

I. Purpose of the Report

The purpose of this report is to provide recommendations to the Delaware General Assembly regarding the inclusion of environmental policies and programs into the State's electric utility restructuring endeavors. These recommendations are based on an examination of the efforts in ten states to incorporate environmental considerations into their restructuring policies and plans. The selection of the ten states was made on the basis of the success of their programs and their proximity to the state of Delaware. All of the ten states chosen for the purpose of this report have enacted electricity restructuring legislation and are currently implementing their plans. Delaware has recently passed legislation to restructure its electric utility sector. With this in mind, it is an important time to learn from the experiences of other states that have attempted to integrate environmental considerations into their electricity restructuring policies and programs.

II. Introduction

The electricity sector in the United States is currently undergoing an historic change. The way electricity is produced and sold is being fundamentally altered. The forces driving these changes are economic: deregulation and restructuring are intended to end the monopoly status of electric utilities and significantly lower electricity prices by encouraging competition among power companies. Although this is a worthwhile goal, the deregulation of the electricity sector also poses environmental, social, and health challenges. This underscores the need to promote a policy of “sustainable development” which recognizes the interconnection between the economic, environmental, and social aspects of deregulation and restructuring.

“[W]hat are the implications of electricity deregulation for the environment and public health? The answer depends on what the rules governing the new electricity market will be. If they ignore threats to the environment and public health, then the overall quality of American life will be diminished by increased pollution, global warming, and other looming problems. But if new market rules are designed to promote cleaner, renewable energy sources such as wind, solar, biomass, and geothermal energy, then we could see lower prices, robust competition, and environmental improvement” (Nogee et al., 1999: vii).

The regulatory framework that governed transactions in the electricity sector for most of the 20th Century emphasized the universal supply of low-cost power with only infrequent attention given to environmental, social, and health concerns. Such concerns were often addressed in a reactive manner, attracting action mainly when significant problems arose. In this regard, the deregulation and restructuring of the electricity sector offers an important opportunity and challenge—to overcome the limitations of earlier regulation and to integrate economic, environmental, and social objectives in a proactive manner.

The key to promoting sustainable electricity restructuring strategies is to encourage the adoption of policies that recognize the inter-relatedness of energy, environmental and social needs. Policy in a deregulated framework needs to ensure that safeguards are in place to advance environmentally benign generation sources. A variety of policy options exist to achieve these goals by stressing the importance of energy efficiency, renewables, and consumer education. These include, among others: establishing system benefits charges to provide funds for investments in energy efficiency and renewables; creating portfolio standards to require minimum levels of investment in these strategies; and requiring green pricing options so that consumers can choose environmentally preferable generation sources.

In *Sustainable America: A New Consensus for Prosperity, Opportunity, and a Healthy Environment for the Future* (1996), the President’s Council on Sustainable Development (PCSD) noted the importance of energy production, distribution and use for the broad goal of sustainability. In recognition of those links, the PCSD identified four key indicators to gauge movement toward sustainability in the energy sector: reductions in the amount of energy consumed; increases in the share of renewable energy use; increases in energy efficiency; and reductions in greenhouse gas emissions associated with the burning of fossil fuels.

Table 1: Definitions of Key Terms

Deregulation: *The removal of regulation from an industry or sector of industry. (Often used interchangeably with restructuring.)*

Restructuring: *The pricing of electricity generation separately from other services (such as transmission and distribution) and permitting consumers to choose their electricity supplier.*

Natural Monopoly: *A market structure in which one firm can produce at lower costs than any possible combination of multiple firms. Electricity markets have traditionally been considered natural monopolies.*

Sustainable Development: *Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*

Energy Efficiency: *Increasing output without increasing energy input, or maintaining output while decreasing energy input.*

Renewables: *Energy sources that are virtually inexhaustible in duration but limited in the amount of energy available per unit of time. Renewable energy resources include biomass, hydro, geothermal, solar and wind.*

Consumer Education: *Preparing consumers to shop for electricity and respond to market messages about electricity purchasing through outreach and education.*

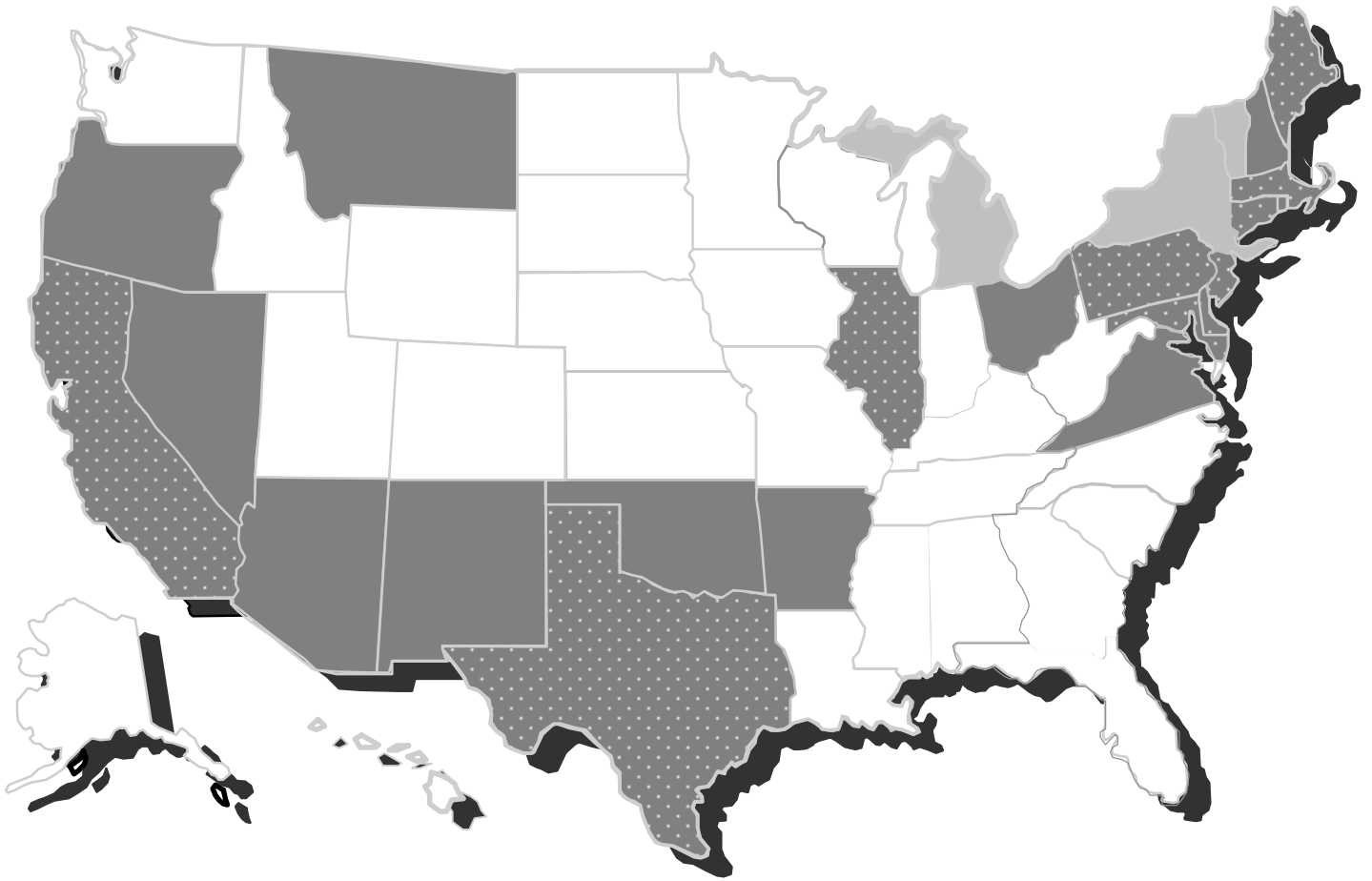
Sources: Convergence Research (1999); Bull (1997); World Commission on Environment and Development (1987).

Although the federal government has yet to enact specific federal electricity restructuring legislation, there are a number of bills that are currently being reviewed in the United States Congress. Importantly, the federal government, through recent rulings by the Federal Energy Regulatory Commission, has responded to pressures to deregulate and restructure the electricity sector by encouraging states to take the initiative. Federal policy designed to increase generation competition has permitted states to pass their own legislation to replace their regulated electricity sectors with alternatives based on competition and consumer choice.

States have thus been given a major opportunity to integrate environmental, social, health, and economic objectives into their restructuring policies and programs. This is particularly significant because there are strong indications that imminent federal legislation will be influenced by the actions that states initially take in their restructuring efforts. In this respect, states have the power to affect the orientation of federal legislation.

As of February 1, 2000 the Energy Information Administration (EIA) reported that twenty-one states had enacted electricity restructuring legislation and another three states have issued comprehensive regulatory orders on restructuring. In addition, every other state, including the District of Columbia, has either a commission or its legislature actively investigating electricity restructuring options (Figure 1).

Figure 1: Status of U.S. Electric Utility Deregulation by State, March 1, 2000



Restructuring Legislation Enacted: Arizona, Arkansas, California, Connecticut, Delaware, Illinois, Maine, Maryland, Massachusetts, Montana, Nevada, New Hampshire, New Jersey, New Mexico, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Texas, and Virginia.

States Surveyed: California, Connecticut, Illinois, Maine, Maryland, Massachusetts, New Jersey, Pennsylvania, Rhode Island, and Texas.

Comprehensive Regulatory Order Issued: Michigan, New York, and Vermont.

Commission or Legislative Investigation Ongoing: Alabama, Alaska, Colorado, District of Columbia, Florida, Georgia, Hawaii, Idaho, Indiana, Iowa, Kansas, Kentucky, Louisiana, Minnesota, Mississippi, Missouri, Nebraska, North Carolina, North Dakota, South Carolina, South Dakota, Tennessee, Utah, Washington, West Virginia, Wisconsin, and Wyoming.

Source: EIA (1999a).

The history of the electric utility sector in Delaware is similar to that of other states. While electricity generation has been an integral part of economic development throughout the State, it has also been responsible for high levels of pollution. Indeed, electric power plants represent Delaware's largest point sources of carbon dioxide, sulfur dioxide, nitrogen dioxide, and PM 10 particulate matter (EPA, 1999c).

Delaware is among the twenty-one states that have already enacted electricity restructuring legislation. As such, the State is currently in the process of trying to create legislative and regulatory provisions that can provide retail electricity choice while also addressing important environmental, social, and health concerns. Such provisions include consumer education, environmental disclosure, green pricing, net metering and establishing a system benefit charge (SBC).

The restructuring of Delaware's electricity sector, however, is far from complete. Additional policy options will be raised in the ensuing years to ensure long-run environmental, social, and health integrity, as well as to realize economic benefits. In order to ensure that restructuring advances the interests of present and future generations, the State needs to lay the groundwork for a sustainable electricity sector. Delaware can effectively do so by creating mechanisms that promote competitive electricity markets, environment-friendly technology, and diverse energy services (CEEP, 2000).

Several states have sought to balance economic, environmental, social, and health concerns into their electricity restructuring initiatives. The experiences of these states can provide important lessons for Delaware. This report examines policy options and mechanisms designed to ensure complementary opportunities for economic competitiveness and environmental sustainability that can be realized in Delaware's electricity future.

III. The Electricity Sector

For nearly a century electricity was generated, transmitted and delivered within a regulated monopoly framework by vertically integrated utilities. This framework was informed by the idea that electricity service was a natural monopoly; that is an “inherent tendency toward declining long-term costs” was believed to exist in the case of electricity supply. A utility that could quickly surmount the “high investment threshold” barred entry to others associated with electricity generation, capital and technology. Ultimately, it was felt, these market entry barriers would preclude competition (Diamond and Edwards, 1997). While many of these factors were prevalent during the early years of construction of the U.S.

“As a regulated monopoly, the electric industry has been asked to do more than provide electricity...in the interest of promoting values such as economic progress, social equity, and environmental stewardship, regulators have required utilities to undertake a variety of activities. The challenge to society is to design a new electric industry that will produce the economic benefits of greater competition without sacrificing the valuable social functions now provided by the industry. In particular, we need to decide which societal functions can be safely left to competitive markets, which require some government oversight, and which no longer merit provision by the electricity industry” (Hirst and Tonn, 1996: 2).

electrical infrastructure, electricity service has never truly been a natural monopoly. Monopoly status, in reality, depended on federal and state grants of exclusive franchise rights and the creation of monopoly service areas. In this regard, the U.S. regulatory model is mainly a creature of policy rather than economics, constructed to protect consumers against high prices and to promote universal service.

A. Industry Structure: Past and Present

The 1935 passage of the Federal Power Act (FPA) and the Public Utility Holding Company Act (PUHCA) created the framework for the current bifurcated state and federal regulatory regime that dominated the electricity sector until the 1990s. The FPA granted separate and specific powers to both the states and the federal government. State utility commissions were empowered to regulate a broad spectrum of intra-state utility activities, allowing them to determine the degree of intervention in utility management. At a minimum, state commissions were empowered to exercise authority in both the determinations of wholesale and retail electricity rates in their states and utility investment decisions. Depending on state mandates, commissions could also be active in environmental planning and protection of low-income consumers. Under the FPA, the federal regulatory structure was a supplement to state regulation. The federal government was granted regulatory jurisdiction over interstate utility activities. These activities are currently administered by the Federal Energy Regulatory Commission (FERC).

PUHCA was designed primarily as an anti-trust protection to regulate the corporate structure and economic activities of utility holding companies. Prior to PUHCA, excessive consumer rates and high debt-to-equity ratios characterized the utility sector. As a result of their inability to

service the debt they incurred through expansion and unreliable service, many utilities failed during the Depression era. In response, the Securities and Exchange Commission (SEC), and to a lesser degree FERC and its predecessors, were granted authority to regulate the corporate structure and activities of electric utility holding companies. This was a reaction to the consolidation and pyramiding of utilities during the early 1900s. By 1932 three groups controlled 45% of the electricity generated in the United States (Diamond and Edwards, 1997: 24).

The SEC (with oversight by FERC) is now primarily responsible for overseeing merger and diversification proposals by utilities. Investor-owned utilities fall into two corporate categories: PUHCA-exempt companies and non-exempt companies. Companies may only gain exemption from PUHCA if their business activities occur within only one state or in contiguous states, unless the SEC determines that such exemption would be “detrimental to the public interest or interest of investors or consumers,” (Diamond and Edwards, 1997: 62). Such vertically integrated investor-owned companies service approximately 75% of the U.S. population. Municipal utilities and rural electric cooperatives serve the remainder of the residential consumer market.

The regime created through the enactment of the FPA and PUHCA remained essentially unchanged until 1978 with the enactment of the Public Utilities Regulatory Policies Act (PURPA). In reaction to the oil price shocks of the 1970s that caused dramatic increases in electricity prices, PURPA sought to diversify the country’s fuel supply and encourage the utilization of cleaner energy sources. The act opened up a degree of competition in the generation of electricity by creating a new legal category of independent power producers — the small power generators and industrial cogenerators. PURPA empowered state regulators to encourage utilities to evaluate options such as purchasing power from qualifying facilities and paying customers to invest in more efficient equipment. Utilities would use these options when their price was less than the avoided cost of power production. This reform led to a so called "integrated resource planning" in which utilities increasingly considered both demand-side and supply-side options to meet the service requirements of their customers.

B. History of Electricity Restructuring

By the mid-1980s wide regional variation in U.S. electricity prices appeared. In California and the New England States, electricity prices were typically 9 cents/kWh or more, while much of the rest of the nation paid 6 cents/kWh or less. More importantly, industrial electricity prices in California (7.4 c/kWh), Pennsylvania (5.9 c/kWh), New Jersey (6.2 c/kWh), New York (6.5 c/kWh) and New England (7.5 c/kWh or more) were significantly higher than the 4.7 cents/kWh U.S. average (EIA, 1997c). As a result of these regional disparities, large industrial consumers advocated additional reforms in the regulatory regime to protect the competitiveness of their plants.

