 TCF for industrial uses (EIA 2010f). And we need 19.5 million barrels of oil per day—819 million gallons—out of a world total of 87 million barrels per day to power our transportation system and other needs.

These energy sources are generally not consumed at the point of extraction, so they must be moved, often repeatedly, with each stage of movement reflecting a loss of efficiency. In other words—it takes lots of energy to create energy. The more energy required per unit of energy produced, the lower the Energy Return on Energy Invested (EROEI). Second, the energy sector requires an intricate and enormous infrastructure, which in the United States is mostly privately owned.

The total capital stock in the U.S. energy industry has been estimated at $1.85 trillion as of 2008, with $946 billion in the electric utility sector alone (EIA 2008b). That is using historical cost figures; current cost estimates are twice that high. The infrastructure for our gasoline and diesel-dependent transport sector, including not only the ubiquitous corner service station with its invisible tanks, but tanker trucks, refineries, pipelines, and so on, is also valued in the trillions of dollars. The annual capital requirements for the entire U.S. energy sector are in the range of $300 to $400 billion per year. Would it be feasible for the U.S. government, or state governments, to own, operate, and maintain this infrastructure? The short answer is yes, but whether that would be desirable is another matter.

Conversion Processes Needed

Energy processes such as this one almost always require conversion, from one state to another, in the process releasing heat or electrons. Even hydropower, considered a "primary" source of electricity, converts the potential energy in a reservoir to kinetic energy as water flows down to and through a turbine.

During these conversion processes, consistent with the first law of thermodynamics, the total energy in the overall system remains constant. But the second law of thermodynamics mandates that the entropy, or disorder, in the system must increase. Once burned and turned into heat and its many by-products, the coal may not be magically re-created, and the process of conversion is inherently inefficient. Despite considerable research and investment, coal power plants have reached a ceiling of about 45 percent efficiency; most average 33 percent efficiency. Much of the energy contained in the original energy source is lost, and not turned into useful services.

This is reflected in Figure 1.3, the most recent in a series of charts produced by the Lawrence Livermore Laboratories of the U.S. Department of Energy that summarize the flows of energy through the U.S. economy (DOE 2009a); about 57 percent of the energy in the system is wasted overall as a result of inefficiencies in both generation and power transmission.

Why Worry about These Conversions?

Why are these conversions important? Why are such enormous quantities of primary sources of energy such as coal, oil, and natural gas required for our economy? Part of the answer lies in the relative inefficiency of these conversions. Most of the energy policy instruments we will summarize in Part 2 attempt to influence the supply or demand for these primary energy sources, for secondary sources such as electricity, or to limit their unintended, polluting effects. But another way forward is to create incentives to bring about improved technical efficiency so as to meet the demand for energy services with fewer inputs. This was one of the arguments of Avery Lovins in his landmark 1976 Foreign Affairs article, "Energy Strategy: The Road Not Taken."

In addition to the inefficiency of these conversion processes, they create huge amounts of unwanted by-products. When the throughput of materials such as coal, natural gas, and oil is so vast, even a relatively small output of a pollutant can add up quickly. And some of these pollutants are produced in very large quantities. For example, for every ton of coal burned, two tons of carbon dioxide ($CO_2$) are released. Figure 1.4 compares gas, oil, and coal emissions.

In the United States, the Environmental Protection Agency (EPA) estimates that energy-related activities generated 86 percent of all greenhouse gas emissions in 2007. Electricity generation is responsible for 41 percent of all CO$_2$ emissions. Overall, coal-fired power is responsible for 33% of all energy-related CO$_2$ emissions (EPA 2009b). Because we are so dependent on coal-generated electricity, particularly in the southeastern and eastern United States, we become inured to its effects.

The infamous August 14, 2003, power blackout in Ontario and the eastern United States forced 508 generating units at 265 power plants in that area offline. A study of air quality in Maryland measured during the outage found dramatic decreases in sulfur dioxide, ozone, and particulates (Marufu et al. 2004).
The Economic Perspective

Energy systems may also be viewed from an economic perspective. Two tools used for economic analysis of energy—energy return on energy invested (EROEI) and product life-cycle cost—are described in Box 1.2.

Coal-fired power appears to be economically “efficient” in part because coal is relatively cheap as a source of fuel compared to the available alternatives, particularly natural gas. The long-run price of coal increased prior to the 2009 recession, thanks in part to increasing demand from China and other newly industrializing countries. Factoring in all other direct costs of production, electricity from coal cost on average 3 to 5 cents per kWh in the United States in 2008, less than the 4 to 8 cents per kWh for natural gas over the same period. Despite this price differential, most new electrical generating capacity added in the past two decades in the United States relies on natural gas.

These plants have much lower capital costs and gas is a cleaner fuel than coal that generates far lower carbon emissions (EIA 2009c). However, these prices omit a wide array of social and environmental effects of the electricity production process, literally from beginning to end. Some of these are: water pollution occurs in the wake of surface coal mining as pollutants work their way into the water table, and more water pollution occurs at the end of the production process as chemicals from coal ash leach into the ground. More seriously, Earth’s atmosphere is a common-pool good, available to all, and the operators of our coal-fired power plants take oxygen from the air for burning the coal and return pollutants to it. Due to our relatively recent recognition of human-caused climate change, the effects of carbon dioxide are now being acknowledged, but the other products have long been recognized as important contributors to air pollution and related diseases.

These externalities or spillovers are effects (both negative and positive, or alternatively, costs and benefits) from production and consumption processes that impact individuals and society, although those others had no impact on the decision, and the effects are not priced into the final good. They occur in part due to a property rights problem: no one owns the air, so from a production perspective, there is no incentive to preserve it. The energy sector is replete with such...
BOX 1.2  TWO TOOLS FOR ENERGY ANALYSIS

How do decision makers, either in the public arena, such as members of Congress, or in the private sector, make decisions about energy projects, or products with energy implications? Two interrelated analytical approaches that have been somewhat useful are calculations of energy return on energy invested (EROEI) and of a product's life-cycle cost, using life-cycle cost analysis (LCA).

EROEI, also termed energy return on investment, is a calculation of the ratio between the energy extracted by a process and the energy used in the process of extraction or production (Cleveland 2008). Calculations of EROEI require careful accounting of the inputs required in extraction and production as well as the nature of the final product. Petroleum has a high energy density and typically generates a high EROEI, even when obtained in costly locations. We can also produce oil and gasoline from tar sands, but the high energy input required considerably lowers its return on investment.

A related process is the measurement of life-cycle cost. This can either emphasize the cost to the producer or consumer, or more broadly consider the total cost of the entire product system to the environment and society. What resources are required to produce and consume an item from beginning to end (European Environment Agency 1997)? Again, the calculations are detailed, are best done with computer software, and the results are sometimes counterintuitive. Which is "better," a flimsy plastic shopping bag that is made from oil and must be thrown away, or a nice, recyclable paper bag? On balance, the plastic bag uses less energy, in part because the greater weight and volume of paper bags requires costly shipping, usually via diesel trucks.

Application of both EROEI and LCA analysis is complicated by the need to set boundaries on each analysis. The choice of boundaries can make a difference; thorough calculation of the LCA of an automobile requires inclusion of all the inputs to the car, not just its assembly (Smil 2008). These concepts are also useful in considering a society's overall energy use. Fossil-fueled civilization has a high overall EROEI, which is likely to decline as we become more reliant on renewable sources (Cleveland 2008).

spillovers, both positive and negative, and they are related to both production and consumption of energy. Much of the public policy in the energy sector aims to reduce the external costs of energy production that are borne by society, and not by the producers of energy.

The Function of Energy Policy

Where does energy policy fit into this narrative? It lies behind each of the major steps, from the beginning at the surface coal mine, to the transport and storage of the raw material, its conversion to energy at the power plant, and distribution of the resulting power to our houses and businesses. As Table 1.1 shows, "energy" policy is somewhat of a misnomer; a wide variety of public policies influence the energy sector. Perhaps the most important energy laws have an environmental focus. They influence where mines and other energy facilities may be opened and how they operate, to protect vegetation, ground water and wildlife, as well as to limit the effluents that are allowed to enter the atmosphere.

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<th>Table 1.1  Federal and States of Wyoming and Washington Energy Statutes</th>
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<td><strong>Federal:</strong></td>
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<tr>
<td>Surface Mining Control and Reclamation Act, PL 95-87 (requires remediation of mined lands).</td>
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<tr>
<td>Clean Air Act of 1960, as amended, 42 U.S.C. 85 (comprehensive statute providing the U.S. Environmental Protection Agency with authority to regulate sources of air pollution).</td>
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<td>Coal Excise Tax, Section 4121 of the Internal Revenue Code (to fund Black Lung disease programs).</td>
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<td><strong>State:</strong></td>
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<tr>
<td>Washington Clean Air Act, RCW 70.94 et seq. (&quot;WCAA&quot;), (Washington's clean air statute).</td>
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<tr>
<td>Washington Energy Facilities - Site Location: Chapter 80.50 Revised Code of Washington (authorizes state control over siting of energy facilities).</td>
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<tr>
<td>Washington Utilities and Transportation Commission regulation of utility tariffs, Title 80, RCW (authorizes regulation of utility rates).</td>
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Regulation of utility rates is a more direct form of energy policy. The U.S. Constitution created a federal system of government that attempts to establish boundaries for the roles and functions of the national and state governments. These boundaries, including the Supremacy Clause, which makes the Constitution the "supreme law of the land," and the Commerce Clause, which gives Congress the power to regulate commerce between the states, have been sorely tested by the need for environmental and energy policies with a national scope. States often rebel against federal action perceived as overly intrusive, but have also acted boldly when they believe the feds are being too timid, such as the state of California's consistent efforts to regulate carbon dioxide as a polluting greenhouse gas (Emerson 2002).

Federal laws and resulting regulations mandating efforts to remediate mines and to limit air and water pollution are mirrored by state statutes that at least match, or exceed, federal requirements. State-level regulators are usually the officials implementing policy on the ground, and it is often a challenging position. They are pulled between conflicting pressures to protect the environment, but also to say "yes" to energy projects that offer badly needed economic development and jobs to cash-strapped communities.

Unexpected Influence of Nonenergy Policies

Policy makers must also consider the unexpected influence of nonenergy policies. In this case, the Staggers Rail Act of 1980 almost eliminated federal government regulation of the railroad industry in the United States. It encouraged a series of mergers in the industry that led to increasing concentration, so that now the United States has only five major railways, and two in the western
United States that provide almost all coal haulage of the coal transported from Wyoming. It also enabled the remaining railroads operating in the intermountain west coal belt to raise their rates for hauling coal. Thus the generators that rely on steady supplies of coal face a restricted market for rail services for their essential input—in many cases they are effectively captive to a monopoly railroad service. As you would expect, this has led to a complex relationship between these two industries, with increasing lobbying for a return of federal regulation (Wilks 2006).

Despite the significant influence of the Staggers Act on the cost of shipping the country’s most important source of electricity, it is not mentioned in a comprehensive analysis of U.S. energy policies created by the U.S. Government Accountability Office in 2005 (GAO 2005). It is hard to criticize the GAO, however, since the list already runs to over 100 different federal policies.

This case illustrates the complexity of the energy systems that provide the foundation for our fossil-fueled civilization. Technology, culture, politics, law, economics, business, and government interact to provide us with the electricity that powers much of our society. But this discussion of a key element of our energy supply leads to a different question: What is the source of Americans’ seemingly insatiable demand for energy?

Why Does the United States Use so Much Energy?

The United States is often described as an “exceptional” country compared to the rest of the world—it is more individualistic, more religious, more suspicious of government than those of other countries. The term is particularly appropriate in the energy sector. We use more energy on an absolute basis than any other society on Earth. As shown in Figure 1.5, in 2006 with a 4.6 percent of world population, the United States produced 15.1 percent of world energy, and consumed over 21 percent of world energy. The 6 percent differential between domestic production and consumption was met by imports, largely of petroleum.

What primary energy sources do we rely on, and how do we use all this energy? Figure 1.6 shows the supply sources and demand sectors, and how as a society we have matched sources to their most appropriate uses. Overall, industrial uses gobble up 31 percent of all U.S. energy, closely


followed by transportation (28 percent). Residential/household use and commercial use reflect 22 and 19 percent of the country’s energy use, respectively.

Not shown in these figures are the high reliance of the transportation sector on demand for petroleum products; 95 percent of all oil use in the United States goes to transportation. Also, the residential and commercial combined sector uses 76 percent of the country’s natural gas, primarily for space heating and cooking. As shown in Figures 1.7 and 1.8, industrial energy demand has been erratic since the 1970s oil shocks, while demand in the other three sectors (other than a slight dip for the early 1980s recession) has grown consistently since the late 1950s.

The United States also uses more energy per capita, and relative to the size of the economy (a measure termed energy intensity), than almost any other country. As shown in Figure 1.9, only Canada uses more energy on a per person basis than the United States. Although there are considerable methodological limitations to these data (countries are not entirely consistent in how they collect and present data on gross domestic product (GDP), and on energy production and use), they are accurate enough to allow a fair comparison between countries.

Factors Influencing U.S. Energy Use

The factors influencing Americans' huge appetite for energy have been explored by authors such as Mumford (1937), Nye (1998), and Smil (2003, 2006). The advance of civilization and the very concept of progress are linked to the ability of humans to make use of new and increasingly powerful sources of energy. Over time, energy use has advanced almost proportionately with economic growth. While this is true for the "industrialized" world as a whole, the United States differs in our resource endowment, climate, sheer size, culture, and other factors (Smil 2006). We have substantial supplies of oil, coal, natural gas, and uranium. It is easy to forget, now that we are reliant on imported oil, that the United States remains the world's third largest producer, behind only Saudi Arabia and Russia. Climate is critical, since colder climates requiring more space heating, and muggy locations made more livable through air conditioning both demand sizable amounts of energy for heating and cooling.

Sheer distance traveled also makes a difference. Americans travel farther by car, on average, than any other society. an average of 12,293 vehicle miles per year (2007 data), while the fuel economy of our vehicle fleet for both commercial and personal use has been stagnant for a generation (FHA 2008). We also travel by air more frequently than citizens of other countries. North Americans (including both the United States and Canada) generated 755 million passengers in 2008, one-third of global air passengers, with just over 5 percent of global population (ICAO 2009).

Americans also like single-family houses, which are 63 percent of the nation's housing stock as of 2007 (U.S. Census Bureau 2008). We have chosen to allocate some of the benefits of economic growth to even bigger houses. In 2008, the average new single-family house had 2,519 square feet.

Sources of Our Preferences

Where do these preferences come from? Nye traces the rise of the country's consumer culture, and our evolution into a wealthy society in which wants are manufactured by marketing and we are defined by what we own and what services we consume. Manufacturers invent increasingly sophisticated technology that creates ever-fancier products, to be bought when the previous model becomes unfashionable (not obsolete). This process relies on the easy availability of energy, and works most adversely when it exploits strong cultural preferences, such as the American sense of restlessness and desire for space and freedom—epitomized by our infatuation with the automobile and preference for suburban lifestyles. Nye cautions us to avoid a simplistic technological determinism that makes advancing technology and its related effects seem inevitable, and thus avoids the reality of human agency: we make choices, they don't simply happen. But even he concludes that "electricity and the automobile transformed society" (1998, 182).

Most pertinent for this book is that public policy has been an important factor encouraging both the creation of the consumer society, and the use of energy. The path toward a consumer society with high levels of energy use emerged in the United States during and after the Great Depression. As historian Alan Brinkley recounts, economic collapse inspired many proposals for the economic and social transformation of U.S. society, including corporatist and social democratic models (Brinkley 1995). The desire to bring about full employment during the postwar era...
moved the country toward a Keynesian model reliant on high consumer consumption, when necessary supported by government spending and policies to help regulate the business cycle.

President Franklin Roosevelt used public action to make electricity more broadly available and enhance economic development, through the creation of the Tennessee Valley Authority, rural electrification, and the construction of dams in the Northwest. Over time, public policy, working in concert with the private sector, was generally effective at providing reliable supplies of gasoline, heating oil, and electricity, often at costs that decreased over time. For example, the real (inflation-adjusted) cost of electricity declined on average in the United States between 1960 and 2007, despite a big jump in price in the mid-1970s and early 1980s. The journey of oil and gasoline prices over that period is much more complex, as we will discuss in Chapter 4. One thing is certain: oil and gasoline decreased in price in real terms for an almost twenty-year period beginning in 1981, before starting its run toward the breathtaking 2008 peak.

The good news about declining energy prices is that they save consumers money, which may then be spent on other goods and services. The bad news is that they encourage increased consumption. One of the paradoxes of energy policy is the so-called rebound effect: savings from investments in energy efficiency may be allocated to increased consumption of the same product (a direct rebound effect) or in more consumption of another energy-intensive good or service, an indirect effect (CRS [Congressional Research Service] 2001; Sorell 2007). This is most evident in automobiles: when our new car has better gas mileage we are likely to drive more often and longer distances. This is a disturbing implication for investments in energy efficiency, as it implies that such investments will be less than fully efficient.