Both technological and political factors have also played substantial roles in the movement toward electricity restructuring. Technical advances in generation technologies and a conceptual broadening of utility planning practices revealed cheaper and more efficient energy options for large industrial customers. Increasing regulatory support of competitive generation markets

complemented these advances. Regulatory reforms and the Energy Policy Act in 1992 (EPACT) opened the wholesale market to competition and encouraged states to explore deregulation of retail service. By the mid-1990s, the changes encouraged by PURPA and EPACT demonstrated the economic viability of non-utility electricity generation and the wheeling (selling) of bulk power from one region to another.

1. The Growth of Industrial Scale

Large, centralized electricity generating systems were conceived to exploit economies of scale and the load diversity of regional service areas. Serving large customer areas enabled utilities to build larger generation plants that were more efficient from the standpoint of capital and fuel costs. While larger plants were more expensive to build, their production was more efficient in terms of economic output (measured in dollars per megawatt) of installed capacity and more efficient in terms of the ratio of fuel input to electricity output (kJ or Btu/kWh—a plant's heat rate). These larger stations also afforded savings in fixed operation and maintenance costs.

Utilities continued to centralize their generation units, enabling them to serve the largest and most diverse loads. Bulk power trading between utilities also became more common, as utilities began to coordinate their generation portfolios and load profiles. This enabled companies to plan capacity expansions and manage their energy loads on a regional basis. With load growth forecasted to increase steadily as the demand for energy grew, a market structure of increased centralization and scale of generation was viewed as mutually beneficial for utilities and consumers alike. This model of development characterized the “golden age” of the electric utility industry in the United States (Hirsh, 1995). During this period utilities reaped increased profits while their stock values often encouraged more industry centralization. Given stable long-term load growth, the increasingly long construction lead times for larger, more capital-intensive generation units was not considered a significant risk.

However, by the 1960s fossil fuel plants reached a ceiling in technical efficiency. From 1960-1970 average heat rates of 10,800 Btu/kWh for new plants improved only marginally to 10,500 Btu/kWh (EIA, 1997c: 109). Such modest improvement limited the scale opportunities that had been traditionally realized through the construction of large generation units. Small-scale reactor designs proved less amenable to large MW applications, leading to construction cost overruns and disappointing operational performance. In addition, the oil price shocks of 1973-1974 and 1978-1979 forced a dramatic increase in historically steady operational costs, throwing utility long-term capacity planning into disarray. From 1970 to 1980 petroleum prices increased at an average rate of 26% per year, natural gas by 23%, and coal by 16% (EIA, 1997c: 109). The energy price shocks contributed to an economic recession, but also improvements in the energy efficiency of electric appliances and equipment. This resulted in substantially reduced load growth, which left utilities with high sunk costs on increasingly underutilized plants. Utilities responded by submitting an unprecedented number of requests for electricity rate increases.

2. Technological Change

The technological development of the industry over the past 25 years has changed the utility planning context dramatically. While the operational efficiencies of large-scale thermal coal and

nuclear plants have stagnated, technical advancements in natural gas units have been achieved that permit the use of smaller scale generation designs that involve less up-front financial risk and much shorter lead times. These smaller natural gas generation units can be added in a modular fashion as loads grow. The combination of significantly higher thermal efficiencies while utilizing smaller megawatt designs, along with less environmental harm (compared to coal and nuclear units) has led to a rising preference among suppliers for natural gas plants. As a result, the new technology offers several advantages: decreased capital intensity; higher efficiency; modular addition capability to follow regional load growth; and decreased environmental and siting constraints compared to coal and nuclear plants.

Moreover, the available portfolio of strategies to meet electric loads increased substantially since the industry's "golden age." Public utility commissions (PUCs) from the 1980s required utilities to consider demand-side management (DSM) options that would improve the efficiency of electricity-consuming equipment (so-called end-use efficiency), and to investigate small-scale distributed generation applications to meet load requirements. PUCs also began to take a negative view of utility requests for higher rates and planned capacity additions. Overall, the advent of advances in modular generation design and the development of more holistic system-based planning models undermined the traditional centralized utility planning paradigm.

3. Policy Reforms

National policymakers responded to technological and operational changes in the electric power industry by passing two historic laws and subsequent regulatory orders that dramatically altered the traditional monopoly structure of the industry. Table 2 provides a summary of these key reforms.

The Public Utilities Regulatory Policies Act of 1978 (PURPA) was passed as part of the National Energy Act. Five different statutes were enacted to improve energy efficiency and diversify the nation's fuel supply (thereby promoting energy security) while encouraging the use of cleaner energy sources. Specifically, PURPA sought to create a market for small, decentralized power producers utilizing cogeneration and renewable technologies. It sought to "provide for increased conservation of electric energy, increased efficiency in the use of facilities and resources by electric utilities, and equitable retail rates for electric consumers" (EIA, 1997c: 27).

PURPA created a degree of competition in the electric industry by establishing a new category of wholesale generators—qualifying facilities (QF)—which were primarily industrial cogenerators and small independent renewable energy producers. PURPA encouraged utilities to purchase power from these facilities at the utility's "avoided costs" (broadly defined as the cost a utility would incur to provide the power itself). The same "avoided costs" rule was to be used, under PURPA reforms, to promote end-use efficiency strategies, heralding the development of a DSM market in the sector. State utility commissions defined a wide range of approaches that were adopted across various states. This reform led to the entry of new suppliers and slower demand growth.

The Energy Policy Act of 1992 (EPACT) reformed the PUHCA that had institutionalized the integrated monopoly structure of electric utilities. PUHCA had effectively prohibited entities

from constructing non-rate based plants. Any entity holding 10% or greater interest in a utility activity was considered a utility holding company and forced to divest itself of its non-utility assets and abide by the PUHCA. Overall, utilities were limited to “single and integrated public utility systems and such businesses that are reasonably incidental or economically necessary or appropriate to the operations of such integrated systems” (Abel and Parker, 1998: 2).

Table 2: Important Federal Utility Restructuring-Related Legislation

Public Utilities Regulatory Policies Act of 1978 (PURPA): *Primary purposes were to promote conservation (through co-generation) and greater use of alternative sources of power generation. Established a class of non-utility generators comprised of small power producers and co-generators and required utilities to buy electricity from these qualifying facilities (QFs) at rates not to exceed a utility's avoided cost.*

Energy Policy Act of 1992 (EPACT): *Required transmission-owning utilities to guarantee non-discriminatory open access to the transmission grid for all parties. These open access provisions have been groundbreaking in allowing anyone to sell their power within the formerly protected service area of a utility. Created a new class of entities—exempt wholesale generators (EWGs)—who do not have to abide by the fuel, technology and corporate structure requirements of the Public Utilities Holding Company Act (PUHCA).*

Federal Energy and Regulatory Commission (FERC) Orders 888 & 889: *Finalized open access rule-making of EPACT. Order 888 required transmission-operating utilities to construct additional capacity to meet transfer needs and un-bundle their transmission activities from their other operations. Order 889 directed transmission-operating utilities to create information networks on transmissions capacity, prices, etc. in order to facilitate trading. FERC 888 and 889 are the primary vehicles moving the electric industry to fully competitive generation markets.*

Sources: PURPA Reform Group (1999); Brennan et al.. (1996); Convergence Research (1999).

EPACT created another new category of generators – exempt wholesale generators (EWGs) – that did not have to abide by PUHCA, thus allowing utility investment in these plants. More importantly, the law ordered the Federal Energy Regulatory Commission (FERC) to propagate rules to guarantee non-discriminatory open access to the transmission grid for all parties. EPACT allowed anyone to invest in generation assets within the formerly protected service area of utilities and enjoy open access to utility transmission networks in order to sell their power to other markets. While the addition of non-utility capacity due to EPACT has been modest, the open access provisions of the law have been groundbreaking.

On April 24, 1996, in response to EPACT's call for an open access transmission system, FERC issued Orders 888 and 889. Order 888 requires utilities to provide open access to their transmission networks for the transfer of electricity. Transmission-operating utilities were also ordered to construct additional transmission capacity (with due compensation) to meet transfer needs if capacity was not already available. Utilities were ordered to un-bundle their transmission activities from other operations and file transmission tariffs containing terms and conditions of service with FERC. FERC stipulated that utilities must charge themselves the same tariffs they charge others when conducting trades over transmission networks they own and operate (EIA, 1998a: 61).

Order 889, the Open Access Same-Time Information System (OASIS) rule, directed transmission-operating utilities to create networks to openly share information pertaining to

transmission capacity, prices and ancillary services (including planning and management of an open access system) needed to conduct trades. Utilities were ordered to obtain information required for wholesale trades through the same OASIS system in order to prevent market power abuse. FERC also encouraged the creation of independent system operators (ISOs). ISOs constitute third party entities governed by market participants that would operate transmission systems. Since ownership of the transmission infrastructure in the U.S. remains with the integrated utility, an ISO is needed to ensure market participants who wish to sell electricity that the operation of the system will not favor utility owners.

EPACT and FERC 888 and 889 have propelled the electric power industry toward full retail competition. They have revolutionized the outlook of the industry and the operating constraints placed on transmission systems. Bulk power purchases increased by 70% from 1988 to 1994 (from 415 billion kWh to 712 billion kWh) (EIA, September, 1998b: vi). Since FERC issued its open access rules, the wheeling of power (the transfer of power from a non-affiliated generator through a utility's transmission network to a non-affiliated customer) has increased substantially, from about 600 GWh per year in 1992 to over 850 GWh in 1996 (EIA, 1998a: 18).

IV. Environmental Risks and Opportunities in Electricity Restructuring

Recent changes in the electricity industry bring risks and opportunities for both the environment and for the development and implementation of environment-friendly and renewable energy technologies.

A. The Environmental Stakes

There are several potentially significant environmental stakes that are related to the electric utility industry.

1. Global Warming

The atmospheric concentration of anthropogenic (human-produced) greenhouse gases—carbon dioxide (CO₂), methane (CH₄), nitrous oxide (NO₂), tropospheric ozone (O₃), and chlorofluorocarbons (CFCs)—has increased significantly over the last century. Since the advent of industrialization, the world's average temperature has increased 0.5-1.3 °F (0.3 - 0.7° C) and if current trends in greenhouse gas emissions continue, the planet's average temperature will rise 2.7 to 9 °F (1.5 to 5 °C) above its pre-industrial levels by 2030 (Ottinger, et al., 1991: 130-135). If this warming were to occur gradually, as it has done in the past, ecosystems would have time to adapt. However, temperature changes are now occurring on a relatively short time frame. While the extent of ecological change, as well as its ramifications for society are uncertain, the international scientific community has reached consensus that precautionary actions are appropriate to reduce the prospect of climate change (Houghton et al., 1996).

The major anthropogenic contributor to the greenhouse effect is the release of CO₂ in conjunction with nearly all major human activities in industrial society. The major source of CO₂ is the burning of fossil fuels (coal, oil and natural gas). The Energy Information Agency (EIA) reports that nearly 85% of anthropogenic greenhouse gas emissions in the U.S. result from the burning of fossil fuels. The combustion of fossil fuels also accounts for between 63-83% of the tons of carbon emitted annually as a result of human activity, and is growing at a rate of about 3.6% per year (EIA, 1998c: 3). Overall, the United States, with less than 5% of the world population, produces over 20% of global anthropogenic CO₂ emissions—and electric utilities are the largest generators of fossil fuel-based CO₂ emissions.

The potential costs of global warming are not reflected in the current price of electricity. Restrictions on fossil fuels to reflect those costs, however, could have significant impacts on the electricity sector. For example, coal-fired plants are the primary source of the U.S. electricity supply and contribute about 85% of all utility CO₂ emissions (Ottinger, et al., 1991: 136). Thus, efforts to reduce CO₂ emissions clearly require changes in fuel mix and energy efficiency.

2. Acid Rain

The emission of sulfur dioxide (SO₂) and nitrous oxides (NO_x) into the atmosphere cause acid deposition, or acid rain. The primary sources of these gases are from power plants, vehicles and industry. In 1996, 67% of SO₂ emissions, and 28% of NO_x emissions in the U.S. were generated

from electric utilities (EPA, 1997a: 2.2-2.3). SO₂ and NO_x are carried in the atmosphere for one to ten days before being deposited as far as 600 miles (1,000 kilometers) or more from their source (Ottinger, et al., 1991: 232). Due to prevailing winds, significant amounts of sulfur emissions produced in the northeastern U.S. are deposited in Canada and the Atlantic Ocean. The northeastern U.S. also receives significant quantities of sulfur emissions from coal-fired plants in other parts of the country.

A related impact of SO₂ and NO_x pollution is the acidification of lakes, ponds, and soils. Increased acidity may decrease lakes' ability to support fish. Acid rain may reduce crop yields and damage plants by damaging leaf surfaces, poisoning plant cells, and disturbing growth and reproduction. Acid rain also makes trees more susceptible to drought and less able to absorb nutrients, and disturbs the mineral content of soils.

SO₂ pollution has deleterious impacts on humans as well. It causes human respiratory health problems, degrades visibility, and damages buildings and materials through deposition. The Clean Air Act of 1967, as amended in 1970, 1977, and 1990, regulates the emission of SO₂ and NO_x by power plants and other industrial facilities. The 1990 Amendment enacted regulations to reduce the release of SO₂ from electricity power plants to 10 million tons per year by January 1, 2000 (EPA, 1999a: ii). This amount is one-half that of 1990 emission levels.

3. Air Pollution

Nitrous oxides (NO_x) react in the atmosphere to form tropospheric, or ambient, ozone, the primary element of urban smog. Anthropogenic sources of NO_x include fossil fuel combustion by vehicles, power plants, appliances, heating systems and industrial processes. Electric power plant emissions account for about one-third of all anthropogenic NO_x pollution. Tropospheric ozone can damage human health in several ways, including lung irritation, hyperactivity, minor eye irritation, inflammation of respiratory cells, coughing, reduction of lung function and pain in the lungs. When breathed in over a continuous period, tropospheric ozone may lead to chronic lung disease, lung cancer and increased susceptibility to respiratory infections (bronchitis and pneumonia). Over 90% of the ozone that is inhaled is never exhaled (Ottinger, et al., 1991: 214). Ozone is a significant contributor to forest and plant damage, and reduced agricultural yield, and it may be the largest contributor to pollution-related crop damage in the country.

Fossil fuel-based electric power plants are also significant emitters of total suspended particulates (TSPs), or particulate matter. TSPs emitted into the atmosphere can be dispersed and deposited hundreds of miles away. The major components of particulate emissions from fossil fuel combustion include heavy metal ash, sulfates and nitrates. The smallest ash particulates can cause or aggravate human respiratory problems and impair visibility. Other effects include materials damage due to soiling and corrosion, and damage to domestic and wild plants and animals (Ottinger, et al., 1991: 267). Secondary particulates also form when sunlight mixes with SO₂ or other chemicals. These particulates can combine to form large particles, which remain in the atmosphere for up to 6 weeks until they settle out of the atmosphere as dry deposition.

4. Water Pollution

Large fossil fuel and nuclear plants require substantial quantities of water for cooling and maintenance. Once-through cooling, the most common type of cooling system in power plants, can have major detrimental impacts on rivers, streams and lakes and the aquatic life they hold. Aquatic organisms, especially eggs and small larval fish, die when they are drawn into the cooling systems or caught in screening devices. Additionally, heated water discharged from the system can destroy vegetation, deplete oxygen and cause fish deaths (Ibid., 280). For example, the Delaware River Keeper Network has reported that water requirements at the Salem nuclear plant account for an estimated 4-12% reduction in certain species of fish in the Delaware estuary (Delaware River Keeper Network, 1998: 2).

Closed-cycle cooling systems, which use mechanical draft or hyperbolic cooling towers (and are rarely installed because of their high construction costs), reduce the amount of water drawn for cooling, but impose other environmental costs. Coastal closed-cycle cooling facilities cause salt-bearing steam to drift across to neighboring land (salt drift), damaging agricultural capacity. Cooling towers can also cause increased local fog (Ottinger, et al., 1991: 280).