**Encouraging Energy Trends**

Several long-term U.S. energy trends are moderately encouraging: Although total energy use in the United States has tripled since 1950, the rate of increase has been much reduced since the 1970s oil shock, and close to zero since 2000. An emphasis on increasing energy efficiency has had a positive impact on our overall energy use. The United States has plateaued at around 99 quadrillion BTUs per year (EIA 2009c). Per-capita energy use has begun a gradual decline, and the overall energy intensity of the U.S. economy has declined steadily since the 1950s. This has been termed the “decarbonization” of the economy and is due at least in part to offshoring of manufacturing to other countries.

**The U.S. Energy Sector**

The first section of this chapter provided an overview of energy use in the United States as well as important energy trends, definitions, and issues. To round out this chapter, we will consider energy from a structural or organizational perspective. We begin with the questions: How is the energy sector organized? What elements of our economy and society does it touch, and how critical is it in each instance? And how do these sectors interact?

The ubiquity of energy use in industrial society makes it worthwhile to view energy from a systems perspective. A system is a set of elements that interact in concert so as to form a whole. Organizational systems rely on inputs of resources, create outputs, and are oriented toward achieving a goal—they are teleological. They are sensitive to feedback loops and usually (but not always) tend toward maintaining an equilibrium or homeostasis. They also rely on subsystems that absorb inputs, and provide outputs important to the success of the system as a whole.

The systems model is helpful in considering energy phenomena because the principles of biology and physics are used to explain energy phenomena; the subdiscipline of energetics is also amenable to a systems approach. The essential input to the Earth’s energy system is the 1.367 Wm² of sunlight that enters the atmosphere each day—only about 20 percent of which is absorbed at the surface. This is the original source of the stored energy that we use as we consume the fossil fuels oil, coal, and natural gas. These in turn have been essential inputs for our economic and social systems. Whether the Earth itself is a goal-seeking and self-regulating system, as suggested by James Lovelock’s Gaia hypothesis, is a hotly debated question.

**Energy in Contemporary Society**

In envisioning the role of energy in contemporary society, it is also helpful to think of the interaction of multiple subsystems with an energy nexus intertwined. These include our economy, commerce, and industry; agriculture; the social/residential; transportation; political/government; and military subsystems. Although they can be described as discrete entities in their own right, these subsystems should not be considered in isolation, since each ultimately impacts the others. This section will provide a quick sketch of each of these elements of the U.S. energy system, and conclude with some thoughts on the nature and goals of this system as a whole.

**Energy as a Business**

The U.S. energy industry is a behemoth—one of what the U.S. Bureau of Labor Statistics terms a series of supersectors. Table 1.2 displays employment and revenue data on each of the subsectors within this supersector and lists key companies. These supersectors include:

- **Oil:** oil companies, refiners, fuel transport, gasoline sales
- **Natural gas:** natural gas extraction and processing, coal gas manufacture, and distribution and sales
- **Electric utilities:** electricity generation, high-voltage transmission, distribution and sales, nuclear power, energy services
- **Coal:** Mining, shipping, and distribution
- **Renewable energy:** wind power, solar power generation, alternative fuels
- **Energy markets:** NYNEX exchange, regional exchanges

The importance of this sector to the U.S. market system is difficult to underestimate. It fluctuates as a share of the overall economy, based primarily on movements in oil prices, but averaged 8.8 percent of U.S. GDP from 1970 to 2006, with a peak of 13.7 percent in 1981 and a low of 6 percent in 1998 and 1999 (EIA 2009c). Its importance is perhaps best measured in symbolic terms. The oil industry, in particular, is emblematic of the market system itself, with companies such as Exxon Mobil representing the best and worst of the free enterprise system. The fascinating history of oil and the oil business is explored in depth in Daniel Yergin’s The Prize (Free Press, 2008). American distrust of the oil business can be traced back to John D. Rockefeller’s Standard Oil monopoly.

Long after the breakup of this monopoly, the perception of cartel-like behavior in oil markets persists. The revenues and stock prices of these companies surge along with upward movements in oil and gasoline prices. Riding a recent oil price spike, Exxon Mobil set a record for profit by
### Table 1.2  U.S. Employment and Revenues in Energy Supersectors, 2008

<table>
<thead>
<tr>
<th>Sector</th>
<th>Employment</th>
<th>Estimated Revenues (SUS billions)</th>
<th>Typical Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum and Coal Products</td>
<td>242,100 (2008)</td>
<td>1,370.5</td>
<td>Exxon Mobil, Chevron, BP, Occidental</td>
</tr>
<tr>
<td>Electric Utilities</td>
<td>559,500 (2008)</td>
<td>365.4</td>
<td>So. Cal Edison, CenterPoint Energy, PG&amp;E</td>
</tr>
<tr>
<td></td>
<td>Total secondary jobs estimate: 8.5 million</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


This began to change with the 1970s oil crises. A destabilized energy market resulted in a huge increase in electricity prices. At the same time, environmental concerns mandated significant investments in pollution control. Electricity price increases also helped create a new business category—energy services companies (ESCOs) that worked with industry and households to increase their energy efficiency. New technology and federal policy also created space for a renewable energy industry that has experienced a series of boom and bust cycles.

### Need for a New Business Model

This period created the need for a significant change in the utility business model, which suddenly had to contend with both planning for future increases in demand, and how to sustain profits when expected to try to decrease use of their basic product. The 1978 Public Utility Regulatory Policy Act triggered a dramatic shift in the industry as it created market openings for new categories of private and often unregulated power generators, which stole away large industrial customers through lower rates. Since the 1970s, the utility industry has become riskier and more complex; the dramatic rise and fall of Enron illustrates the vulnerability of the sector to financial manipulation.

As these capsule descriptions suggest, the energy industry has evolved dramatically over the past three decades, in the process growing larger and more important to the economy. Not surprisingly, energy industries have sought to preserve their markets and profits through the political process. Possibly the most glaring example of this was the crafting of the infamous 2001 National Energy Strategy by Vice President Dick Cheney, with energy companies at the table but almost no other public input. Now, the energy sector faces an even greater test: the need to adapt to climate change and a world in which carbon—the unwanted by-product of the fossil fuel economy—will eventually be priced and its output increasingly limited.

Even with a new carbon economy, U.S. use of fossil fuels will remain large for generations, so this sector will remain significant. But the role of federal and state energy policy in encouraging a shift to renewable sources will increase the role of government.

### Energy in Commerce and Industry

In 2008, the U.S. industrial and commercial sectors used over 50 trillion BTUs of total energy, about 50 percent of all energy consumed in the country that year. But the energy trends of these two sectors of the economy are diverging. Although the United States remains the world’s largest manufacturing country, the global share of U.S. industrial activity has declined. With the contribution of investments in energy efficiency, this has lowered the amount of energy needed for the country’s industrial sector by more than 11 percent since its 1997 peak. The drop in 2008 also reflects the onset of a serious economic recession that lowered energy use. The commercial sector, however, reflects the continued growth of services, including commercial real estate, with its demand for energy continuing to expand.

Since the 1970s oil crises, the sophistication of U.S. business toward energy use has increased considerably. For most large businesses, it is no longer just another manageable resource. Managing energy is now a cost center, and firms hire individuals and staffs that pay for themselves through reductions in energy use. This is now easier, thanks to the availability of technology to help manage energy use and costs.

Firms also must manage how they are perceived by the public: at a time when being “green” is becoming mandatory for marketing success. Yet some aspects of business energy use are still in
need of attention from a policy perspective. For example, buildings continue to be responsible for 40 percent of U.S. carbon emissions. The nation's reliance on petroleum as a transportation energy source receives much attention, but virtually all of it is focused on personal automobiles and light trucks; business vehicles, most using diesel, remain relatively inefficient and are ripe to be replaced by short-haul electric trucks.

Energy and the Consumer

Private citizens need energy because they need energy services. An analysis of household electricity demand in 2001 found that appliances are responsible for about 65 percent of electricity use, with refrigerators responsible for the most consumption (14 percent), with lighting (9 percent) in second place. The good news is that despite larger houses with their increased need for heating and cooling, and greater demand for electricity for electronics, the rate of growth in the residential use of energy has fallen dramatically. Since 2000, residential energy demand has increased by less than 1 percent. This is partly due to increased efficiency, replacing of old appliances with newer models that demand less power (thanks to the Energy Star program described in Chapter 4), and a shrinking of household size. Also, the effects of compact fluorescent lights, which typically use 75 percent less power than an incandescent bulb, are beginning to be felt.

We are also driving less; vehicle miles traveled were down by about 3.6 percent in 2008 compared to 2007. One of the energy surprises of 2008 was the realization that the demand for gasoline went down when gasoline reached the $4-per-gallon threshold. The price elasticity of demand for gasoline in the United States—the change in demand that results from an increase in price—has been shown to be low in the past, since there are few substitutes for driving for most Americans. But suddenly people were willing to carpool, work from home, or take mass transit. But prices of $4 per gallon of gasoline and $140 per barrel of oil are difficult to sustain politically in the United States. High fuel prices also strike fear in the OPEC states that now produce most of the world’s oil. High prices change consumer behavior and encourage the development of sustainable substitutes that threaten their energy hegemony.

Help for Low-Income Families

Although the market system in the United States does a reasonable job of supplying energy to most people and families, it often fails for low-income households whose basic living circumstances differ dramatically from people and families with higher incomes. According to 2007 data from the Department of Energy, families below 150 percent of the poverty level ($30,975 for a family of four in 2007), are much more likely than people not in poverty to live in apartments than single-family homes; to own their homes if they are in a single-family house; and to live in a much older home (HHS 2009). They spend less on energy for their households than families with higher incomes; an estimated $7,171 in 2007, compared to $2,132 for households not in poverty. However, energy purchases represent a much larger portion of their income: 9.9 percent compared to only 2.5 percent for households not in poverty.

Low-income families are also much less likely to own a vehicle. In 2001 (the latest data available), more than 20 percent of households with incomes of less than $25,000 per year did not own a vehicle, compared with about 2 percent of households with incomes higher than that threshold (BTS [Bureau of Transportation Statistics, U.S. Dept. of Transportation] 2003).

Energy and Agriculture

Although agriculture reflects only 1.2 percent of the $14 trillion U.S. economy as of 2008, and less than 1 percent of the labor force, the relative importance of this sector to our economy and society is significant. This country is more than self-sufficient in food, and agricultural goods remain an important category of U.S. exports. The country provides around 40 percent of world grain exports, for example. The evolution of U.S. agriculture toward larger but fewer farms has been accompanied by increasing specialization in the use of energy, and energy use per unit of agricultural output has decreased steadily since the 1970s energy crisis (USDA [U.S. Department of Agriculture] 2005).

However, the big story in the agricultural sector can be summed up in one word: biofuels. There is no better example of the systemic, global nature of energy policy than the vast expansion of the country’s ethanol production since 2001. Ethanol is alcohol generally produced in the United States through the industrial fermentation and distillation of corn, although any feedstock may be used that contains substantial sugars or starch, including sugar cane. U.S. policy has been to encourage ethanol production as a gasoline additive and substitute. Although pure ethanol has a significantly lower energy density than gasoline, in a 90/10 gas/ethanol blend, it helps lower emissions while only lowering the energy density of the fuel by about 3 percent.


To meet the increased demand, some farmers switched from growing white corn suitable for human consumption to field corn, which is used to feed cattle and to make ethanol. Demand for cropland and animal feed increased, along with the prices of other farm commodities, including meat, soybeans, dairy products, and wheat; these increases quickly led to significant increases in U.S. food prices. The U.S. Congressional Budget Office (CBO) estimated that the ethanol binge was responsible for 10 to 15 percent of the 5 percent increase in food prices from April 2007 to April 2008, and increased federal spending on food assistance programs (CBO [Congressional Budget Office] 2009). Mexico was plunged into a crisis as white corn shortages led to a tripling or quadrupling of the price of tortillas, a cultural staple.

Tightening markets for energy, agricultural commodities, and fertilizer, plus low stocks of stored foods helped to drive up food prices worldwide. The World Bank estimated that these increases led to a 3 to 5 percent increase in poverty across the planet, as well as serious nutritional consequences as the urban poor switched to cheaper but less nutritious sources of food (World Bank 2008).

By early 2010 the boom in farm prices had been replaced by a classic bust. In early 2008 high corn prices made ethanol production uneconomic for smaller producers and scores of planned investments in ethanol plants were cancelled or finished plants left idle. The severe 2008 world-wide recession lowered demand for energy generally, including gasoline and ethanol. Ethanol producers, plus the USDA began lobbying for increasing the 10 percent "blend wall" of ethanol with gasoline to 15 percent. Food and fuel prices have moderated. We will return to our discussion of biofuels later in the book to provide a clearer description of the role of U.S. public policy in encouraging this cycle.
Conclusion: Energy out of Balance

This discussion of the U.S. energy system and its interdependent energy subsystems omits an important reality: it is out of balance. In 1955 the country crossed the threshold of 1 million barrels per day (mbd) of net oil imports, and oil imports have risen relentlessly ever since. As of 1990, net oil imports began to exceed domestic oil production; now we import around 57 percent of our daily oil needs, over 12 mbd (EIA 2009a). We do not produce enough oil to meet current demand and are reliant on the world oil market to make up the difference.

Our inability to meet our oil needs from domestic sources for decades has been one of the main irritants in U.S. energy policy. It also raises fundamental questions about our long-term supplies of not only oil, but other types of energy, and the extent to which we should seek to be self-sufficient. The recognition that global climate change is almost certainly linked to our vast appetite for energy is causing a reappraisal of our energy habits. The next chapter will consider these and other challenges and our need to begin an energy transition.

Chapter 2

Energy Policy in Transition

Clearly, there are no easy choices facing future production and use of energy for most countries. ... Only large reductions in global primary energy use, with all its difficulties of implementation, can meet the resource, environmental, economic and political problems that future energy use will face.

—Patrick Moriarty and Damon Honnery (2009)

In the summer of 2009, one of the authors traveled to British Columbia’s Okanagan Valley. The Okanagan has beautiful lakes and mountains and warm summer weather that make it an ideal vacation spot. Over the past two decades it has become famous for a new reason: the quantity and quality of its wines. Local winemakers were initially boosted by Canadian government support for removing previous grape varieties and replacing them with superior vinifera. They also received an assist from a gradually changing climate. Warming winters have extended the region’s wine growing area further south and made it possible to grow a wider variety of red wine grapes. Skillful vintners have taken advantage of the weather change; the valley is now one of the top wine-producing regions in North America.

But the same warming winters have had a devastating effect on British Columbia’s (BC’s) forests. The mountain pine beetle has long been established in the vast pine forests of the province’s central plateau, but its effects were relatively minor as long as extended cold winters kept its numbers low. Low temperatures of −35 to −40°C (about −31 to −40°F) for several consecutive days are needed to kill the various stages of the beetle. But warmer, dryer winters that don’t reach these bone-chilling temperatures have allowed the beetle to survive and flourish in these forests, which have also been weakened by hotter and dryer summers. As of 2009, 35.8 million acres, or almost 56,000 square miles have been affected, with infested trees typically turning a rust color. Large areas of BC’s interior forests are now colored an unearthly red. What’s worse, as the dead and dying trees decay and emit carbon, BC’s forests have become a net emitter of carbon dioxide. Although the infestation appears to have peaked, its effects on communities in the affected area and on the overall environment will likely linger for a generation. Similar forest pest infestations have caused extensive damage in Colorado, Alaska, Montana, and Idaho and the province of Alberta.

Clearly, the Earth’s climate is changing. Average surface temperatures around the globe rose by 1.3°F over the last century, with varying effects, as the cases above suggest—sometimes beneficial,
the United States and across the globe. National action is essential but will not be sufficient. The next chapter will examine the public policy environment in the United States, which shapes what problems are recognized as worthy of resolution, and the range of possible responses.

Public policy is a reflection of particular attitudes, intentions, and actions of policy makers that affect society; examples include industrial policy, education policy, welfare policy, public safety policy, environmental policy, energy policy, water policy, and the like. The results of public policy on the energy industry are exemplified in the character of the laws enacted, regulatory actions taken, court decisions handed down, and the behaviors and attitudes expressed by legislatures and the public on energy industry operations and issues. These policies seldom if ever remain permanent; they are always subject to change.

Chapter 3
The Art and Science of Crafting Public Policy

Politics and policy making is mostly a matter of persuasion. Decide, choose, legislate as they will, policy makers must ever be catered to with them, if their determinations are to have the full force of policy. . . . To make policy in a way that makes it stick, policy makers cannot merely issue edicts. They need to persuade the people who must follow their edicts if those are to become general public practice.


On Presidents Day 2010, Washington State's capital complex in Olympia was a busy place. Two groups of citizens took advantage of their right to assemble to gather on the steps of the neoclassical Legislative Building and make known their deep concerns about the state's plans to cope with its $2.8 billion 2011 budget deficit. The first group, organized by antitax forces affiliated with the so-called Tea Party movement, aired their opposition to proposed tax increases and threatened their legislators with electoral Armageddon. A group with the opposite message then took over the same location, arguing for tax increases to avoid deep cuts in the social and health services programs and education. Legislators caught in this electoral pincer faced a dilemma: how to eliminate the deficit, as required by the state constitution, without alienating a wide swatch of the state's voters. This brief example illustrates the difficulties of policy making in a democracy.