Other potential water impacts of electric generation include pollution of surface water from fuel storage piles and plant site run-off, and the wastewater discharge of acids, organics, suspended solids and metals derived from boiler or cooling system maintenance procedures.

5. Solid Wastes

Coal, oil and nuclear power plants generate a variety of solid wastes from power generation and maintenance operations. Coal-fired utility plants generate the most solid wastes—producing large volumes of ash, boiler slag and flue gas desulfurization wastes. Each year utilities burn roughly 900 million tons of coal, resulting in the generation of about 100 million tons of large-volume wastes (EPA, 1999b: 7). These solid wastes must be disposed of in landfills or surface compoundments from which leaching can adversely affect surface water, groundwater and land use. Utility waste management sites, especially older ones, generally do not provide a high level of protection against leaching. Historically, only 25% of these facilities had liners to protect against off-site leachate migration. Only about 15% have leachate collection systems, and one-third had groundwater monitoring systems (Ottinger, et al., 1991: 331). Moreover, combustion wastes are often exempt from disposal requirements applicable to other industrial hazardous wastes.

6. Radioactive Wastes

The spent fuel taken from nuclear reactors remains radioactive for hundreds or thousands of years. The spent fuel removed from all U.S. nuclear power plants totals about 2,000 tons every year, an accumulation of more than 40,000 tons by the year 2000 (Ottinger, et al., 1991: 387). Exposure to high-level nuclear waste can result in serious health hazards. Almost all of the high-level wastes generated by civilian nuclear plants since their initial operation are now stored on-site in large pools of water next to reactors. Since it is difficult to find conventional materials that will withstand elevated temperatures for hundreds or thousands of years, the long-term

storage of high-level wastes presents a difficult problem and a long-lived environmental and health risk.

Low-level radioactive wastes are also generated at nuclear power plants. These include radiochemicals on gloves, papers, contaminated machine parts and similar items. All states are required by federal law to provide a disposal site for their own low-level radioactive wastes. Whatever the repository selected, the waste material from the spent fuel pools at each power plant site are transported to the repository in solid form in armored casks. Many fear accidents will occur, spreading long-lived radiation over a large area.

Another type of radioactive waste is the nuclear plant itself. Eventually all nuclear plants, when they reach the end of their useful lives (a typical plant life is 20-40 years), will have to be closed down and decommissioned. Once closed, the entire facility becomes a radioactive waste site. Thus, nuclear plants pose inescapable environmental risks that require storage and containment technologies that have yet to be fully proved.

7. Other Environmental Risks

Other adverse or potentially adverse environmental effects are associated with the transmission of electric power. These include health effects from exposure to electromagnetic fields (EMFs), which can alter hormone levels, brain and central nervous system development, learning, alertness, reaction and heartbeat rate. Additionally, power line construction and maintenance can have detrimental impacts on land availability and plant and wildlife habitat.

B. Additional Environmental Risks of Electricity Restructuring

There are four main environmental risks that may result from restructuring.

1. Increased Emissions from Older Fossil Fuel (Coal and Oil) Plants

Many utilities have older power plants that are currently not used to full capacity. These plants are often inexpensive to run because most or all of their capital costs have been paid, and they have not been required to meet the same pollution-control requirements as new plants. Restructuring may lead to increased generation from coal-reliant utilities in the Midwest that currently have excess capacity. This is of special concern to states in the Mid-Atlantic and Northeast that would be adversely impacted by the transport of increased air pollutants into their regions (CEEP, 2000).

This concern was addressed in FERC's open access rule (Order 888). In preparing its environmental impact statement (EIS) related to Order 888, FERC required an investigation of this issue and concluded that negligible environmental impacts would result (NESCAUM, 1998). Recent evidence has called these finding and FERC's assumptions into question. FERC's EIS finding was based on the assumption that East-West transmission constraints would preclude a substantial increase of power wheeling to the East Coast. It determined that through 2005 transmission constraints would restrict power flows between regions to less than 5% of total generation. Moreover, FERC assumed that transmission prices, but not capacity, would change

substantially in reaction to market forces. FERC's environmental worst-case scenario, "Competition Favors Coal," predicted that the coal-reliant East-North Central Region (comprising IL, IN, MI, OH and WI) would export only about 1 million MWh in the year 2000. FERC determined that the combination of this scenario and its "Expanded Transmission" scenario (which it deemed highly unrealistic) would result in the net export of 10.9 million MWh to Eastern states.

A 1998 study by the Northeast States for Coordinated Air Use Management (NESCAUM), utilizing the most recent generation and power trade data available from FERC, indicates that FERC's assumptions may have been highly flawed. In 1996 (when Order 888 began), net power exports from one East North Central utility, American Electric Power (AEP), to three control areas farther east increased by 7.6 million MWh. In turn, the net exports of these control areas to the Pennsylvania-New Jersey-Maryland (PJM) control area increased by 9.5 million MWh (NESCAUM, 1998). During the same period, coal generation by AEP increased by 10.3 million MWh (10%), and NO_x emissions increased by 51,518 tons at AEP coal-fired power plants. Moreover, AEP substantially increased generation from its dirtiest coal-fired power plants. This trend was mirrored by two other utilities analyzed (Illinois Power and Indiana Power and Light) during this period. Overall, NO_x emissions increased by 6% in six Midwest states (IL, IN, KY, MI, OH, WV), despite reductions being made in Group I utility boilers due to Clean Air Act Title IV acid rain provisions (NESCAUM, 1998).

In 1996 coal-fired generation increased by 88 million MWh and natural gas generation decreased by 44 million MWh, while use of the transmission system for power wheeling substantially exceeded FERC's expectations. As a result, CO₂ emissions from coal-fired plants increased 6% while utility-wide CO₂ emissions increased 4.4% (EPA, 1998). Although these results cannot determine long-term trends, they do raise concerns as to whether open markets, absent uniform emission standards across regions, will result in increased emissions of air pollutants. Clearly, the 1996 emission and power trade data underscore the potential for increased utilization of more polluting fuel types and generation units in reaction to market forces.

2. Reduced Supply and Demand-Side Energy Efficiency

A restructured electricity sector will usher in a more competitive marketplace. With increased competition, utilities will be under pressure to compete by the yardstick of short-term market prices. As the ability of utilities to secure and expand market share in the short-term becomes paramount, long-run investments may become less appealing. These forces will make maximum use of older plants (coal and nuclear) more appealing than investing in newer and more efficient natural gas plants. The short-term focus of competition, especially for an emerging utility, can result in continuing operation and increased production from older inefficient plants. This will worsen the environmental impact of electricity generation.

Increased competition and a short-term focus can also de-emphasize the importance of energy efficiency programs. The rationale behind energy efficiency programs is to decrease long-term electricity costs and pollution. Most utilities are now cutting these programs to lower their short-term costs in order to appear more competitive.

3. Delayed Development of Renewables

Restructuring threatens the continued promotion and development of clean renewable energy sources in several ways. The main risk is that renewables will be at a competitive disadvantage against fossil fuels. The market's inability to value public benefits like environmental protection and fuel diversity, along with market barriers, together will make it hard for new technologies to become commercialized and enter the mainstream marketplace. This could decrease the use of renewables, leading to higher levels of pollution and greenhouse gases.

Market competition will force utilities to make resource choices based on short-run internal costs, meaning that opportunities for valuing the non-market benefits of renewables will be diminished. While the overall outlook is uncertain, renewable energy will face serious challenges in a utility environment focused more on short-run cost competition. As utilities are forced to compete more heavily on price in the short-term, the flexibility to experiment with new or unproven technologies, including renewables, is also diminished. Utilities that might otherwise invest in projects that might be cost-effective in the long run, but carry high short-run costs (or high capital costs), would be less likely to do so in a market competition based on short-term costs. Renewable technologies, with their relatively high capital costs and low operating and maintenance costs, may be cost-effective in the long-run, but they are less attractive to an industry facing strong near-term competitive pressures.

Increased price competition will also limit the importance of the beneficial (but mostly society-wide) attributes of renewables. Renewable energy technologies are environmentally benign relative to conventional energy technologies. They also reduce the risks associated with fuel prices and availability by offering a more diverse fuel mix and by decreasing dependence on foreign energy supplies. Since these benefits accrue to the public in general, they are not usually counted in cost decisions and are not captured in electricity prices. Even if these benefits were included in resource planning decisions, as some states have tried to require, they are extremely difficult to measure. The acknowledgment and treatment of these benefits may determine the pace and path to commercialization for renewable energy technologies in the United States.

While renewable energy costs have come down 80-90 percent in the last 20 years, the technologies are still immature (DOE Office of Utility Technologies et al, 1997). Renewables will have to compete against mature fossil fuel and nuclear technologies that have received hundreds of billions of dollars in tax subsidies over many decades (Public Citizen, 1996). And, because renewables are capital intensive, competitive markets will discount the long-run fuel savings of renewables in favor of lower near-term prices for traditional fossil fuel technologies.

4. Costs Cuts and Nuclear Safety Issues

Although nuclear power avoids many of the air emissions associated with fossil fuels, they create unique environmental risks. A combination of human and mechanical error could result in the accidental killing of several thousand people, injury to several hundred thousand others, contamination of large areas of land, and billions of dollars in costs (Union of Concerned Scientists, 1977). While the odds of an accident are low, experience shows they can occur.

Pressure to cut costs at marginal nuclear plants could reduce safety margins. For example, the Nuclear Regulatory Commission (NRC) attributed safety problems at the closed Maine Yankee plant to economic pressures to produce low-cost energy which limited resources for repairs (NRC, 1996). In addition, other nuclear plants, such as Millstone in Connecticut, and Dresden in Illinois, have encountered safety problems as a result of efforts to cut costs in response to a more competitive market. A 1998 report by the Union of Concerned Scientists found a breakdown in quality assurance during a one-year study of a 10-plant focus group (Lochbaum, 1998). These findings are significant at a time when nuclear plants are cutting costs to become more competitive. Ensuring enough funds to dispose of nuclear waste and decommission plants when they retire could also become a problem in a deregulated industry.

C. Environmental Opportunities

While uncertainties remain regarding deregulation of the electric power industry, the policy challenge of restructuring also creates unique opportunities to address the impact of electricity use and generation on the environment. Restructuring can correct past barriers to renewable energy production and promote the substantial benefits that come with increased utilization of renewables. These benefits include: a cleaner environment, greater energy security (by decreasing dependence on foreign oil), increased fuel diversity, improved national health and lower health care costs, and greater economic opportunity through job creation and investments in renewable energy technologies.

“If new market rules are designed to promote cleaner, renewable energy sources such as wind, solar, biomass, and geothermal energy—all the while permitting robust competition and lower prices—then we may see significant improvements in all these [environmental] areas. As several exhaustive studies have established, renewables offer a technically sound, economically feasible alternative to more polluting fossil fuels. The once-a-century restructuring of the electricity industry is an opportunity to ensure that the environmental performance of the industry is optimized along with the economic performance” (Nogee et al, 1999: 1).

A recent Union of Concerned Scientists study found that achieving 20% renewable generation in the United States by 2020 would fix carbon dioxide at year 2000 levels, compared to a 24% increase under business as usual conditions. It would also decrease consumer electricity rates by 13%, compared to 18% for business as usual, and would decrease monthly bills by \$4.57, compared to \$5.90 for business as usual (Clemmer et al, 1999: 1). This report shows that renewable energy can be competitive and holds great promise for the future.

In sum, environmental opportunities under restructuring include improvements in supply-side efficiency, new market opportunities for end-use efficiency and renewables, and the possibility of retiring all nuclear power plants. These opportunities, however, depend on the policies adopted to guide electricity restructuring.

1. Improved Generation Sector Fuel Mix and Efficiency

A diverse fuel mix, particularly with renewables, guards against supply volatility. Solar and wind source prices remain constant in an uncertain economic and political world. A fuel mix with a significant share of renewables also guards against supply interruption—renewable energy sources are not scarce but are, by definition, regenerative. A renewable fuel mix also offers the domestic opportunity for job creation and export markets.

New fossil fuel combustion technology offers the opportunity to increase generation efficiency. More efficient generation lowers the cost of producing electricity by using less fuel. Furthermore, by using less fuel the emissions from the production of electricity are also decreased. Increased efficiency also makes the energy sector more productive thereby keeping energy-led inflation down.

2. Enhanced Choice for Consumers to Purchase Efficient and Renewable Energy Options

Competition in the electricity sector can allow more choices and force the market to respond to consumer values. If consumers demand the generation of electricity with renewables, the market can respond accordingly. A competitive restructured market provides incentives for utilities to offer the products and services that consumers value and allows consumers to purchase products from the utility that best meets their values. Under the current structure, consumers are forced to buy their power from one utility regardless of what value structure the market or the utility may represent. A competitive market structure with unfettered access to transmission facilities for consumers will allow renewable energy sources to have an opportunity to compete as other sources in the electric power market.

“Many surveys have shown that customers are willing to pay more for electricity from clean and renewable sources. At least 40 programs offering customers renewable energy choices were available by mid-1998. Results from initial pilot and marketing experiments are mixed, with low initial participation rates but some signs of long-term promise. Supportive market rules are important for allowing effective customer choice” (Nogee et al, 1999: 6).

Although the restructuring movement is largely based on the promise of cheaper electricity for large industrial users, smaller users have been combining to enhance their market power. This process—customer aggregation—offers the opportunity for small consumers to combine to buy in block to reduce “overhead and marketing costs, and facilitate choice of green products” (Nogee et al, 1999: 7). Customer aggregation gives consumers the opportunity to promote the development of renewable energy sources and those utilities that utilize them.

To fully realize the potential of customer aggregation and renewables, consumers need full information about the products that they purchase. Certification and disclosure programs must provide consumers with the information they will need to make informed purchasing decisions. This information coupled with consumer environmental education holds promise for demand-side led improvement in the electricity sector.

3. Retirement of Uneconomic Nuclear Plants

A restructured electricity sector can put incentives in place that will make nuclear power uneconomic and renewable energy alternatives more attractive by comparison. Competitive markets can reveal the inefficiency of nuclear plants and, by ushering in more efficient production, bring more environment-friendly power generation units online.

The current regulated electricity system allocates many risks to consumers that in other industries fall on industry shareholders. For example, consumers, rather than investors, have borne most of the costs of past decisions to build large nuclear plants. Many of these nuclear plants have turned out to be much more expensive than initially anticipated and have sometimes not even been needed. In a restructured electricity market, producers are no longer protected. “Operators of nuclear power plants are finding it hard to compete with other generators in a deregulated environment” (Pospisil, 1995: 56). With these subsidies gone, efficient producers utilizing natural gas or renewable energy will be allowed to compete.

There is evidence of this in Illinois, a state that has already restructured its electricity market. Due to non-competitive operating expenses, the Commonwealth Edison Zion nuclear power plant in Lake County, Illinois will be permanently closed by 2005 after 25 years of operation. The plant simply cannot compete with the costs of producing electricity at prices predicted in a deregulated market.

D. Potential Barriers to Environmental Improvement

The environmental opportunities that the restructuring of the electric utility industry may offer, however, could fail to be realized because of a number of potential barriers.

1. Utility Market Power

As the electric utility sector moves toward competition, it has displayed a correspondent trend toward consolidation that has not been witnessed since the days before PUHCA. A study commissioned by the California Energy Commission, entitled *Mergers, Acquisitions, and Market Power in the Electric Power Industry*, notes that as retail wheeling initiatives are creating larger regional markets, regional consolidation is occurring through mergers and acquisitions (Diamond and Edwards, 1997). From 1985-1995, 34 mergers and acquisitions of major U.S. electric utilities were announced. In contrast, from 1995 to April 1997, 58 were announced. According to the American Public Power Association, the 16 major announcements for electric company mergers from 1995 through September 1996 accounted for over \$120 billion in assets, nearly 20% of the industry’s entire asset base (Diamond and Edwards, 1997: 6).

This trend is viewed as a response to the pressures of a competitive electricity market. Utilities are making strategic moves to consolidate their market shares and insulate themselves from market uncertainties. As a result, they are moving to aggregate their regional transmission and distribution systems since they will remain the last monopoly domain, and perhaps the most profitable subsector of the new electricity market. These actions indicate that the industry may

respond to the challenges of competition by moving toward a consolidated, oligarchical structure.

Mergers and acquisitions may serve as a means of securing market power and lowering costs rather than improving organizational efficiencies through the utilization of economies of scale and scope. In 1996 the American Public Power Association and the National Rural Electric Cooperative Association filed a petition with FERC urging it to adopt a more stringent antitrust-based merger oversight policy, stating that otherwise the industry would see a “few dominant companies rather than workable competition” (Pierobon, 1995: 51).

“For a majority of firms in the industry, average costs would not be reduced through the expansion of generation, numbers of customers, or the delivery system. Evidently the combination of benefits from large scale technologies, managerial experience, coordination or load diversity have been exhausted by the larger firms in the industry... it is likely that economies of scale have been exhausted in larger utilities, and many of the motives [for mergers and acquisitions] are not consistent with the public interest of regulation” (Pierobon, 1995: 62).

The Wall Street Journal also noted that there is “a convergence under way between the gas and electricity industries” (Sullivan, 1996). Cross-sectoral mergers are being encouraged by an evolving industry strategy of gaining market share by providing a full package of services to customers—including electricity, gas, phone, cable and internet—through the utilization of existing distribution and billing infrastructure. Such a “one stop shopping” approach encourages corporate agglomeration and presents an extra layer of competitive barriers to smaller companies attempting to penetrate the market, including those who would offer clean renewable energy.

2. Lack of Small Consumer Market Power

While a restructured electricity market will allow consumers to exercise their preference for renewables or other options, the consumer market is not an equal one. Residential consumers are the most likely to value the environmental benefits of advanced generation technologies and renewables, yet they constituted only 35% of the electricity market in 1996 (EIA, 1997a). Large industrial and commercial consumers (33% and 29% of the market, respectively) are coveted by utilities and independent power producers (IPPs) due to their large energy demand, optimal load factors, low transaction costs and dominant purchasing power. Yet, these consumers are most likely to only focus on short-term costs. In a deregulated market, their dominant status may skew the social outcome of electricity planning and use.

Utilities have already granted large industrial customers highly favorable discounts to keep them from moving their operations or constructing their own generation units. For example, the downward movement in industrial customers' electricity prices is already substantial. In 1998, industrial rates averaged 4.5 cents per kilowatt hour (kWh) and commercial rates 7.43 cents/kWh, while residential rates averaged 8.27 cents/kWh (EIA, 1999b). This is a clear indication of the dominant position of large industrial users in the electricity market.

Utilities may offset discounts to industrial customers with higher rates on residential customers in order to receive a suitable overall rate of return on their investments. Such rate-making, combined with differential buying power across customer groups, does not bode well for renewables and other environment-friendly generation sources. The need for profit of industrial and commercial customers will influence utilities and IPPs to favor low-cost generation sources over renewables in a restructured market. While this may favor an increase in natural gas generation, which is relatively environmentally benign compared to coal and nuclear, it may also favor increased production from previously underutilized older coal power plants.

Although the market power of individual residential electricity consumers is small, residential consumers could wield substantial buying power if this class bought electricity as an aggregation. Unfortunately, the majority of individual residential electricity consumers are unlikely to switch providers given the marginal cost savings available. Evidence from deregulation in California's electricity supports this view. As a result, the structure of the market affecting residential consumers is as important as the structure affecting industrial consumers.

3. Stranded Costs

Stranded costs are a recently developed concept in the utility sector that has no known economic precedent. It has become the most contentious aspect of restructuring. Stranded costs refer to past utility investments incurred under the era of regulated monopolies that would be rendered uncompetitive in a deregulated market. The Energy Information Administration defines stranded costs as the "unamortized portion of the original or historical cost of the plant which becomes unrecoverable under conditions of competitive pricing of electricity" (EIA, 1997a: Chapter 8).

According to a study by Resource Data International, \$202 billion in stranded costs exist in the country, with the majority (\$86 billion) resulting from heavily financed nuclear plants (Resource Data International, 1997). Of the remainder, \$42 billion is due to above-market purchases from non-utility generators under PURPA, \$54 billion for long-term power purchases from other utilities, and \$49 billion is due to "regulatory assets." This latter category refers to previously incurred costs that utilities have carried on their books with the expectation that they would be recovered through future, continued regulatory rates (Resource Data International, 1997).

Significant stranded cost recovery effectively precludes the emergence of a vibrant competitive residential electricity market. Stranded cost transition charges determine how much "headroom" within a typical utility bill generation competitors have with which to profitably compete for customers in an incumbent utility's market. This narrows the scope of lucrative competitive markets available to outside competitors. It also poses additional competitive difficulties for smaller independent power producers and renewable energy companies in their attempts to compete for market share. Stranded cost recovery would subsidize large scale, capital-intensive utility generation capacity over smaller, more efficient and environmentally benign independent generation investments subject to greater financial risk (and therefore higher financing costs) and more stringent financial performance obligations.

The opportunities afforded residential customers in California's restructured market are indicative of the effect of stranded costs on the development of competitive generation markets.

In California, approximately 45% of a resident's electric bills could be dedicated to stranded cost recovery (Hoge, 1997). As a result, many energy marketers are bypassing the residential market in California. According to Enron CEO Ken Lay, "It's virtually impossible to make money [selling to residential customers in California], in fact you'll probably lose money on every customer you hook up" (Zucchert, 1997).

4. Lack of Customer Knowledge/Education

Consumers will increasingly create de facto environmental and social policy in a deregulated electricity market through their choices. Overall, consumer preferences will determine the resource mix of electric generation. Large industrial customers can be expected to seek low-cost power and may not be as interested as other customers in considering the environmental and social costs of their electricity choices. On the other hand, segments of the residential customer class may have such concerns, *if* they are aware of environmental and social costs.

Current studies indicate that residential consumers know little about the economics or environmental quality of the power they purchase. The National Association of Regulatory Utility Commissioners has conducted the most thorough analysis of utility customer knowledge and preferences to date, utilizing a national sample of 1,307 adults (Winnege et al, 1998: 5). It found that 86% of bill payers did not know how much per kWh they were charged for electricity, and 76% were unaware of their monthly usage. Research also revealed that the majority of residential customers could not correctly name the most heavily used fuel resource in their region.

This study also found that people consistently believed that electricity production in their region is much less environmentally damaging than it is in fact. Due to this misconception, a majority (77%) stated that they were satisfied by the environmental concerns demonstrated by their current electricity provider. Many consumers (72%) felt that the environmental effects of electricity production were relatively small compared to other sources of pollution (Winnege et al, 1998: 4). In reality, electricity generation is the largest industrial source of carbon dioxide and sulfur dioxide emissions in the country.

When policies exist to educate and facilitate consumer decisions to change providers and when environment-friendly electricity options are known and available, it is clear that sizable numbers of residential consumers will choose so-called *green* electricity options. For example, as of January 1, 2000 Pennsylvania's pilot residential choice program has had over 500,000 switches in providers among participants representing over 40 percent of electric customers (Pennsylvania Office of Consumer Advocate, 2000: 1). The largest bloc of consumer-led provider change were to those offering green electricity options.

This lack of knowledge about environmental impacts is contrary to the environmental concern demonstrated by electricity customers. Fifty-two percent stated that global warming is a "real concern" and that utilities should care about the amount of air pollution they create (86%), the amount of renewables they utilize (78%), the amount of nuclear waste they create (85%), and should promote energy conservation (85%) (Winnege et al, 1998: 4). Studies such as this underscore the importance of consumer information and education in a restructured market

where residential consumers will have to know more than they do presently in order to make informed choices.

Effective education is needed for residential consumers. Information on resource use and the environmental impacts of electricity generation and distribution are especially important. Little attention has been given so far to the full disclosure of economic and environmental information to electricity consumers. If these issues are not addressed, restructuring may fail to achieve the optimal economic and environmental efficiency objectives its proponents promise.

V. Environmental Implications of Recent Federal Proposals for Electricity Restructuring

A restructured electricity market offers the opportunity to institute new rules and mechanisms to account for environmental and social concerns, and promote clean energy. This section discusses the policy and program options that are currently being considered in restructuring and provides an overview of the extent to which recent federal proposals have included them.

A. Current Environmental Policy and Program Options

Promoting the switch to cleaner energy and renewable energy can be institutionalized through a number of policy and program options. Table 3 briefly summarizes these options.

Table 3: Environment-Related Policies and Programs
Consumer Education: <i>Education programs designed to inform consumers about the choices and options available to them in a newly restructured electricity market.</i>
Customer Aggregation: <i>The consolidation of numerous individual energy users into a single purchasing group, thereby enabling them to compete on more favorable terms in competitive markets.</i>
Environmental Disclosure and Certification: <i>Requirements for utilities to reveal their energy sources and the environmental impacts associated with their electricity generation. Certification requires that power sources labeled "green" by utilities meet specified standards.</i>
Emission Standards: <i>Requires electric generation plants to meet specified emissions standards.</i>
Green Pricing: <i>Allows customers to pay a premium to receive electricity generated by renewable sources.</i>
Net Metering: <i>Customers that have their own electricity generating source can sell the surplus energy back to the utility while paying only for net energy used.</i>
Renewable Portfolio Standards (RPS) and Set Asides: <i>An RPS requires a percentage of generating capacity to be generated from renewable sources. Set asides require that a percentage of new generating capacity come from renewable sources.</i>
System Benefit Charges (SBC): <i>Charges imposed on all customers to fund public benefits, including environmental, low-income and energy efficiency programs.</i>

1. Consumer Education

The move to electric competition will require unprecedented educational efforts. Preparing consumers for a restructured electric market challenges states to develop comprehensive and

professional outreach and educational efforts. Consumers will need information from a variety of sources to understand their new rights, responsibilities, and opportunities. Comprehensive public education programs should maximize public participation in the implementation of retail competition, minimize customer confusion about the changes being made, and equip customers with the means to effectively participate in a competitive market. These efforts will probably require additional resources as well.

In states that have designed comprehensive electric restructuring education programs, public utility commissions have taken a leadership role in coordinating, funding, and implementing programs, although usually with an advisory committee or other public involvement process. While there are several funding options, such as state tax appropriation, increased commission budgets, or funding via the distribution utility's rates, most states have opted to fund their education programs through the imposition of transition costs on distribution utilities.

2. Customer Aggregation

Customer or community aggregation is the consolidation or pooling of numerous individual energy users into a single purchasing group, thereby gaining leverage to win more favorable terms in competitive markets. Customer aggregation options are crucial to meaningful choice in a restructured electricity market. Industrial and large commercial electricity customers currently enjoy favorable rates and generation resource options in relation to residential and small commercial customers. Customer aggregation is key to increasing residential market power and leveling the restructured playing field. This is crucial since preliminary restructuring results in some states indicate that alternative providers may bypass residential customers and only focus on large industrial and commercial users.

Aggregation reduces the transaction costs incurred by alternative generation suppliers, making residential communities more attractive market candidates. Aggregators can compete not only for low-cost power, but can bargain for a wide range of related services offered by the power provider, including conservation programs, energy efficiency measures, the use of renewable energy sources, reduced rates for low-income residents, etc. Thus aggregation provides an opportunity for communities to express their preferences regarding the social and environmental attributes of electricity generation.

“[Customer aggregation] offers consumers market power, universal service, and public accountability. For environmentalists it offers unprecedented opportunities to bolster renewables and efficiency programs. For suppliers, [it] removes market volatility by forming bulk markets with an organized bidding process. If states are going to deregulate, it is important citizens have options, both as consumers and members of a community that gives them a real choice and real leverage.” (American Local Power Project, 1997: 3).

In theory, any group—including residential neighborhoods, interest groups, nonprofits, school districts, etc.—can band together in aggregation. Many proponents of aggregation, however, feel that it is best suited to the city or county level, and that local governments can most naturally serve as the aggregating entity. An entire city or county could offer providers a substantial

customer base and a stable electricity load with evenly distributed peak periods. Local governments are also well-established and experienced in administering public services.

The main models of aggregation comprise the “opt-in” and “opt-out” approaches. Under the opt-in model, consumers must affirmatively, and of their own volition, join the aggregating entity. Under the opt-out model, consumers are automatically enrolled into a municipality’s aggregation program. The opt-out approach may also be “restricted” or “unrestricted”—individual consumers may be able to leave the aggregation program at any time or there may be certain restrictions placed on their ability to leave.

3. Environmental Disclosure

Environmental disclosure refers to the requirement that utilities make known the fuel mix that they use to generate power. Under restructuring, most consumers will receive bills that list generation, transmission, and distribution costs separately because these services will be operated by separate entities. Proposed environmental disclosure requirements mandate that power generators disclose the percentages of their fuel inputs (i.e., coal, oil, natural gas, nuclear, wind, solar, etc.). Power producers could also provide information on the environmental impacts of their generation sources, such as the amount of pollutants and type of air emissions generated. Advocates of disclosure rules draw an analogy with food labeling where the Food and Drug Administration requires that producers list all ingredients.

There are two primary justifications for disclosure of energy resources (Holt, 1997). The first addresses the needs of a competitive retail market. In order for markets to work, consumers must have knowledge about the product. In particular, they must have information that is relevant to their decision-making. The second justification is that, in surveys across the country, there is an expressed support for renewable energy among consumer groups. This indicates that utility fuel mix is an important criterion for customer decision-making.

4. Emission Standards

The Clean Air Act of 1970 (CAA) exempted older utility plants from meeting emissions requirements placed on new plants. This “grandfathering” clause continued in Amendments to the CAA in 1977 and 1990. The main reasons for the exemption were beliefs that installing controls would be more expensive for older plants and that those plants would be replaced by newer and cleaner plants over time (Biewald et. al., 1998). Instead, life-extension technologies have allowed older coal plants to continue operating at a lower cost than building new plants. Today, 25% of the nation’s stock of fossil and nuclear plants are more than 30 years old, with some coal plants over 50 years old (EIA, 1995).

Older plants are not equipped with as much pollution control equipment, which makes them cheaper to run. But they emit more pollutants, and to the extent that some of these plants are not currently used to full capacity, they could sell more electricity when markets are opened up, thereby increasing pollutant emissions further. New and fairer emission standards could require these old plants to meet the same requirements of the new plants through such programs as pollution taxation, emission standards or even trading programs.

Several proposals to establish comparable emission standards and eliminate disparities are being considered. Uniform standards could be applied to the average of all plants owned or controlled by a company or to each plant individually. In certain respects, the application of a uniform standard to each plant would be simplest and provide emission reductions to all communities near power plants. This approach would be less flexible, however, and more expensive than allowing averaging or trading among plants. Furthermore, applying standards to individual plants would not create incentives for companies to reduce emissions by incorporating more renewables into their mix.

5. Green Pricing and Certification

Green pricing programs allow consumers to pay a special rate to receive all or a portion of their electricity from renewable sources. Green pricing is a utility service that responds to utility consumers' preferences for electricity derived from solar, wind, or biomass sources. These programs are not mandated but are usually initiated by utilities. Green pricing programs are one of the most promising mechanisms for promoting renewable energy resources. Power generators throughout the country have noticed the overwhelming support that "green power" marketers have received in pilot programs in New Hampshire, Massachusetts and Pennsylvania. Under retail competition for generation, green pricing programs will allow power generators to distinguish themselves and meet the growing demand for green power, which surveys have repeatedly shown exists.

Although green pricing programs have been initiated in advance of restructuring, many utilities have started these programs in anticipation of restructuring with the intention of improving customer loyalty. Utilities have employed aggressive marketing strategies with successful results, including bill inserts, newsletters, radio and newspaper advertising, public events, and telemarketing. Though it is somewhat easier to market green pricing to residential customers (because they tend to be less cost conscious than business customers), efforts are now being made to begin marketing green pricing programs to commercial and industrial customers.

Carefully conceived green pricing programs can be financially self-supporting. Green pricing programs need to earn higher rates in order to offset the higher costs that renewable technologies typically incur. Many utilities with existing green pricing programs have not recovered all of their costs through customer premiums, instead choosing to subsidize these programs internally or have received grant funding to offset the added costs of using renewable technologies.