Policy Making in Action

The public policy process is the expression of the political system in action. Citizens and other stakeholders experience frustrations, perceive needs, and seek satisfaction through collective action and the formal political system, aiming to bend that system in their direction. Change in democratic systems is rarely easy, however. Like many institutions, political systems suffer from inertia; there is no political equivalent to the Second Law of Thermodynamics. Once changed, policies tend to
we have a federal constitutional republic, a model of government that retains power in the hands of citizens but relies on elected representatives at the national, state, and local levels to make collective decisions. Whether that political model is still working acceptably is a deeper question. Since the 2008 national elections, there are both encouraging and discouraging signs. But to gain a deeper understanding of the policy process, a much broader consideration of our political community and political culture are needed. We need answers to such questions as these: Is this system capable of taking on the challenge of climate change and a transformed energy sector? Is it still a model of political community that citizens want to live in? What changes are possible?

The Evolution of U.S. Political Culture

The dominant political tradition in the United States is classical liberalism. Best described by English political theorist John Locke in his Second Treatise on Government, the liberal tradition emphasizes the primacy of the individual as a person with a set of natural rights, to life, liberty, and property. Men, Locke argued, lived in a free, but anarchic state of nature. Without a strong government that freedom was constantly endangered, and “the enjoyment of the property he has in this state is very unsafe, very insecure.”

Locke envisioned a state in which individuals could work together in a sphere outside of government, which he termed civil society, and through a limited government that would protect individual liberty and individual rights, and encourage civility between citizens. Ideally, this would protect individuals from both the anarchic dangers of the state of nature, and the very real dangers of an overly strong monarchic government.

In the economic sphere, Adam Smith described in his book The Wealth of Nations a similar, limited state that would protect individuals in their role as economic self-maximizers, pursuing their self-interests in a competitive marketplace. Smith countered criticism that an economy and society based on such a rule would lead to chaos with his famous metaphor of the “invisible hand,” arguing that free markets would produce a rich variety and amount of goods that would meet society’s needs. Smith was a more nuanced thinker than many of his later admirers—including the members of the so-called Austrian School of economics—will admit: he acknowledged the need for government action under a variety of circumstances.

The psychologist Carl Jung suggested that people display a variety of dominant characteristics, but also have a Shadow—those characteristics that are repressed, unconscious, and often denied. In the political realm, the liberal model also has a shadow: the human need for community, a collective approach to life whose advocates view with alarm the implications of a society based on the atomized, self-aggrandizing individual. Such a communitarian model is stronger than the notion of civil society suggested by Locke. From this perspective, the basic societal unit is the group, not the individual. Decisions about the goals of society and dominant values would be based on a collective, more egalitarian approach that sought to advance the interests of the collective, and also sought to provide more protection to individuals.

This tension between individualism and collectivism is a basic fault line in many political cultures and has dominated our political evolution. There are other important variables useful in considering the evolution of a political culture, including respect for tradition versus the role of science, and unity and centralization versus fragmentation, which we will discuss below. But in the United States, tension over the basic unit of society, and our obligations to those individuals and communities, continues to influence the design of our institutions and basic policy debates. Box 3.1 illustrates this conflict.
BOX 3.1 NIMBY CONFLICT OVER A BIOMASS DEVELOPMENT

Mason County, Washington, has always been a lumber town. Oakland Bay, located at the end of a narrow southwestern arm of Puget Sound, has for many years depended upon private timberlands and nearby national forests for its livelihood. At one time, sawmills were lined up side by side on the waterfront: Fir, hemlock, and cedar in seemingly endless quantities came out of the local forests to be cut into the lumber that helped build the West. Today, just one mill and a tugboat towing log rafts to Tacoma are all that remain of that not so distant past. The nearby woods are still logged, however, and tons of wood waste is still left behind, which must be openly burned each winter. The local area produces an estimated 1,430,000 dry tons of woody biomass from forest harvesting, mill by-products, and thinning each year. Mason County has one of the highest rates of unemployment in the state. That’s why people’s reaction to an announcement that a new biomass-burning power plant was to be built that would bring something like 750 construction jobs and 200 permanent jobs to the community came as surprise to country administrators.

Biomass is one of the renewable energy processes the Department of Energy strongly supports; among others are hydropower, wind, and geothermal energy. The proposed $250 million, 60-megawatt biomass power plant is one of several that are planned across the United States by Adage, a Maryland-based joint venture between North Carolina’s Duke Energy and Areva, the giant French atomic power service company. The plant fits neatly into the national plan requiring all utilities to get at least 15 percent of their electricity from renewable sources by 2020.

Local environmentalists objected vehemently to the proposal. One spokesperson at a public hearing pointed out that the plant, which will consume some amount of the 604,000 tons of wood waste annually, will annually emit an estimated 240 tons of nitrous oxide, 149 tons of sulfur dioxide, and 548,480 tons of carbon dioxide, along with large amounts of fly ash. A mailed flyer produced by John Deere, the company that manufactures the forest waste harvesters, notes that the facility will meet or exceed all state and federal regulations for emissions, will use air rather than water for facility cooling, and that controlled burning of forest and mill residue rather than open-air burning will improve the region’s air quality.

Project opponents started a recall petition drive against county commissioners; the drive was inconclusive at the time of this writing.

(From K. Moore, Mason County Journal, 2010, and John Deere Biopower Facts, 2010.)

A New Conception of the State

The United States enjoyed an unprecedented era of growth between the late 1940s and 1973. During this period a new conception of the state began to develop in the United States that reflected a more inclusive political system and a more expansive role for government in attacking economic inequality. Groups traditionally excluded from the political process, particularly women and African Americans, demanded representation and civil rights, and won significant victories through the Civil Rights Act of 1964 and the Voting Rights Act of 1965. President Lyndon Johnson, aided by unusually large Democratic majorities in Congress in the mid-1960s, pushed through a series of Great Society programs in education, health, transportation, and the environment. The most important of these were health care programs for seniors (Medicare) and low-income people and children (Medicaid).

The American social model relies on strong economic growth to drive an expanding sense of economic and social opportunity. This model hit the rocks following the 1973 Arab Oil Embargo, for reasons that are still not entirely clear. Economic productivity decreased, and the long-run growth in consumption dropped in half, from around 3 percent per year during the period 1950 to 1973 to around half that afterward. The resulting economic turmoil set the stage for the so-called Reagan Revolution.

President Ronald Reagan defined government as the problem and sought to reduce federal expenditures, deregulate business, privatize wherever possible, and pull back the size and scope of the state. He was successful at having a cowed Democratic Congress cut taxes. However, his relative failure at reducing expenditures led to massive deficits that persisted until tax increases under the Clinton Administration and the dot-com boom of the late 1990s. This "rebalancing" approach, combined with U.S. openness to trade in a smaller, more globalized world, helped to reverse the gains in economic equality of the early postwar period and brought a new era of increasing inequality.

Emerging Themes

Several themes emerge from this summary of the evolving role of the federal government in the country’s economic and social life. The U.S. political culture has emphasized individual initiative and a smaller government, and has limited the role of public policy. This is also evident when the U.S. public sector is compared with other “developed” countries, most of which have a significantly larger government sector. The United States, with roughly 32 percent of gross domestic product (GDP) devoted to government, has a much smaller public sector than most European countries, where it is common to devote 40 to 50 percent of national GDP to government. Government expenditures in the United States have expanded since the 1960s, and their composition has changed, as shown in Table 3.1. In 1960, military and international expenditures totaled 9.9 percent of federal gross domestic product, while entitlement programs represented only 4.7 percent. These percentages have shifted dramatically, with defense and international reflecting only 4.5 percent of GDP and entitlements increased to 12.8 percent of GDP in 2008.

Congress and Its Influence on Policy

Congress no longer commands the respect that it once did. It has evolved into a more partisan body with weaker leadership, making it more difficult to pass major legislation. The Senate is now a collection of individuals with ties to their party caucus but generally weak commitment to the institution itself and its august history as the “World’s Most Deliberative Body.”

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Gov</th>
<th>Defense and International</th>
<th>Entitlements</th>
<th>Other Federal</th>
<th>Interest on the Debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>26.2</td>
<td>9.9</td>
<td>4.7</td>
<td>1.9</td>
<td>1.5</td>
</tr>
<tr>
<td>2008</td>
<td>33.0</td>
<td>4.5</td>
<td>12.8</td>
<td>1.8</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Source: U.S. Office of Management and Budget
recent years the filibuster has become a standard mechanism for obstructing the agenda of the party in power, rather than a means of preventing the passage of particularly egregious legislation. Senators regularly place "holds" on nominees for judicial and administrative posts, often as an exercise in political pique over ideological or policy differences, not over concern about the candidate's qualifications.