"Green" certification is a consumer protection strategy that requires power sources marketed as "green" to meet certain standards. In order for fuel mix information to be consistent, most disclosure proposals include provisions for the certification of green resources. That is, a utility that states in its fuel mix that a certain percentage of its power comes from solar systems, for example, will have to have those systems certified and their capacity rated by an oversight board or commission. Certification, therefore, stands to prevent fraudulent claims of being "green."

Certification issues have become an important topic due to misleading claims of providing green power in retail competition pilot programs. The major difficulty in green labeling is the

determination of what exactly meets the standard. FERC is currently considering this issue in discussions of the establishment of nationwide certification standards for green labeling.

6. Net Metering

For consumers who have their own electricity generating units (typically using photovoltaics, wind turbines, micro-hydropower, etc.), net metering allows for the flow of electricity both to and from the consumer through a single, bi-directional meter. This arrangement is more advantageous to the customer than the two-meter arrangement that is typically used for independent power producers authorized by PURPA. Under the most common two-meter arrangement, any electricity produced by a consumer that is not immediately used flows to the utility through the second meter. This excess generation is purchased by the utility at its avoided cost, while the customer purchases electricity off the grid at the retail rate. There is usually a significant difference in price between the electricity bought and sold under the two-meter arrangement (Starrs, 1996).

Net metering allows for the installation of a single meter that monitors flows. The advantage to the consumer is that these flows are netted over either a one-month or annual period. Therefore, at times when the consumer's generation exceeds their use, flows from the customer to the utility offset any consumption of electricity from the utility. In effect, the consumer is using the excess generation to offset electricity that would have been purchased at the retail rate. Thus, the primary difference between the two-meter and single-meter systems is that the customer essentially receives the retail rate for a large portion of their excess generation with the latter system.

Net metering is seen as a low-cost and easy-to-administer way of promoting customer investment in renewable energy. It is an attractive policy option because it provides an economic incentive for renewable energy without public funding (Wan, 1996). One of its major advantages is its simplicity; once the meter and system are in place, no regulation or administration is needed. Net metering rules can be implemented by the state through legislation, by public utility commissions through rulings, or by individual utilities through tariffs. Typically, a state public utility commission or legislature establishes net metering rules. Whether created by a legislature or commission, individual utilities must file tariffs to implement net metering.

Two issues surrounding the design of net metering rules are the price that the utilities are required to pay for customers' net excess generation and the limits on individual system size. In the majority of existing net metering programs around the country, utilities are required to pay their avoided cost for net excess generation, as if they are buying the power on the wholesale market. In only a few states do utilities pay a retail rate, and in some states utilities do not pay for net excess generation. Concerning size, state with net metering typically limit the generation capacity of, for example, a residential customer's net metered system to less than 20 kW. To date, restructuring rules have not caused major changes in the net metering policies in states.

7. *Renewable Portfolio Standards (RPS) and Set Asides*

Renewable energy portfolio standards (RPS) and set asides are similar types of regulations. An RPS is a public utility commission requirement stipulating that a certain percentage of a utility's or a state's overall generating capacity must be derived from renewable resources by a certain date (e.g., 1% of the state's electric capacity must be from renewable energy by the year 2001). Set asides, on the other hand, typically require that either a percentage or a fixed amount of a utility's or state's newly installed capacity must be from renewable energy sources (e.g., a utility must incorporate 100 MW of renewables as part of new generating capacity).

Those states with portfolio standards have usually included the RPS in restructuring legislation (though Arizona has included it in its regulations). In those states with set aside provisions, they are typically not connected with restructuring legislation. While renewable portfolio standards fit into the competitive market structure, traditional set asides may not. Due to the nature of set asides, a regulatory body needs to specify not only how much renewable energy capacity must be built, but also which generators must build how much capacity. In a restructured market, where providers move in and out of markets frequently, an RPS is generally more workable.

Those favoring an RPS approach argue that it is the most direct and effective way to bring renewables into widespread use. Broad adoption of renewables will lower technology prices. It is also relatively easy to administer since it only requires setting the level of renewables with modest subsequent oversight and enforcement. An RPS relies on market forces to bring down the costs of renewable technologies. An RPS can also accommodate a credit trading system that offers flexibility to those generators for whom developing renewables will be extremely costly (Spratley, 1997).

8. *System Benefits Charges*

Like the RPS, a non-bypassable system benefits charge (SBC) is an important regulatory tool to promote renewable energy and energy efficiency in electric restructuring. An SBC is usually applied universally to all customers and is considered competitively neutral. Also termed "wire charges" or "transition charges," an SBC is typically structured as a volumetric fee — a charge per kilowatt-hour — though an SBC could be structured as a fixed fee. As of early 1999, seven states had adopted renewable energy and energy efficiency funds via an SBC totaling about \$1 billion over 10 years (Nogee et al, 1999: 5). Delaware adopted such a charge in its restructuring legislation.

SBC advocates argue that supporting renewables and energy efficiency through a universal wire charge is the most logical way to continue sustained development of these environmentally friendly options. Since many states will already be using a wire charge to collect funds to recover stranded costs or provide service to low-income households, using such a charge to support renewables and energy efficiency would be a matter of simultaneously designating the per kilowatt-hour charge to support the development of these resources. SBC funds can also be distributed among a wide range of renewable and energy efficiency technologies, ensuring that emerging technologies that may not benefit under the renewable portfolio standard (RPS) receive support. SBC funds can also be used to leverage other funding sources. Additionally, an SBC

can ensure a guaranteed level of funding, thereby reducing some of the risks involved in research and development investment (Spratley, 1997).

It should be noted that there is no necessity of treating an SBC and an RPS as an "either-or" choice. It is possible, and under certain circumstances desirable, to pursue both in order to encourage cost-effective development of environmentally friendly "green" technologies.

B. Federal Proposals on Electricity Restructuring

A number of proposals have been introduced in the 106th U.S. Congress that directly or indirectly relates to the restructuring of the electric power industry. To date, at least eight bills have been proposed in this session to implement retail competition nationally—with legislation poised to move early next year. In addition, the U.S. Department of Energy submitted the Administration's *Comprehensive Electricity Competition Act* on April 15, 1999, is an attempt to set the standard for national electric industry restructuring. These proposals indicate that there is increasing pressure to implement retail competition on a national basis.

1. SB 1047 and HR 1828—The Administration's Comprehensive Electricity Competition Act

The Administration's Act, which has been introduced in the Senate as SB 1047 and in the House as HR 1828, encourages states to implement retail competition, protects consumers by facilitating competitive markets, and promotes and preserves public benefits. In particular, the Act attempts to produce significant environmental benefits through both market mechanisms and policies that promote investment in energy efficiency and renewable energy. It establishes a Public Benefit Fund of up to \$3 billion annually (1.0 mill/kWh) to providing matching funds for state commitments to programs supporting consumer education, demand-side management options, energy efficiency measures, and renewable energy.

SB 1047 and HR 1828 also contain: green labeling provisions, to allow customers to identify and choose environmentally friendly generations sources; disclosure requirements in which electricity sellers disclose information in billings on fuel mix and emissions characteristics; a net metering provision, to encourage the installation of small renewable systems (up to 20kW); and a renewable portfolio standard (RPS), which requires that electricity sellers generate at least 7.5 % of their power from non-hydroelectric renewable resources by 2010. The RPS expires in 2015 and allows power companies to substitute renewable energy credits in lieu of the 7.5 %. The bills also include a tradable emissions credit system for NO_x to facilitate cost-effective, market-driven emission reductions. Finally, the bills prohibit states from impeding customer aggregation in areas that have begun deregulation.

2. SB 1369—The Clean Energy Act

Submitted by Senators Jeffords (R-VT) and Lieberman (D-CT) in July 1999, SB 1369 is highly regarded for its environmental provisions. The Clean Energy Act sets emission caps on, and establishes a tradable emissions credit system for NO_x, CO₂, SO₂, and mercury. It requires electricity generators to disclose data on their fuel mix and the type and quantity of emissions

released by their facilities. Electricity distributors must also provide net metering services to any system up to 100kW that is built primarily to offset the owner's own electricity usage.

The bill's renewable portfolio standard (RPS) is particularly ambitious. It begins at 2.5% in 2000 and increases by 0.5% annually for five years, then increases by 1.0% annually for fifteen years, reaching 20% in the year 2020. A tradable renewable energy credit (REC) is also provided to make the movement to clean energy a cost-effective one. A system benefits charge (SBC) of up to 2 mill/kWh is placed on transmission costs and a federal-state public benefits board is established to disburse SBC monies as matching funds to state programs that focus on low-income energy assistance, universal and affordable electric service, energy efficiency and conservation, and renewable energy.

3. HR 2645—The Electricity Consumer, Worker, and Environmental Protection Act

Representative Kucinich (D-OH) re-introduced HR 2645 in July 1999. The Electricity Consumer, Worker, and Environmental Protection Act contains several provisions for consumer and environmental protection. It requires each state to establish a Citizen's Utility Board (CUB) to represent and promote the interests of residential electricity customers. State CUBs would conduct research, initiate demonstration projects, and conduct public information activities as well as represent customers before regulatory, legislative, and other public bodies. States would be required not only to allow customer aggregation, but also to facilitate the ability of customers to establish municipal electric systems and utilize local franchise powers. An SBC of no less than 7 mill/kWh would support affordable electricity for low- and moderate-income residential customers, provide matching funds for state programs relating to job loss from restructuring, and support research and development in energy conservation, efficiency, and renewables.

HR 2645 also includes a RPS that would begin in 2000, with a baseline of the amount of renewable energy in the U.S. as of December 1997. The RPS percentage would increase by a minimum of 0.5% yearly between 2001 and 2004. Beyond 2005, the percentage would increase by a minimum of 1.0% over the previous year. A tradable renewable energy credit system is also provided to promote renewable energy in a cost-effective manner. The bill also requires disclosure of generation fuel sources and emissions of NO_x, SO₂, CO₂, and particulate matter, and the amount of high- and low-level nuclear waste associated with a provider's electricity supply.

4. HR 2569—The Fair Energy Competition Act

Representative Pallone (D-NJ) introduced HR 2569, which contains significant environmental provisions, in July 1999. The Fair Energy Competition Act sets emissions caps on CO₂, NO_x, and fine particulates. A declining emissions cap is also set on mercury. An allowance system is established for each substance and electricity generators can earn allowances by engaging in conservation activities that lower the gross demand for electricity. The bill also specifically declares the right of any citizen to sue a generator for failure to meet the emissions standards and it protects customers from marketing abuses and breaches of confidentiality.

HR 2569 includes net metering provisions—power distributors must connect to: any residential customer with an on-site renewable energy generating facility (wind and solar) up to 100kW; and any commercial consumer with an on-site renewable energy generating facility (wind, solar, biomass, and fuel cells) up to 250kW. The bill requires disclosure of generation fuel mix and emissions data. It also includes an RPS which begins at 2.5% in 2000 and increases yearly until it reaches 7.5% in 2010. The RPS is accompanied by a tradable renewable energy credit system as well. Finally, the bill establishes an SBC of no more than 2 mill/kWh to fund state programs for low-income residential customers, energy conservation, and renewables.

5. Other Federal Proposals

In addition to comprehensive electricity restructuring proposals, two other noteworthy bills have been submitted. Representative Brown's (D-OH) HR 2734, the Community Choice for Electricity Act, specifically focuses on customer aggregation. The bill prohibits any state that undergoes restructuring from limiting the ability of electricity customers to aggregate themselves.

Representative Inslee's (D-WA) HR 2947, the Home Energy Generation Act, focuses on net metering. The bill enables individuals who generate electricity from renewable sources to receive credit for the surplus electricity they put back into the grid. It also sets uniform national reliability and safety standards for the interconnection of electricity generation units onto the grid. Under this measure, electricity suppliers and utilities would be allowed to count home energy generation capacity among their individual customers towards any RPS requirements.

VI. State-by-State Review of Environmental Proposals in Current Electricity Restructuring Legislation

State regulatory commissions and legislatures around the country are currently engaged in the process of restructuring. All fifty states plus Washington D.C. have either enacted electricity restructuring legislation, issued orders, have legislation or orders pending, or have begun examining restructuring options. Many of these states have developed mechanisms to support renewable energy and energy efficiency as part of their restructuring efforts. The knowledge gained from these activities can provide a valuable foundation of experience for Delaware to consider as it continues the process of restructuring its electric utility market.

“Many states have already responded to federal and industry pressures to restructure the electric power industry. As of May 1, 1999, at least 17 states had decided to introduce customer choice into their electricity industry over the next few years by enacting restructuring legislation. Another 8 states have either issued comprehensive regulatory orders or have legislation/orders pending, and 24 states (including the District of Columbia) have commissions or legislatures actively investigating electricity restructuring options” (EIA, 1999a: 1).

According to a study by Public Citizen’s Critical Mass Energy Project, many states already offered a wide range of incentives and programs to promote the use, purchase and manufacture of renewable energy systems before they considered restructuring their electricity sectors. In 1995 it was reported that, “Thirty-three states offer tax incentives, eight states have set-asides or targets for renewable capacity additions, 17 states offer loans for renewable energy projects, three states require electric utilities to provide off-grid customers with cost comparison between line extension and a photovoltaic system and four states encourage or require the use of renewable energy systems in state buildings” (Public Citizen, 1995: 1). The programs in place before states began restructuring proceedings, however, addressed only a fraction of the renewable resource potential that can be economically and technologically harnessed. In order to keep energy and environmental policies moving forward, the introduction of retail competition must strengthen and build upon existing programs.

States have formulated some beneficial policy measures to preserve and promote renewables and energy efficiency in a restructured electricity market. This section examines ten states that have passed electricity restructuring legislation. These states were chosen based on the success of their programs and their proximity to Delaware. The ten states examined here are: California, Connecticut, Illinois, Maine, Maryland, Massachusetts, New Jersey, Pennsylvania, Rhode Island, and Texas (Figure 2).

The ten states reviewed here were analyzed in relation to the strengths and weaknesses of eight policy and regulatory mechanisms used to promote energy efficiency and renewable energy development. These mechanisms are: Consumer Education, Customer Aggregation, Environmental Disclosure and Certification, Emissions Standards, Green Pricing, Net Metering, Renewable Portfolio Standards and Set Asides, and System Benefits Charges (see Table 3 above for definitions). Among restructuring experts, energy policy planners and analysts, and

environmental and consumer advocates, these mechanisms are generally considered the most important tools for shaping and promoting environmental goals in restructured electricity sectors.

This section provides an overview of the experiences of the ten selected states in passing their electricity restructuring legislation. It provides a capsule of the standard environmental features of each, as well as the strengths and weaknesses of the eight programs in each state.

This state-by-state overview is based on an analysis of the legislation and other available literature, and telephone interviews with government officials and citizen groups involved in the writing and implementation of the legislation. Each state's description is structured in a similar manner to provide for efficient comparison across programs. For all of the state overviews, program strengths and weaknesses are also described. These sections reflect the opinions of CEEP researchers.

Table 4 summarizes CEEP's findings of the environmental mechanisms used in the ten states. The remainder of this section provides an in-depth discussion of CEEP's findings regarding each state. The specific policies adopted by each state to address its environmental objectives and the needs of its customers and electric suppliers are reviewed. Analysis of their collective experiences can be useful to Delaware as it continues to address restructuring issues. The lessons that are offered regarding the promotion of energy efficiency and renewable energy are particularly significant.

Table 4: Comparison of State Restructuring Efforts

Restructuring Efforts	Customer Education	Customer Aggregation	Environmental Disclosure	Emissions Standards	Green Pricing and Certification	Net Metering	Renewable Portfolio Standard (RPS)	System Benefits Charge (SBC)
California	- Program designed by utilities and Commission - \$89.3 million annual budget	- Opt-in	- Fuel mix disclosed to customers in uniform format	- Existing regulations remain in effect	- No program mandated but robust voluntary program - Green-e renewable certification program	- Facilities of <10 kW are eligible at avoided cost rate - Solar and wind are eligible - 53.3 MW statewide limit - Non-utilities are exempt	- No RPS currently exists	- \$540 million over 4 years for existing, new, consumer-led and emerging renewable projects - \$872 million for efficiency and conservation projects
Connecticut	- Established by Commission-appointed advisory council - Funded through SBC	- Aggregation regulations will be set by early 2000	- Fuel mix and emissions disclosed to public bodies on an annual basis	- Must implement stricter emissions standards when other states in its power pool agree to adopt them	- No program mandated - Some voluntary green options exist	- Facilities of <100 kW are eligible at avoided cost rate	- Renewables must provide 13% of generation - Eligible renewables include solar, wind, biomass, “trash-to-energy” and some hydro	- \$109 million yearly for conservation and renewables
Illinois	- Commission-appointed body to distribute customer information packet in 2000	- Opt-in	- Fuel mix and emissions, including nuclear waste, disclosed to customers and Commission in uniform format	- Existing regulations will remain in effect	- No program mandated - Some voluntary green options exist	-No set provisions	- No RPS currently exists	- \$100 million over 10 years for conservation and renewables - Additional \$250 million transferred from utility company for Clean Energy Community Trust
Maine	- Developed by Commission-established advisory panel - \$1.5 million annual budget	- Opt-in	- Fuel mix and emissions disclosed to customers and Commission in uniform format	- Existing regulations remain in effect	- No program mandated - Some voluntary green options exist	- Facilities of <100 kW are eligible at avoided cost rate - Unlimited statewide limit	- Every electric product must be 30% renewably generated, effective immediately - Most renewables are eligible	- No SBC currently exists
Maryland	- Commission-will develop by July 1, 2000	- No provisions regarding aggregation	- Fuel mix and emissions disclosed to customers and Commission every 6 months - Regional average must also be disclosed - Format has yet to be decided	- Commission will consider stricter emissions standards after July 1, 2001	- No program mandated - Some voluntary green options exist	- Facilities of <100 kW are eligible at avoided cost rate - Considering requiring utilities to buy back excess - 34.7 MW statewide limit	- Currently considering implementing an RPS	- Approximately \$9 million/year to support power plants designed to help minimize environmental impacts

Table 4: Comparison of State Restructuring Efforts

Restructuring Efforts	Customer Education	Customer Aggregation	Environmental Disclosure	Emissions Standards	Green Pricing and Certification	Net Metering	Renewable Portfolio Standard (RPS)	System Benefits Charge (SBC)
Massachusetts	- Developed by Commission	- Opt-out for cities and counties - Opt-in for all others	- Fuel mix and emissions disclosed to customers and public bodies in uniform format - Number of union and replacement workers employed must also be disclosed	- Must implement stricter emissions standards when other states in its power pool agree to adopt them	- No program mandated - Some voluntary green options exist	- Facilities of <30 kW are eligible at avoided cost rate - Unlimited statewide limit	- Renewables must provide 14% of generation by 2010 and 25% by 2020 - All renewables are eligible	- \$150 million over 5 years, \$20 million yearly thereafter to support renewables - An additional \$500 million over 5 years to support efficiency
New Jersey	- Developed by Commission	- Cities and counties may apply for opt-out - Opt-in for all others	- Fuel mix and emissions disclosed to customers and Commission in uniform format - Information on energy efficiency must also be disclosed	- Must implement stricter emissions standards when other states in its power pool agree to adopt them	- No program mandated - Some voluntary green options exist	- Facilities of <100 kW are eligible at avoided cost rate - Statewide limit of 0.1% of state's peak demand	- Renewables must provide 2.5% of generation by 2001 and 6.5% by 2012 - All renewables, (hydro must be <30 MW) are eligible	- \$1 billion over 8 years for renewables and energy efficiency
Pennsylvania	- Developed by distribution utilities and Commission - Funded by customer charge	- Opt-in	- Fuel mix disclosed to customers and public bodies in uniform	- Existing regulations will remain in effect	- No program mandated but robust voluntary program - Green-e renewable certification program	-Varies by electricity provider	- RPS for competitive default service providers begins at 2.0% in June 2000 and increases by 0.5% per year	- Separate SBCs and related renewable energy pilot programs for each of the distribution utilities - Funds are expected to total approximately \$55 million over 6½ years
Rhode Island	- Developed by distribution utilities and Commission	- Opt-in	- No disclosure mandated	- Stricter emissions standards imposed for out-of-state facilities	- No program mandated - Some voluntary green options exist	- Facilities of <25 kW are eligible at full retail rate	-No RPS currently exists	- \$17 million annually to support renewables and energy efficiency
Texas	- Commission must develop by January 1, 2001	- Opt-in	- Disclosure of environmental impacts is required - Rules for disclosure under development	- Generators must reduce NOx emissions to 50% and SOx emissions to 75% of 1997 levels	- No program mandated - Utilities can offer renewable energy tariffs to customers - Some voluntary green options exist	- Facilities of <100 kW are eligible - Regulations are currently under revision	- 2,000 MW of new renewable capacity installed by 2009 - Efficiency measures to meet 10% of increase in demand - Solar, wind, geothermal, hydro, wave/tidal, and biomass	- Small SBC finances some low-income energy efficiency and consumer education programs

A. California

In September 1996, Governor Pete Wilson signed AB 1890, opening up California's electricity market to retail competition starting March 31, 1998. The Public Utilities Commission (PUC) is currently implementing a four-year transition period to the competitive generation market, and the industry is expected to be fully competitive by 2002.

Background

California's electricity rates and service have traditionally been regulated by the State's PUC. Prior to restructuring, renewable energy was addressed as part of the state's qualifying facility program. The PUC created demand-side management (DSM) and energy conservation programs and set funding levels, guidelines, incentives and standards to measure program success. Utilities were given flexibility in deciding how they wanted to develop and implement those programs. In 1994, when the PUC began its investigation of deregulating California's electric industry, the main concerns were financial in nature. Over time, however, California shifted its focus to include significant environmental and consumer provisions that attempt to ensure a more environmentally and socially sustainable electricity sector in the future. The electric rates of the former generation monopolies were frozen at the rates in effect in June 1996. These utilities were also required to reduce residential and small commercial electric rates by 10% on January 1, 1998, and to set a goal of another 10% reduction by the year 2002.

Consumer Education

California's public education plan, which ran from September 1997 to June 1999, consisted of three main components: 1) the "Plug In, California!" campaign; 2) an "Outreach Plan;" and 3) the Electric Education Trust (EET). The budget for the entire education campaign was \$89.3 million, with funds provided by customers of the former generation monopolies. The Plug In, California! Campaign (budgeted at \$73.5 million) was developed to provide electricity consumers with information about their new electricity choices. The campaign also focused on small businesses and hard-to-reach and special needs customers—seniors, persons with disabilities, rural populations, ethnic community members, and non-English-speaking individuals. The PUC's Outreach Plan (budgeted at \$2 million) was designed to help consumers protect themselves from unfair or abusive marketing practices.

The Electric Education Trust (EET—budgeted at \$13 million, with \$10 million available for use by non-profit organizations) was developed to ensure that the public education and community outreach process continues over a sustained period of time. Although the EET only lasted through June 1999, further legislation may extend its duration. Though California's consumer education program was well-funded, it has been criticized for disseminating superficial information and not sufficiently informing customers about all of the options available to them in the newly restructured market.

Customer Aggregation

All customer classes are entitled to aggregation on a voluntary basis (opt-in). Any private party or governmental entity may serve as an aggregator; however, it may not require consumers within its jurisdiction to purchase generation service from that entity. Public bodies acting as residential aggregators must make an offer to include everyone within the jurisdiction.

Environmental Disclosure

Energy suppliers must disclose to all customers the energy resources used in generation using a standard label created by the California Energy Commission (CEC). The restructuring of California's electric market includes the creation of an independent system operator (ISO) to manage transmission and distribution. Energy generators that provide metering information to California's independent system operator (ISO, which was created to manage transmission and distribution in the new market) must also provide quarterly data on fuel type and fuel consumption, which is then forwarded to the CEC for verification. Specifically, generators must provide percentages of annual sales that are derived from coal, large hydroelectric (greater than 30 megawatts), natural gas, nuclear, and eligible renewables. Eligible renewables include biomass, waste, geothermal, small hydroelectric (30 MW or less), solar, and wind. If less than 25% of the generation in the previous year came from a fossil fuel source, a generation site using multiple energy sources can be reported as a renewable facility.

Emissions Standards

AB 1890 does not contain any provisions specifically regarding emissions standards. Electricity providers will remain subject to the existing emissions regulations that have been established by state and federal agencies.

Green Pricing and Certification

Although AB 1890 does not contain any provisions specifically regarding green pricing, electricity service providers in California voluntarily offer a number of different green pricing options to their residential and small commercial customers (as of February 1999, 9 providers offered 27 different options). California's best-known electricity service provider, which is regarded as the creator of the most innovative green pricing program in the country, is the Sacramento Municipal Utility District (SMUD). SMUD is a publicly owned electric utility which serves over 430,000 residential and 50,000 business customers in a 900 square mile area surrounding Sacramento county. Nearly half of SMUD's generation comes from its own renewable energy facilities including hydroelectric dams, geothermal sites, photovoltaic cells, and wind turbines.

SMUD's "Greenergy" green pricing program includes a "Renewable Energy Options Program" and "Community Solar." Renewable Energy Options allows participants to choose the level of renewable energy they consume by selecting one of two premium options. The "All Renewables" option (100% from renewables) has a premium of 1 cent/kWh added to the monthly bill. Consumer premiums are used to pay for renewable facilities owned by SMUD and to invest in new renewable projects. The "Renewables Advocate" option, with a premium of 0.5 cents/kWh, guarantees that a portion of the consumer's energy comes from renewables. Community Solar, which began in June 1997, supports the installation of photovoltaic panels on community buildings, schools, churches, and other government or commercial facilities. SMUD's customers can make contributions to the Community Solar program by paying a 1 cent/kWh premium. The program also allows customers to earmark their contribution to specific projects. As of April 1999, more than 600 customers have participated in the Community Solar program.

SMUD's best-known solar green pricing program, the three-year-old "PV Pioneers" program, has installed PV systems on the rooftops of over 375 residential customers. Program participants pay a premium of \$4 per month (\$48 annually) to have small PV systems (from 3.5 to 4.2 kW) installed. This program locks customers into their electricity rate until it increases by at least 15% and requires a ten-year customer commitment. Although SMUD receives over 1,000 applications annually for this program, it has to limit participation to its installation capability. The PV Pioneers program is not yet self-supporting. A Utility Photovoltaic Group (UPVG) through the U.S. Department of Energy has augmented user costs and revenues collected from all SMUD customers. SMUD also announced plans for a "PV Pioneers II" program, which will provide at least another 2.5 MW of power (PV Pioneers provided 1 MW) by the end of 2002. SMUD approved \$9.4 million to fund new homes powered by solar shingles, which can generate roughly 75% of each home's average yearly electricity needs. Homeowners will own these systems and have the opportunity to sell surplus power back to the utility. SMUD will buy down half of the \$17,000 cost of the systems.

Additionally, California environmental and consumer protection advocates initiated a green labeling certification program in September of 1997 called the "Green-e" Renewable Branding Program. Overall, the program is designed to help the state's customers identify credible renewable energy producers. Designed by the Center for Resource Solutions (CRS), this voluntary certification and verification program became the country's first. The program's label is available to energy generators whose renewable energy content is at least 50%. For the non-renewable portion of energy, if fossil fuels are used, those resources must have air emissions of SO₂ and NO_x less than or equal to California's system power per/kWh average. An independent oversight body, the Green Power Board, governs the program. As of October 1999, nine California power marketers are participating in the Green-e program.

Net Metering

California's restructuring legislation does not contain any provisions specifically regarding net metering. The State's existing net metering law, however, requires all electric utilities to allow net metering for residential customers with solar electric power systems under 10 kW. Under California's law, utilities can calculate the net electric generation on their regular billing cycle or annually. Under either accounting system customers are paid the utility's avoided cost for all net excess generation. Overall limits to net metering capacity are determined for each individual utility as one tenth of one percent (0.1%) of its 1996 peak generation. Based on 1996 figures, total net metering capacity in the state can reach 53.3 megawatts. It is important to note that non-utility generators are exempted from net metering requirements.

Renewable Portfolio Standards and Set Asides

California's current restructuring legislation does not include any type of renewable portfolio standard (RPS).

System Benefits Charge

AB 1890 supports new, existing, and emerging renewable generation technologies through a non-bypassable system benefits charge (SBC) called the "Public Purpose Program" (PPP). The PPP provides \$540 million over four years (\$135 million per year) to help renewables projects compete with conventional fossil fuel sources. Funds are allocated according to the following

formula: 1) *Existing* technologies receive 45% of fund revenues; 2) *new* technologies receive 30%; 3) *emerging* technologies receive 10%; and 4) *consumer-initiated projects* receive 15%. Each of these four categories is further subdivided into smaller accounts.

The existing technologies category is intended to support the development and maintenance of existing renewable projects. This category is subdivided into: a) biomass, waste tire combustion and solar thermal (25% of the funds, or about \$135 million); b) wind (13%, or \$70.2 million); and c) geothermal, small hydro, digester and landfill gas, and municipal solid waste (7%, or \$37.8 million). The new technologies category is intended to support new renewable electricity generation projects, which include facilities using a renewable resource technology that began generating electricity on or after September 23, 1996. This category is slated to receive over \$160 million. The emerging technologies category targets photovoltaic (PV) systems. Sixty percent (60%) of the category's \$54 million will go toward rebates for small PV systems (10 kW or less), with an additional 15% reserved for PV systems of 10-100 kW. Twenty-five percent (25%) will support systems of unlimited size. Rebates will reduce in size over time to encourage early use of the program.

The consumer-initiated projects category will fund rebates to consumers who choose to buy power from renewable energy sources (about 14% of the \$540 total, or \$75.6 million) or build renewable energy facilities and sell their generation (about 1%, or \$5.4 million). Renewables supported under this category include biomass, micro-hydro, geothermal, solar, and wind. In addition, between January 1998 and December 2001, California's Public Purpose Program will provide \$872 million for energy efficiency and conservation activities. These funds will be provided collectively by the states' major investor-owned utilities, with each contributing proportional to their customer base. The California Board for Energy Efficiency (an independent board created in October 1998) along with members appointed by the PUC are responsible for administering the funds.

Program Strengths and Weaknesses

California has made great strides in attempting to ensure the State effectively meets its energy needs in an environmentally sustainable manner. In particular, the enactment and implementation of California's SBC, the "Public Purpose Program," provides an excellent model for other states that seek to support research and development in renewable energy and energy efficiency and conservation. Through dedicating funds to existing, new and emerging renewable technologies, and consumer-initiated projects involving renewables, the Public Purpose Program takes a comprehensive approach to promoting renewable energy. Another strength of California's restructuring efforts is its strong disclosure and certification system. The independently governed "Green-e" certification system, pioneered by a non-profit organization, benefits both consumers and electricity providers. The successful implementation of the Sacramento Municipal Utility District's (SMUD) innovative green pricing programs also facilitated the development of clean energy in California. SMUD's programs have repeatedly demonstrated to other electricity producers that a sizeable market and sentiment exists for generating electricity from renewable resources.

Despite these great strengths, California's restructuring efforts have been somewhat constrained during the implementation stage. The State's lack of a RPS has kept some electricity suppliers

from using renewables. The exemption of non-utility generators from net metering requirements has provided no incentive for customers to purchase renewable systems to participate in net metering programs. Moreover, the lack of the opt-out aggregation approach has severely limited the potential for customer aggregation. Aggregators have had a difficult time signing up new customers (even though they have offered lower rates). Finally, California's consumer education campaign has been criticized for not effectively providing consumers with all the information they need to make fully informed electricity choices.

B. Connecticut

On April 29, 1998, Governor John Rowland signed RB 5005, Connecticut's electricity deregulation measure, into law. The bill will phase in electricity retail competition over a six-month period starting in January 2000. It will initially grant retail competition to electricity generation suppliers for 35% of consumers by January 2000 and then will expand retail competition to suppliers for all consumers by July 2000.