The gradual decline of the House began as Democrats held a majority in the House from 1954 to 1995. During the early years of that period, the institution was under the grip of both seniority rule and conservative Republicans from the South. The post-Watergate elections brought elections of more progressive members, who subsequently pushed through reforms to strengthen ethics standards and weaken the seniority system. The election of a Republican majority in 1994 moved the House into a more combative zone under Speaker Newt Gingrich, who sought to expand Republican control of the institution. Although Republicans held the House until 2006, their legislative accomplishments were meager until the election of George W. Bush as president in 2000. The 1994 reform of welfare was a major exception, when center-right President Bill Clinton was willing to endorse a bill that ended welfare as an entitlement.

The Battle for Control

The separation of powers in the Constitution created a continuing, structural battle between the president and Congress for control of the federal government. Through much of the nineteenth century, Congress dominated, with the exception of the Civil War presidency of Abraham Lincoln. The Progressive Era began the decisive shift toward a strong president, which was solidified with the Depression and the rise of the administrative state, which required a strong manager in chief. A hallmark of the postwar period was the rise of the national security state, with the Cold War against the Soviet Union from 1949 to 1993, major wars in Vietnam, Iraq, and Afghanistan, and the 9/11 terror attacks all contributing to the perception that a strong leader was needed to protect the United States from a chaotic world. Although the Congress on occasion attempted to restrain the presidency through, for example, use of committees to provide oversight over government operations, budget reforms and the War Powers Act of 1973, these proved ineffective at blunting the long-term trend toward a strong executive.

The Bush II era may prove to be the pinnacle of presidential power in the early decades of the twenty-first century. Bush showed considerable skill during his two terms at pushing through his policy agenda of tax cuts, wars in Afghanistan and Iraq, expansion of Medicare to include prescription drugs, a bill revising the bankruptcy code, education reform, creation of a Department of Homeland Security, and two major energy bills in 2005 and 2007. It is a curious record that reflects no particular ideology except enhancing presidential power and the interests of corporate elites. On balance, the Bush Era considerably expanded the scope and reach of the federal government, while undermining its local soundness through tax cuts that mainly benefited a select few. In contrast, the Obama Administration consistently has faced strong resistance from Congress, even before the election of a Republican House of Representatives in November 2010. An intense battle over the direction of public policy will continue.

Pluralism, Elites, Triangles, and Networks

Producing an energy policy that meets security and environmental criteria begins with answering these questions: Who has decision-making power in this system of government? How does the political system acknowledge needs and concerns, and respond to them? Whom is the government more likely to respond? These questions are broader than the narrower workings of the policy process, but are also essential to it. The huge scale of the United States and its states and limited role of the citizen in a representative democracy leaves the individual citizen capable, in most cases, of little impact on important policy processes at either the state or national levels.

Beginning in the 1950s, political scientist Robert Dahl and others argued for a pluralist or group model of political decision making. That model emphasized the competition between groups of relatively equal power in the political arena, and the policy outcomes that result from the bargaining between these groups. The pluralist model largely ignores the differences in resources and power between groups and the reality that large economic entities, especially corporations, have a considerable advantage in the policy bargaining process. Their ability to control investment and employment gives them the means to shape perceptions of policy, and the resources to gather data and present it so as to support a preferred position.

Shifting Models of Government Power

In the 1970s and 1980s, the dominant metaphor for the relationship among Congress, the bureaucracy, and interest groups was that of the Iron Triangle, as shown in Figure 3.2. This model acknowledged the role of interest groups in policy development and decisions and suggested that the type of linkages among these three parties influenced policy outcomes.

The key to this set of relationships was the recognition that the staff persons in federal agencies were not simply passive recipients of congressional policy judgments, but instead were active constructors of their own policy reality. Government workers are responsive to members of Congress, but they also aim to shape perceptions of their performance and needs, and to equate what benefits them as being in the public interest.

The triangle model also suggests that boundaries between the private interest groups and public employers may blur; this is encouraged by the cycling of employees between the three corners of the triangle. The most powerful such triangle is perhaps that in the broad arena of national defense, which provides a powerful floor under all federal expenditures. It is the rare member of Congress who can afford to be perceived as weak on defense.

A New Approach: The Policy Network

Since 2000, the metaphor of the policy network has gained growing acceptance among analysts. The Iron Triangle metaphorically looks like a closed system with unitary actors at each corner. The network metaphor, on the other hand, suggests a profusion of different individuals and groups.
that the reality they described was ambiguous and anarchic; the policy arena was thus filled with uncertainty. To make sense of this puzzle, Kingdon deftly borrowed a model termed the "garbage can" from the organizational theorists Cohen, March, and Olsen (1972) that attempted to make sense of this chaos. Their critical insight was that organizations and decision processes were not orderly but could best be described as "organized anarchies."

Problems are separate from solutions. Participants in the policy arena come and go; they are often cagier about revealing their preferences. Many solutions are proposed during negotiations; most arc discarded, but they do not disappear. All wait in the "can" for the right situation. Kingdon simplified the model for the policy arena, suggesting that three streams of problems, policies/solutions, and politics/elected officials/public sentiment flowed independently until a policy window opened that enabled a policy entrepreneur to bring the streams together, resulting in enactment of a policy. This model is particularly helpful at conceptualizing how some issues are suddenly on the agenda and ripe for action, and many others are not.

The vocabulary of the multiple streams model is now part of political discourse. We can see policy entrepreneurs at work and are more likely to be able to spot when a policy window opens, as it did for health care reform following the 2008 election. An open question in the energy policy arena is whether, as we write in early 2010, the policy window is truly open for transformational climate change legislation.

Policy Design and Social Construction

Where the Kingdon model emphasizes agenda setting, the social construction perspective starts with policy design—policies that have been crafted, implemented, and that have had an impact on their policy holders—and on the target groups they are intended to benefit. Much of the literature in public administration describes these as interventions or programs, but they are much more powerful than those flat terms suggest. Policy designs influence both the target groups intended to be helped, and the institutions and culture as a whole. This influence occurs both through the "objective" impacts of the policies as intended and through the rhetoric used to describe these target groups.

Some groups are identified as more worthy of support than others. These groups are given both more benefits and positive messages about their impact on society. This in turn encourages their participation in the policy process, in part to protect those gains. In the energy world, no group has benefited more from this process than the oil industry. The oil industry is typically characterized as entrepreneurial, dynamic, and risk taking. Counterintuitively, this industry as a whole receives massive yet largely hidden public subsidies.

For individuals unfortunate enough to be in a negatively constructed target group, particularly low-income people and families receiving public benefits, the drumbeat of negative messages about their basic unworthiness is a significant deterrent to their willingness to participate in the political process. Ingram, Schneider, and deLeon (2007) suggest that these messages convey who belongs to which group, whose interests are more important, what kind of "game" politics is, and whether the person has a place at the negotiating table. Their model identifies several categories of groups, the most important of which are: (1) the Advocates, groups with high political power and positive social constructions; (2) Contenders, groups with high power but negative constructions; (3) Dependents, groups that are weak politically but viewed as deserving; and (4) Drainers, groups that are typically blamed for the social ills of society and face strong sanctions for their transgressions.

Perhaps the most intriguing of these groups are the Collaborators, including corporations, who actively use their power to gain benefits that are often hidden from the public and receive little
scrutiny. They are also often relieved of burdens, such as environmental regulations, that may be fought in court or priced into their products. Many of the laws that provide the legal framework of U.S. energy policy include provisions for tax expenditures and subsidies that receive less attention than funded programs. They reflect revenues foregone by the U.S. Treasury. Few members of the public have a clue about the magnitude of these lost revenues and the corporations that receive them have no incentive to publicize them.

The model suggests that policy makers craft and perpetuate these social constructions because they believe the public will support them. As President Obama has found with the massive bailout of the financial sector in 2009, the public is not sympathetic to policy designs that benefit the “soundbites” believed to be responsible for a big mess.

Constructions Are Not Fixed
Yet social constructions are by definition not fixed. Much of the power of this model emanates from the capacity of politicians and pundits to change the social construction of target groups, for better or worse. For example, although scientists are generally considered Advantaged, they are vulnerable. The recent ClimateGate furore was seized on by opponents of climate change legislation to depict pro-warming scientists as unethical and self-interested, only aiming to gain access to big streams of grant funds by hyping up the risks of climate change. This is where the social construction model blends with the policy “framing” perspective advocated by Goffman (1974), Schön and Rein (1994), Lakoff (2008), and others.