Background

Connecticut's restructuring legislation was designed to take into account consumer and environmental concerns in a deregulated electricity market. Connecticut also sought to go beyond merely enacting preventative measures—it put forth pro-active environmental measures to benefit its community. In particular, Connecticut is the first state to require its utilities to divest themselves of their nuclear assets. Under the State's electricity deregulation measure, all utilities were required to sell non-nuclear generation assets by January 2000 and interests in nuclear generation by January 2004. RB 5005 also guarantees an immediate 10% rate cut for all residential consumers. Significant environmental provisions, such as measures to reduce air pollution from power plants and increase the use of renewable energy, also play a role in Connecticut's attempt to construct a more environmentally and socially sustainable electricity sector.

Consumer Education

RB 5005 required the State's Department of Public Utility Control (DPUC) to establish a comprehensive education program. The principal objective of the program was to educate consumers about the implementation of retail competition among electric suppliers and how competition affects them. The primary goals of the program were to maximize the amount of public information available, minimize customer confusion and equip all customers with the ability to participate in a restructured electricity generation market. A Consumer Education Advisory Council, comprised of representatives from state regulatory bodies, environmental departments and agencies, community and business organizations, consumer groups and electric distribution companies, was established to determine what information the education effort should distribute to customers.

The Consumer Education Advisory Council identified the following information as important: customers' rights and obligations in a restructured environment; how customers can exercise their right to participate in retail access; the types of electric suppliers expected to be licensed including the possibility of load aggregation; electric generation service options that will be available; and the environmental characteristics of varying generation facilities. The consumer education and outreach program began in January 1998 and is being funded by a non-bypassable system benefits charge (SBC).

Customer Aggregation

The DPUC is currently proposing standards and procedures to facilitate the aggregation of electricity loads and the aggregation of end-use customers into buying groups. It was set to complete these activities by January 1, 2000.

Environmental Disclosure

Each electricity generation supplier must report to the Department of Public Utility Control (DPUC) and the Department of Environmental Protection its fuel mix by October 1, 1999, and annually thereafter. Fuel mix statements must include the percentage of the electricity supplier's production from facilities that use nuclear, oil, coal, natural gas, electric hydropower and other fuels (such as renewables) as their principal generation fuels. Connecticut's electricity suppliers must also disclose the amount of air emissions that are emitted from their facilities. Air emission statements must include the amount of volatile organic compounds (VOCs), nitrogen oxides (NO_x) sulfur oxide (SO_x), carbon dioxide (CO₂), carbon monoxide (CO), total suspended particulates (TSPs) and heavy metals. Statewide information on both fuel mix and air emissions must then be reported to Connecticut's General Assembly by January 1, 2000, and annually thereafter. Although fuel mix and air emissions need to be disclosed to state regulators and political bodies, there are no provisions within the restructuring legislation that requires fuel mix and air emissions to be disclosed directly to electricity consumers.

Emissions Standards

RB 5005 requires Connecticut's Department of Environmental Protection to develop "uniform performance standards" for electricity generation facilities supplying power to end-use customers in the state, whether the facilities are located in the state or elsewhere. These standards go beyond past emission requirements to ensure that all generation facilities are playing on a level field (older, coal-powered plants traditionally were favored by having to meet less strict emissions standards). New standards are designed to improve air quality to the greatest extent possible and further the attainment of meeting the National Ambient Air Quality Standards as promulgated by the U.S. Environmental Protection Agency (EPA).

Performance standards will limit the amount of air pollutants, including, but not limited to, nitrogen oxides (NO_x), sulfur oxide (SO_x), carbon dioxide (CO₂), carbon monoxide (CO), and mercury, emitted per MW of electricity produced. Provisions for emission standards may also include a program that would allow electricity generation facilities to purchase offsetting reductions in emissions and engage in emissions trading across facilities. RB 5005 requires that these uniform performance standards go into effect when at least three of the states that are participating in the northeastern states' Ozone Transport Commission (whose policies affect a population of approximately 27 million people) agree to adopt them.

Green Pricing and Certification

Connecticut's electricity restructuring legislation does not contain any standards that define or mandate that green pricing options be made available to electricity consumers. However, the legislation allows voluntary green pricing programs to be implemented by electric power suppliers.

Net Metering

The Department of Public Utility Control (DPUC) originally established net metering regulations for the State in 1990. DPUC's Ruling 159 required all electricity power suppliers to purchase net excess generation from qualifying facilities. This includes all facilities that have generation units of up to 50 kW capacity and for renewable generation units up to 100 kW capacity.

RB 5005 requires electric power suppliers to give residential customers a credit for the power that they produce using certain renewable technologies. To permit this, distribution companies must provide net metering services at their cost. An important drawback of this net metering provision is that residential customers must pay the competitive transition assessment and the system benefits charge based on their total, as opposed to net, consumption. RB 5005 states that these new net metering provisions will begin in July 1999.

Renewable Portfolio Standards and Set Asides

Connecticut's restructuring legislation contains a renewable portfolio standard (RPS) that is broken down into two different tiers. The first tier, "Class I" renewables consists of generation units powered via solar, wind, and/or sustainable biomass energy, as well as fuel cells. The second tier, "Class II," includes trash-to-energy facilities, biomass facilities that do not meet criteria for Class I renewable energy status, and certain approved types of hydropower facilities. The RPS preserves the existing level of renewables (for Class I and II combined) and promotes the development of Class I renewables in the future. Electricity suppliers must initially show the DPUC that 5.5% of their total electricity output will be generated from Class I or Class II renewables. The amount of electricity generated from those generation units or new generation units (either Class I or Class II renewables) must increase to 7% by July 1, 2009.

In addition, total electricity output from Class I renewables must equal at least 0.5% and rise incrementally by that amount until reaching 3% by 2006. After 2006, Class I renewables must provide an additional 1% of power per year until it reaches 6% by 2009. Thus by July 1, 2009, renewable power is projected to provide 13% of the state's electricity generation mix (7% for Class I or Class II renewables and 6% specifically for Class I renewables). An electric supplier may satisfy the requirements of the RPS by participating in a renewable energy-trading program approved by the state.

System Benefits Charge

RB 5005 includes a number of provisions to promote renewable energy and energy conservation through a non-bypassable system benefits charge (SBC). Connecticut's DPUC assesses a charge of 0.05 cents/kWh to each end-use consumer of electricity services (including residential, commercial, and industrial customers) in the state to fund investments in renewable energy technologies. The charge rises to 0.1 cents/kWh by July 2004. The revenue that is generated is deposited into the Renewable Energy Investment Fund (REIF), which will be administered by an independent, outside consultant. The REIF will be used to promote investment in renewable energy sources, and to foster the growth, development and commercialization of renewable energy technologies in Connecticut. The REIF will provide approximately \$14 million beginning in 2000 and \$30 million from 2004 on for the development of renewables. The DPUC has also established a 0.3 cents/kWh non-bypassable SBC, which is assessed to each end-use customer to fund energy conservation programs.

In addition, the restructuring legislation stipulates that electric distribution companies are required to establish an Energy Conservation and Load Management Fund (ECLMF) to be held separate from all other funds and accounts. The Energy Conservation Management Board was established to advise and assist electric distribution companies in the development and implementation of a comprehensive plan to carry out cost-effective energy conservation

programs and market transformation initiatives. The Energy Conservation and Management Board will administer the ECLMF. Overall, the two SBCs and the ECLMF are expected to raise more than \$109 million annually to fund energy conservation programs and the development of renewable energy technologies.

Program Strengths and Weaknesses

Connecticut's restructuring package has helped the State take a pro-active approach to achieve its environmental goals. Overall, the plan calls for divestment in nuclear energy, and movement from fossil fuels to renewable sources of energy. Connecticut is one of the few states to implement a renewable portfolio standard (RPS) and a system benefits charge (SBC). The two-tiered RPS (for Class I and Class II renewables) will ensure that by 2009, at least 13% of the State's electricity generation mix will come from renewables. The SBC creates a Renewable Energy Investment Fund (REIF), and an Energy Conservation and Load Management Fund (ECLFM) which will provide more than \$109 million annually to fund energy conservation programs and support the growth, development and commercialization of renewable energy technologies. Connecticut has also adopted "uniform performance standards" which set higher emission standards than those previously in place for all electricity generation facilities that supply power to customers in the State. These stricter standards ensure that restructuring does not add to the detrimental environmental effects of electricity generation. Both the State's extensive consumer education program and its expansion of net metering rules to allow customers to receive credit for the power they produce using certain renewable technologies have also proven to be successful.

A number of weaknesses, however, have kept Connecticut from fully realizing its environmentally sustainable energy goals. Though electricity suppliers are required to disclose their fuel mix and emissions characteristics to state agencies, they are not required to pass this information on to consumers. This has limited the electricity customer's ability to make informed decisions about their power usage and provider. Additionally, although the net metering rules were expanded, customers must pay the transition and system benefit fees based on their total, rather than net, consumption. This has dampened the incentive for consumers to purchase renewable systems and engage in net metering. Finally, although Connecticut does allow for aggregation, aggregators cannot hold default provider status. As a result, aggregation has not been nearly as successful as it was intended to be.

C. Illinois

On December 16, 1997, Illinois Governor Jim Edgar signed three bills that are generally considered to comprise the State's electricity sector deregulation package. HB 362, the Electric Service Customer Choice and Rate Relief Act of 1997, the core legislation, was written collaboratively by a broad range of interests, including consumer groups, municipal electric utilities, investor-owned electric utilities (IOUs), electric cooperatives, the Illinois Commerce Commission, and other government bodies.

Background

The Illinois Commerce Commission (ICC) has traditionally regulated Illinois' electricity rates and service. Prior to electricity restructuring legislation, Illinois had virtually no environmental provisions attached to electricity generation or use. This was largely due to the fact that the State had consistently generated more electricity than it needed. As a result of this extra electricity capacity, the ICC had little impetus to engage in any sort of energy conservation programs that would be environmentally beneficial. With the advent of electricity restructuring, however, Illinois has sought to address some of its environmental shortcomings and promote a more sustainable electricity sector.

In particular, Illinois' restructuring package has focused on ensuring benefits for residential electricity consumers and the environment as a whole. The Electric Service Customer Choice and Rate Relief Act cut customer rates by 15% for users of ComEd and Illinois Power (the largest electricity power suppliers in the State) beginning in August of 1998. Customers of those large utilities are to receive an additional 5% rate cut in their electricity prices by 2002. At the time, those rate reductions represented the largest in the U.S. In addition, smaller utilities in Illinois will phase in a 5% rate cut in electricity prices for their customers by 2002. HB 362 stipulated some choice in electricity supplier for the commercial and industrial sectors by 1999, and for all customer classes by May 2002. The law also includes environmental disclosure provisions and establishes trust funds to help promote the development of renewables and energy conservation measures.

Consumer Education

Illinois has sought to advance consumer education in a restructured market by establishing a consumer-oriented working group. This group, which includes representatives from electric utilities, residential customers, small businesses, alternative suppliers and the Illinois Commerce Commission (ICC), was brought together to develop an information packet that will be distributed to all residential and small commercial customers before they become eligible to purchase power in the competitive market.

The information packet, which will be available in 2000, will discuss the following issues in the context of a restructured electricity market: consumer rights, risks and responsibilities; the legal obligations of alternative suppliers; the different types of products and services that may be offered; the meaning of the various components of unbundled electricity bills; and the procedures for filing complaints against alternative suppliers. Consumers may seek additional information from the ICC as well.

Customer Aggregation

HB 362 allows customer groups to aggregate electrical power purchases at bulk rates. Electric utilities must allow such aggregation for any voluntary grouping of customers, including those having a common agent with contractual authority to purchase electric power and energy and delivery services on behalf of all customers in the grouping. In these instances, customers must affirmatively make the decision to engage in aggregation (opt-in). Aggregation groups may not require consumers within their jurisdiction to purchase generation services from that entity.

Environmental Disclosure

The Electric Service Customer Choice and Rate Relief Act requires all retail suppliers of electrical power generation to submit disclosure statements regarding fuel mixes and emissions to the ICC and electricity consumers. In particular, both consumer electric bills and quarterly reports to the ICC must show a break-down of the generation percentages for various technologies, including solar thermal, photovoltaic, wind, biomass, hydropower, coal, natural gas, nuclear, oil, and alternative fuels. To simplify this information, the percentage breakdowns and categories must be visually shown in the form of a pie chart. In addition, retail electricity suppliers must provide electricity consumers and the ICC with tables which disclose the amount of carbon dioxide (CO₂), nitrous oxides (NO_x), and sulfur dioxide (SO₂) emissions associated with their method of power generation.

Illinois restructuring legislation has also gone beyond mere emissions disclosure. The State's disclosure provisions also require electricity suppliers to disclose the amounts of high- and low-level nuclear wastes that are created in power generation. Finally, HB 362 also requires that all of the information that must be disclosed by retail suppliers be listed on the ICC's web page to ensure the availability of timely and accurate information for electricity consumers.

Emissions Standards

HB 362 does not contain any provisions that specifically address air emissions standards. In accordance with existing legislation, electricity providers will remain subject to the emissions regulations that have already been established by state and federal agencies.

Green Pricing and Certification

Illinois' electricity restructuring legislation has not adopted any standards that either define green pricing options or require that they be made available to electricity consumers. It does, however, allow power suppliers to implement their own individual green pricing programs on a voluntary basis.

Net Metering

HB 362 does not include any measures that allow for net metering. Under HB 362, electric utilities must allow consumers the option of generating their own power, but the bill contains no provision which would require electricity suppliers to buy excess power back from self-power generating consumers.

Renewable Portfolio Standards and Set Asides

Illinois' restructuring legislation does not include any provisions that establish a renewable portfolio standard (RPS).

System Benefits Charge

Illinois has been particularly successful in establishing a system benefits charge (SBC) to help the State meet its energy needs in a more environmentally-sustainable manner. HB 362 created a non-bypassable SBC which will provide financing for two renewable energy and energy conservation trust funds. The Renewable Energy Resources Trust Fund was designed to promote the development of renewable energy resources, including: active solar water heat; active solar space heat; solar industrial process heat; solar thermal electricity; photovoltaics; wind; biomass; hydro-electric (that does not include further dam construction); and geothermal. The fund, which is administered by Illinois' Department of Commerce and Community Affairs, provides financial support for the development of renewable energy largely through project grants and loans. Revenue will be collected from monthly charges that include a flat amount of 0.05 cents a month from residential electric and gas customers, a flat amount of 0.5 cents a month from nonresidential customers with peak demands below 10 megawatts and gas usage below 4,000,000 therms, and a flat amount of \$37.50 a month from large, nonresidential customers.

Total revenue from these charges is expected to amount to \$100 million over ten years. The Renewable Energy Resources Trust Fund will receive half of this revenue to support and develop renewable resources. The other half will be deposited in an existing fund to be distributed according to the Illinois Coal Technology Development Assistance Act. Illinois has also established a long term Energy Efficiency Program that funds projects to improve energy efficiency. This 10-year program will include window replacements, appliance replacements, efficient lighting, and insulation in homes and rental properties for residential customers. The program will be budgeted at \$3 million per year and will be funded through an assessment levied on each generator based on their percentage of the state's total kilowatt-hour sales for the year. Although municipal utilities and cooperatives may opt in or out of the Energy Efficiency Program, they must participate in the program in order to receive benefits.

Additionally, Illinois was particularly innovative in establishing the State's Clean Energy Community Trust. In June 1999 the State Legislature passed SB 24, which allocates \$250 million from the sale of a Commonwealth Edison fossil fuel plant toward this trust fund. Illinois' Clean Energy Community Trust will provide financial support and assistance for programs that benefit the public by improving energy efficiency, developing renewable energy resources, supporting other energy-related projects that improve the State's environmental quality, and supporting projects intended to preserve and enhance Illinois' natural habitats and wildlife areas. A non-profit organization, the Environmental Policy and Law Center, was chosen to manage this important trust fund.