The System: Weakened, but Still Functioning—for Now
In their classic analysis of the Clinton administration’s doomed health care reform effort, The System, Broder and Johnson (1996) describe a fractured political system with a divided, distrustful, and easily manipulated electorate, a political class that is alternately cynical and public spirited, and a media sector that failed in its basic task, to fairly inform public debate on the issues. Although the forces against reform “won” that battle, the victory was pyrrhic: it undermined public trust in institutions of all kinds, and as they note (Broder & Johnson 1996, 658), “A thoroughly cynical society, deeply distrustful of its institutions and leaders and the reliability information it receives, is a society in peril of breaking apart.”

Framing the Energy Policy Issue
How did the U.S. political system perform on energy issues in 2010? In 2009 and 2010, health care legislation was the signature issue; substantive reform of health care in the United States was the object of considerable executive and legislative attention during most of the first two years of the Obama administration. As a result, energy issues were pushed off center stage, with little public or legislative interest paid to the UN’s 2009 Copenhagen environmental conference. Despite President Obama’s personal diplomacy efforts, little progress toward controlling greenhouse gas emissions was achieved at the conference.

The 112th Congress acknowledged the seriousness of the health care issue and invested vast amounts of time, energy, and political capital in the task of crafting sensible legislation that would, over time, limit the vast disparities in the U.S. health care system. The bad news is that almost all of those supporting health care legislation were Democrats. Republicans refused to budge on the issue.

The political divide in the United States continues to widen, and partisanship has taken on a bitter edge that does not bode well for the capacity of the political system to tackle the challenges of energy use and climate change. With the United States and world economy mired in a continuing economic crisis producing high unemployment and a weakened financial sector, the last years of the first decade of the twenty-first century is obviously a very difficult time to pass potentially costly legislation. The public also shows signs of disgust: recent polls found between two-thirds and three-fourths of the public are unhappy with the performance of Congress. Public trust in government is at an all-time low.

Worrisome Trends
Several trends in the broader political system in the intervening years since the collapse of President Bill Clinton’s health care proposal give cause for concern. Winning election to our primary policy-making body, the U.S. Congress, is now so costly as to require virtually nonstop campaigning to pay for polling and television spots. The average cost of a House campaign in 2008 was $1.1 million, while Senate campaigns averaged $6.5 million. The fundraising required drives out capable people who are not personally wealthy or who do not have the stomach for the never-ending “ask.”

Despite a succession of scandals, lobbying of Congress and the government as a whole is at an all-time high, with $3.47 billion spent on lobbying in 2009, according to the Center for Responsive Politics. The perception, right or wrong, is that members of Congress are for sale, trading positions and votes in exchange for campaign contributions. The endless parade of “earmarks,” the narrow clauses attached to larger bills that are intended to benefit particular constituencies and the complexity and backroom deals needed to grease major legislation, seems to confirm the public’s suspicions.

In discussing how difficult it has become to pass legislation in the public interest, Galston (2006) noted the explosion in the numbers of registered special interest associations and their lobbyists in Washington, DC since 1953: the number of associations grew from under 5,000 to more than 20,000; membership in the Society of Association Executives grew from less than 2,500 to nearly 25,000; the number of lobbyists registered with the U.S. Senate grew from 3,000 to more than 10,000; and the number of lawyers in Washington grew from 12,000 to 76,000.

Partisanship politics is deeply entrenched in the United States. The Senate is now hostage to the filibuster, with the number of cloture votes required having more than doubled since the late 1980s. Redistricting has produced for each party in the House “safe” seats that are more likely to appeal to party extremists. The parties themselves continue to grow wealthier and stronger. With the rise of highly partisan political blogs and the need to stay exposed in the never-ending news cycle, many senators appear as political singletons, concerned first for their own reelection chances, and less for the institution. Both parties seek to exploit highly divisive cultural issues such as abortion, immigration, and gay marriage.

Noisy, news-grabbing partisan events are staged by the parties and interest groups to look like the natural mobilization of grassroots opposition, in a phenomenon called astroturfing. The end result is fewer members in the political center who can speak each other’s language and seek common ground, and an attack mentality that aims to score quick political points, but ignores the long-term damage to Congress as an institution, and the country (Sheb 2010).
Visible Lack of Consensus

This lack of consensus is visible in the constant, vicious battle to frame the nature of debate on public issues. Frames are “organizing principles that are socially shared and persistent over time, that work symbolically to meaningfully structure the social world” (Rice 2001, 5). At the broadest level, linguist and political analyst George Lakoff (2006) argues that there is a fundamental split between the conservative and progressive/liberal frames.

Conservatives see the world as a dangerous and competitive place in which a family-based, strict father is needed to emphasize discipline and self-reliance. Government should have the limited role of protecting the family from harm. The progressive frame is a nurturing model that emphasizes the equal contributions of women and men. From this frame there is a need for a more community-based model that uses collective action to help individuals who can’t make it on their own, largely because the system is stacked against them.

Conservatives have been far more adept than progressives at framing important political issues over the past 50 years. They have an easier task because the U.S. political system is rooted in a classic liberal model that emphasizes limited government. But examples abound of their framing skill. Who could possibly oppose such calls for action as: “American families deserve tax relief?” “A greedy government takes too much of your money and delivers too little in return?” and “Provide relief to hard-working Americans impoverished by taxes?”

The progressive frame—that we all benefit from the infrastructure and services provided by government and should be willing to support it—is a harder sell. Another recent example is voter registration. Efforts to ease voter registration are decried by one party as “opening the door to fraud,” while the other party wants to “eliminate roadblocks to participation in our democratic system.” Even the word liberal, twisted from its original meaning, has become a negative one-word frame, while the corresponding term conservative lacks the same bite in political discourse.

A More Divisive Nation

Related to this framing problem is the fact that there is some evidence that Americans themselves have begun to be less accommodating to political and religious diversity (Bishop 2008). There are signs that they are seeking refuge in media (radio talk shows, newspapers, and magazines), living circumstances (gated communities and ideologically concentrated neighborhoods), and faith communities that reinforce a consistent set of ideological messages, and make them less open to political compromise. In such circumstances, Bishop suggests, attempts to find common ground through dialogue with those who hold opposing views may instead lead to even more polarization. Like-minded, relatively homogenous subgroups can sharpen their differences in discussion with each other, frustrating attempts at consensus.

Subtext of the Framing Issue

The subtext of the framing issue is its acknowledgment that members of the political class manipulate voters/citizens, both through careful framing and other means. This is one of the many criticisms of the loop model (Miller and Fox 2007). Voters’ worries are manipulated through the use of television and the news media. Local television news focuses on crime and sensational stories that attract viewers and in turn, advertisers. Also, citizens do not put much effort into their civic responsibility and have weak knowledge of the issues and institutions.

This rings an alarm bell for those concerned about energy and climate change, since the argument for policy change rests on a relatively complex causal argument involving energy choices, scientific findings, future risks, and the need for somewhat costly actions now to avoid possible future calamity. It is inevitable that the great clash over climate change and energy legislation will be over how the issue is framed. As Lakoff (2006) dryly notes, “when the frames don’t fit the facts, the frames are kept, but the facts ignored.”

A Glimmer of Optimism

We are somewhat more optimistic about the overall capacity of voters to broadly provide signals about their preferences to the political system. We are reassured by such work as Carpini and Keeter (1997), who concluded after an exhaustive analysis of voter knowledge and involvement that on balance, citizens do a reasonable job of this. Still, they found “systematic differences in political knowledge.” People of color and low-income persons generally were found to be less knowledgeable and under-involved, while wealthier and better-educated individuals and groups with power and resources were more knowledgeable and able to obtain access to the system and make their preferences known. Our energy policy is a clear reflection of the distinct differences in wealth and power between various widely divided groups.

Hard to Generate Citizen Involvement

The U.S. political and policy system simply is not designed to enable much direct citizen involvement. Will it be possible to bring about transformation in the energy sector within a political system so closed to individual citizens? Asked to share the burden of costly policies and lifestyle changes without sufficient input, many citizens may resist. An early 2009 poll on energy and environmental issues found broad support for renewable energy development, and willingness to change transportation behavior, but strong opposition to tax proposals—including a large rise in gasoline taxes or a “fuel” gasoline price, which would quickly raise the cost of driving (Bittle, Rochkind, and Ott 2009).

Needed: A New Way of Thinking about Policy

A new way of thinking about energy policy is needed; one that is more grounded in people’s concerns and lived experience. One approach is suggested by postmodern political theorists, who have concluded that the “modern” political and economic project supporting corporate-led economic growth through a distant government of experts and elected representatives has failed. Instead, the role of the expert is recast as a skilled facilitator of citizens, to help them engage in political discourse.

Hajer (2003, 89), for example, suggests that policy proposals from political leaders and others “make people aware of what they are attached to,” and through dialogue with others—preferably those with a range of beliefs and opinions—must build a “sense of collective identity.” Such conversations provide a forum, through which political communities are created and nourished, and people may reflect on their vision of a preferred future and the policies needed to create it. Hajer provides examples of such processes in the Netherlands. King and Strivers provide similar examples in their 1998 book, Government Is Us.
Occurring at the Local Level

These processes occur almost exclusively at the local level. The federal government’s approach to public involvement requires extensive, mostly one-way communication from citizens to the agencies about their opinion of policy proposals, but does not create a forum for respectful and thoughtful dialogue. Recent attempts to do so (including the absurdist health care policy forums held in mid-2009 that devolved into shouting matches) are fine examples of the challenge of creating respectful forums and seem to confirm Bishop’s pessimistic analysis. A condition that appears necessary for effective dialogue is for individuals to have relationships across a wide swath of society, not only people from one’s own “in-group” (Bishop 2008).

The knowledge that your opponent today may be part of your coalition tomorrow tempers legislators’ willingness to label opponents in ways that make future cooperation impossible. We would be wise to nurture institutions and forums that encourage the formation and maintenance of such cross-cutting relationships at the local level.

The U.S. Policy Space: Today and the Near Tomorrow

Our emphasis in this chapter has been on the historical evolution of governance and policy in the United States. But it is useful to consider the situation in the broad, national policy arena at this moment, and longer-term trends that are likely to have an impact over the next 10 to 20 years on energy and climate change legislation.

Although recent polls of U.S. residents continue to show low levels of regard for the Congress, arguably the 111th Congress has been one of the most productive in the last several decades (O’Keefe 2009). The vast American Recovery and Reinvestment Act of 2009 economic stimulus bill alone was an impressive legislative achievement that included tax cuts, aid to state governments, investments in transportation and health information technology, and an important array of energy provisions.

Despite these accomplishments, the Great Recession has not ended and President Obama’s rhetorical skills did not win over a middle class worried about job losses and angry about his administration’s support for bailouts of banks. The slow-motion process of crafting a health care bill was also done with considerable transparency, and the public did not like what it saw. Trading benefits for particular states and legislative districts to gain votes is a standard legislative practice, but left many Americans thinking that the price of reform was too high.

A common metaphor used to describe the environment for public policy making is that of the policy space. How much room is available for new policies to be crafted and implemented, in the political system as a whole, or particular issue areas? Many factors influence the dimensions of this space. The power of the metaphor lies in its implicit suggestion that there are hidden factors exerting unexpected influence, which if identified, become more open to active engagement and contesting. The previous discussion suggests that public attitudes about political processes are one of those factors. But there are several others that are likely to impact the capacity of the political and economic system to respond to many challenges, including those in the energy arena. We will examine a few of these below.

Meeting the Needs of an Aging Society

The United States is an aging society. We are not alone; the entire world is aging. The United Nations predicts that the median age worldwide will increase from 29 to 38 by 2050, and that by 2050, 22 percent of the world population will be age 60 or over, compared to 11 percent now. In the United States, the baby boom generation is living longer and having fewer children. The number of people aged 65 years or older is expected to increase from 40 million (12% of the U.S. population) to nearly 70 million (20% of the population) in 2030 (Agerworks.com 2010). Figure 3.3 displays the over 65 trend in the United States.

This increase in the senior population will place substantial additional burdens on the Social Security, Medicare, and Medicaid systems that currently cost about 10 percent of the U.S. GDP, or about 44 percent of the overall federal budget. Older people have more health problems.

Providing care to older people without resources or family is very costly. Part of the challenge to Social Security is the change in the dependency ratio, the number of dependents (children plus retired people) in society relative to the number of wage earners. Currently this is about 3.3 workers per beneficiary, but is expected to be about 2-to-1 by about 2015. The Social Security program is a "pay as you go" system that is projected to be financially sound until 2037, after which Social Security revenues will cover about three-fourths of paid benefits.

Medicare is in much worse condition, with the main hospital insurance trust fund due to be exhausted in 2017. Substantial amounts of general revenues will be needed to cover Medicare costs even prior to that date. The relatively good news is that the overall cost of managing the rise in Social Security costs over the next few decades will be about 1 percent of U.S. GDP per year—a significant sum but not a backbreaker. But health care spending is projected by the Congressional Budget Office to increase from 16 percent of GDP to 37 percent by 2050 under current policy, a vast increase that would force a retrenchment of other federal government programs.

Structural Deficits and Entitlements

Overall, the current forecast is for a continuing structural deficit for the United States in future years of around 5 percent of GDP, a chronic gap between federal revenues and expenditures. The
The federal budget deficit increased to $1.4 trillion in 2009 and is estimated at $1.6 trillion in 2010, around 11 percent of GDP. After a brief surplus in the late 1990s, the government first slipped into deficit spending thanks to past tax cuts and increased domestic spending. Additional tax cuts, economic stimulus and other expenditures, and decreased receipts due to the Great Recession dug the hole much deeper. An immediate result: a substantial increase in the cost of debt service to the U.S. government, which will likely hit over $700 billion per year by 2015. And state and local governments are sharing the pain, with decreased tax revenues and increased expenditures on social services likely to tighten budgets for the next several years.

The implications of the country’s changed financial picture for the U.S. policy space are profound. Deficits of such magnitudes are not sustainable without driving down the value of the dollar and endangering the country’s economic stability. There is no guarantee that buyers in the global bond market will continue to finance such large deficits.

Political capital, political will, and presidential attention will be needed to pass the combination of tax increases, policy changes, and spending cuts needed to stabilize the budget. There will be less political capital left over to devote to other policy challenges. Although political capital is not a fixed asset, it tends to wane as administrations age. The most important of the policy changes is the reform of the U.S. health care system. As economist Henry Aaron (2009) argues, reforming the system to lower its long-run costs, while improving access to care and health outcomes, is the essential policy step required. But as we have already seen, this is a very, very difficult task.

Overall, funds for direct expenditures or tax expenditures and subsidies will be much more difficult to come by. In the energy arena, this will encourage consideration of policy instruments that use indirect means such as regulation to accomplish policy goals, or the political bravery required to increase the taxes and fees needed to finance new programs.

A Shifting U.S. Economy

Since 1995, the U.S. economy has swung through two boom and bust cycles. First was the 1995-2000 dot-com boom helped by investment in the Internet, followed by a recession deepened by the effects of the 9/11/2001 terrorist attack. Economic growth picked up in the United States in 2003, thanks to a housing boom pumped up by low interest rates and “innovative” financial strategies. With rising house prices, people felt wealthier, spent more, and saved less. U.S. savings rates actually became negative as households spent and borrowed more than they earned. Then, in 2008 the party ended. Now the country must figure out how to create the conditions for more sustainable growth, as households are saving more and spending less in the recession.

What will replace the roaring housing and financial sectors that supported the recent boom and the federal stimulus spending that helped the economy at the depths of the recession? That is anything but clear. A more balanced macroeconomic situation, with higher savings rates and a lower U.S. dollar, could encourage increased investments, exports, and support for manufacturing. In part due to this uncertainty over future sources of growth, growth forecasts for the upcoming decade are generally around 2.5 percent per year, and unemployment rates are expected to remain high.

With a relatively weak economy and high unemployment, policy makers will be exquisitely sensitive to the influence of policy proposals on the economy and on the federal budget. Much of the debate over climate change legislation will focus on how to frame its economic impacts. One side will emphasize its cost to both households and the economy, and the dangers of slowing the economy and raising unemployment; the other will tout the potential for a transformed energy sector to generate U.S. jobs through new energy investments, while minimizing its cost to households and the overall economy. How receptive will the public be to these arguments? Are policy makers right to be concerned that the United States could emulate Japan, whose rapid response to its 1980’s combined housing and banking bust led to 20 years of economic stagnation? So far the U.S. policy response to its financial meltdown has been strong.

Conclusion: A Rough Terrain Ahead

The making of public policy in the United States as in any country, is usually not a pleasant spectator sport. This overview of the U.S. political system and its policy-making processes could lead one to wonder how any proposal makes it through such daunting terrain. But at Bismarck reminds us, “Politics is the art of the possible.” Legislators are subject to persuasion by, their peers and leaders, and make difficult judgments between their personal preferences and the needs and wants of their constituents. The expanding girth of the U.S. Code reminds us that political agreement is surprisingly possible.

The recent history of U.S. energy policy is a complex story, and not easy to characterize—some view it as farce, others as tragedy. But it has shaped the America we know today in numerous ways, and having an understanding of the goals, means, and accomplishments of these policies is essential to crafting policies appropriate for a new energy era.