Program Strengths and Weaknesses

Prior to electricity restructuring, Illinois had almost no environmental provisions attached to electricity generation and its use. The State's restructuring efforts, however, have provided the impetus for a new commitment to taking the environmental concerns associated with electricity generation and use into consideration. Electricity suppliers must now disclose information regarding their fuel mix, emissions, and nuclear waste to all regulatory bodies and electricity consumers. Moreover, this information must be supplied graphically in an easy to understand format (such as a pie chart for showing fuel mixes). This information must also be supplied on the Illinois Commerce Commission web page. This will help Illinois' electricity consumers to

make more informed choices regarding their electricity usage and choice of power providers. Illinois has also established a system benefits charge (SBC) to support renewable energy and energy efficiency. The Renewable Energy Resources Trust Fund (budgeted at \$5 million annually) and the Energy Efficiency Program (budgeted at \$3 million annually) will finance these activities for a period of at least ten years. Additionally, Illinois has established an innovative trust fund, the Illinois Clean Energy Trust, from the sale of a fossil fuel electric generation facility. That trust fund will provide \$250 million to the development of renewables, energy efficiency, habitat enhancement and wildlife preservation projects. A non-profit organization will manage this trust fund for the benefit of Illinois' citizenry.

Despite these efforts, a number of shortcomings have become apparent as Illinois attempts to implement its restructuring plan. The omission of a renewable portfolio standard (RPS) from its restructuring package has hindered efforts to move toward more environmentally sustainable energy resources. The lack of net metering provisions has dissuaded consumers from purchasing renewable energy systems for the purpose of net metering. In addition, by not providing uniform or stricter emission standards, Illinois has left the status of air emissions associated with restructuring uncertain. There are no assurances that pollutant emissions will not increase with subsequent negative impacts on the environment and human health. Finally, Illinois' efforts to promote customer aggregation have been hampered by the State's lack of a default aggregator provision. As result, many residential customers who could benefit from aggregation will not receive the program's advantages. Finally, much of the electricity generation in Illinois is generated with nuclear power. Illinois failed to take advantage of phasing out this source with its restructuring legislation. Nuclear power plants will now be decommissioned as the plants wear out and approach their licensing periods.

D. Maine

On May 29, 1997, Governor Angus King approved LD 1804 entitled An Act to Restructure the State's Electric Industry, opening up Maine's electricity market to retail competition starting on March 1, 2000. Maine's Public Utilities Commission (PUC) will hold proceedings throughout 1999 to refine policies related to the implementation of the State's restructuring act.

Background

Maine's Public Utilities Commission (PUC) has traditionally regulated Maine's electricity rates and service. Under the direction of the PUC and the state legislature, Maine has been an innovator in meeting its energy needs in a sustainable manner. Indeed, prior to electricity restructuring, Maine received 50% of its electric power generation from renewable energy resources (mostly from hydroelectric power and biomass). This remains by far the largest percentage of power generated from renewables by any state in the U.S. Prior to LD 1804, renewable fuel generation in Maine was regulated under the "Small Power Production Act," the State's own "mini-PURPA," which required that a discussion of renewable generation be included in the proceedings whenever generation contracts with suppliers were made, renegotiated or bought out. Demand-side management (DSM), or energy conservation, considerations were also initially included in utility rate cases, and later through annual separate alternative rate making proceedings.

When Maine originally began negotiations to deregulate the generation sector of its electric industry in 1993, the concerns were primarily financial in nature. Environmental concerns began entering the proceedings in 1995 when Maine's state legislature set up an advisory and research group to consider the potential environmental impacts of restructuring. The PUC was also charged with conducting its own study that included environmental issues. In order to ensure that restructuring did not worsen environmental conditions within the State, Maine adopted strong consumer education, disclosure, and renewable portfolio standard (RPS) requirements.

Consumer Education

In order to facilitate consumer education, the PUC selected a communications contractor, NL Partners of Portland, Maine to assist with the planning, execution and evaluation of the Consumer Education Program. The PUC also organized the Electric Choice Consumer Education Advisory Panel, which included representatives from electric utilities, low-income groups, senior citizen and community-based organizations, residential and non-residential consumers, and Maine's Office of the Public Advocate, to investigate and recommend methods to educate the public about retail access and its impact on consumers. Together, the PUC, NL Partners of Portland, and the Advisory Panel addressed the funding levels needed for adequate educational efforts, the aspects of retail access on which consumers need education, the most effective means of accomplishing consumer education, the appropriate entities that would conduct education efforts, and other relevant issues regarding consumer education.

In July 1999, Maine's PUC adopted the Comprehensive Plan for the Electricity Retail Access Consumer Education Program. The new Comprehensive Plan is a slight modification of Maine's initial Work Plan (adopted in August of 1998). It calls for a residential direct mail primer and a small business primer, the creation of a Community Outreach Assistance Fund (to help reach especially "hard-to-reach" consumers) and increased funding for Regional Outreach

Coordinators as well as the overall advertising budget. The education program sought to target residential consumers and included surveys to evaluate the extent to which consumer education was successful. PUC also increased the funding level of the education program from approximately \$1.2 million to \$1.5 million, while preserving about \$100,000 of the total authorized program funding as a contingency fund.

Customer Aggregation

When retail access begins, consumers may voluntarily aggregate in any manner they choose. However, if a public entity serves as an aggregator, it may not require consumers within its jurisdiction to purchase generation service from that entity (this is the opt-in approach to aggregation).

Environmental Disclosure

In February 1999, the Public Utilities Commission (PUC) adopted provisions (Chapter 306) requiring competitive electricity providers to disclose prices, resource mix and emissions information to customers in a uniform format. Electricity power providers, not including aggregators and brokers, must provide this information to all customers with a demand of 100 kilowatts or less, and to larger customers upon request. Each electricity supplier must provide a label for each price or product offered which contains information on the fuel mix and emissions characteristics associated with the provider's resource portfolio. These will be determined using market settlement data provided by the regional Independent System Operator (ISO). The label must include percentages of biomass, coal, hydropower, municipal solid waste, natural gas, nuclear, oil, solar, wind and other renewables. Carbon dioxide (CO₂), nitrogen oxides (NO_x) and sulfur dioxide (SO₂) emissions must also be included on the label.

The PUC, in consultation with Maine's Department of Environmental Protection, reserves the right to determine whether additional pollutants should be disclosed. Emissions will be computed as an annual emission rate in pounds per kWh, and compared to New England's regional average emissions rate. Providers must provide the information labels to customers prior to the installation of electrical service, on a quarterly basis (with their billing information) and upon request. Each provider must verify the accuracy of their fuel mix and emissions information annually with the PUC.

Emissions Standards

Maine's restructuring plan does not contain any specific provisions regarding the emissions standards of electric power generators. Electricity power suppliers will remain subject to the emissions regulations established by state and federal agencies.

Green Pricing and Certification

LD 1804 does not include any rules to establish a state-led green pricing program. However, the legislation does not hinder individual electric power providers from offering their own green-pricing programs. Various electricity power suppliers, including Green Mountain Power and several qualifying facilities, have expressed substantial interest in offering voluntary green pricing programs in Maine.

Net Metering

The State's restructuring plan does not contain any measures relating to net metering requirements. Since 1987, however, Maine's Public Utilities Commission Code has called for net metering between electricity power providers and consumers. The PUC's Code regarding net metering, known in Maine as "net billing," requires electricity power suppliers to purchase net excess generation from qualifying facilities with a maximum generation capacity of up to 100 kW. Electricity power suppliers must purchase net excess power generation from qualifying facilities at their avoided cost rate (rather than the retail rate of electricity). There is also no statewide limit to the power capacity allowed for net billing.

Renewable Portfolio Standards and Set Asides

LD 1804 included a renewable portfolio standard (RPS) that is consistent with Maine's leading role in using renewable energy resources. Under Maine's original restructuring legislation, a RPS of 30% (known in Maine as the "eligible resource portfolio requirement") was established. The RPS would have required electricity power suppliers to generate at least 30% of their overall power via renewable resources. However, Maine's RPS was amended in May 1999 through a separate bill, LD 2154, to apply the 30% standard on a product-wide basis. The new legislation now requires each product offered by every electricity provider to meet this new 30% renewables floor. Under restructuring legislation, renewable resources are defined as the total power production capacity not exceeding 100 MW and relying on fuel cells, tidal power, solar, wind, geothermal, hydroelectric, biomass, or municipal solid waste generators. LD 2154 retained the state's 100 MW limit for hydropower, but will consider setting a higher limit for hydro generation in 2000. The environmental implications associated with large hydroelectric facilities would make this a regressive step in Maine's promotion of environmentally benign renewable energy resources.

Maine presents an interesting case because the state already has the highest percentage of renewable energy use in the country, at over 50% of total generation (mostly hydroelectric power and biomass). This high percentage of renewables (50%) relative to the State's RPS (30%) may be a threat to promoting the development of renewable technologies. Some have argued that this low RPS may deter investments in renewables in the future. Recently, it has been proposed that the New England region develop a collective RPS with tradable credits. Under such a scenario, Maine could sell the credits it earns from its excess renewable energy generation to support the continued use of that renewable generation.

System Benefits Charges

Maine's electricity restructuring legislation does not include a mandatory system benefits charge (SBC).

Program Strengths and Weaknesses

Maine's restructuring package continues to advance the State's long-standing commitment to meeting its energy needs in a way that does minimal impact to the environment. In particular, the State's renewable portfolio standard (RPS), known as the "eligible resource portfolio requirement," requires power providers to generate at least 30% of all their power via renewable resources. It is important to note that this strong RPS has been amended so that the 30% standard must be met on a product-wide basis, providing a 30% floor for all electricity

generation. Maine has also implemented a disclosure system that requires power providers to supply their customers with information labels that display fuel resource mix and emissions breakdowns. Understandable and uniform information labels will help electricity customers make more informed decisions. Maine's inclusive Consumer Education Program is also noteworthy. Consumer education is facilitated by an independent communications contractor, in conjunction with the State's Public Utilities Commission and the Electric Choice Consumer Education Advisory Panel (which includes representatives from low-income, senior, and community-based organizations). The group has put forth a plan for consumer education that targets residential and small business customers. The plan also creates a fund to target "hard-to-reach" consumers in the community.

There are a number of weaknesses in Maine's restructuring efforts that impair its ability to meet its environmental goals. The lack of a system benefits charge is a substantial omission. Research has shown that renewables, energy efficiency, and conservation measures need financial support to promote their development. Without an SBC, such development is severely hindered. Although Maine has a net metering program, known as "net billing," electricity customers only receive the power providers avoided cost rate (rather than the retail rate) for their excess generation. This serves as a disincentive to participate in the net metering program. In addition, the State's aggregation program does not allow aggregators to hold default provider status, meaning aggregators will have a difficult time signing customers. Maine has also not strengthened its emissions standards with their restructuring package.

E. Maryland

Governor Parris Glendening signed Maryland's electricity restructuring legislation, SB 300, into law on April 8, 1999. SB 300, the Electric Customer Choice and Competition Act, phases in deregulation over a 3-year period. The law states that on July 1, 2000, one-third of residential customers shall have the opportunity to choose an electricity provider. All industrial and commercial customers shall be afforded consumer choice on January 1, 2001. The percentage of residential customers that are afforded choice shall increase to two-thirds by July 1, 2001, and all customers will be afforded choice by July 1, 2002.

Background

Maryland's Public Service Commission (PSC), which was responsible for regulating the State's electric utilities, has taken a very cautious approach to electricity restructuring. The PSC's 1995 Regulatory Policy Order displayed this approach, stating that it believed the conditions needed to ensure a competitive market did not exist. In 1996 the Commission revised its stance, stating that it would investigate and make recommendations regarding how Maryland customers could best benefit from electricity restructuring. In 1997 utilities were required to submit restructuring plans which set in motion the process for electricity restructuring that has continued in the rule-making phase of SB 300.

Maryland's initial caution with electricity restructuring is the result of the position in which the State finds itself. Overall, Maryland's electricity rates are equal to or below national and regional rates and the PSC was unsure whether the State's residents would benefit economically from a restructured market. Thus, the PSC's primary concern the potential economic impacts of restructuring. Moreover, although electric power suppliers in Maryland may benefit economically from a deregulated electricity market (through wheeling power to high-cost markets), uncertain environmental impacts could negatively affect the state. Maryland has attempted to account for these customer and environmental concerns by guaranteeing a 3% to 7.5% rate decrease for residential customers (over the first four years of restructuring) and by providing mechanisms to ensure that the environmental effects of restructuring are not detrimental.

Consumer Education

The Electric Customer Choice and Competition Act requires the Public Service Commission (PSC), in conjunction with the Office of the People's Council (OPC) and other parties, to order each electric distribution company to implement a consumer education program informing their customers about the restructuring of the electric industry. As part of the consumer education program, Maryland's Division of Consumer Protection of the Office of the Attorney General will develop and maintain a pool of information regarding rates and services for the small commercial and residential electricity consumers.

While orders and regulations on the consumer education programs are forthcoming, the PSC has noted that the information provided in these programs needs to be uniform and readily understandable to consumers. The information must provide a comparison of the different rates and services among electricity suppliers of similar products. The PSC shall issue its final orders or adopt its regulations regarding consumer education before the initial implementation of

customer choice (on July 1, 2000). Electricity providers will be required to engage in consumer education programs through June 30, 2002.

Customer Aggregation

Maryland's restructuring law defines aggregators as an entity or an individual that acts on behalf of a customer to purchase electricity. This definition does not include an entity or individual that purchases electricity for its own use or for the use of its subsidiaries or affiliates, a municipal electric utility serving only in its distribution territory, or a combination of governmental units that purchases electricity for use by the governmental units. SB 300 does not contain any other provisions regarding aggregation.

Environmental Disclosure

Under SB 300, the PSC requires each electricity supplier to disclose its fuel resource mix and emissions produced from power generation. A common, uniform set of information must be submitted to the PSC and customers every six months. Fuel mix information must include amount produced from coal, natural gas, nuclear, oil, hydroelectric power, solar, biomass, wind, and other resources. Information about regional fuel mix averages must also be provided to allow customers to compare their electricity service provider against a regional baseline.

The PSC has yet to decide on which air emissions must be disclosed. At the very least, electricity suppliers will have to submit information regarding the levels of carbon dioxide (CO₂), nitrogen oxides (NO_x) and sulfur dioxide (SO₂). The PSC may suggest other emissions to be listed. The PSC has not yet set rules for the format in which fuel mix and emissions information is to be disclosed.

Emissions Standards

Electricity providers in Maryland must pool their resources to conduct a study that tracks shifts in generation and emissions as a result of the restructuring of Maryland's electric industry. The study must be submitted to the Maryland's Department of Environment and the Public Service Commission (PSC) one year after the initial implementation of customer choice (the report is due on July 1, 2001). The Department of Environment and the PSC will review the study and determine whether deregulation will impose a higher emissions burden on Maryland. If they decide it will impose higher emissions, these agencies are to study the "appropriateness, constitutionality, and feasibility" of establishing an air quality surcharge or other mechanisms to protect Maryland's environment and the health of its residents.

Green Pricing and Certification

SB 300 has not adopted any standards defining or mandating green pricing options in Maryland. Electric generation companies, however, may offer voluntary green pricing programs for their customers.

Net Metering

The Electric Customer Choice and Competition Act does not contain any provisions specifically regarding net metering. Maryland does have an existing net metering law, however that allows net metering for residential utility customers with qualified solar energy systems of up to 80 kW. Utilities are required to install the meter and offer net metering services at no additional charge

or rate to customers. Net generation is calculated on a monthly basis in sync with the normal billing cycle. Under the current net metering law, the electricity a customer generates is subtracted from his or her bill. However, if the customer generates power over and above what he or she uses within the billing cycle, the utility does not pay for the excess power. (The PSC is currently reconsidering this provision). Statewide net metering capacity is limited to 34.7 MW, which is equivalent to 0.2% of projected 1998 statewide peak electricity demand.

Renewable Portfolio Standards and Set Asides

Maryland's restructuring efforts are currently looking at the inclusion of a renewable portfolio standard (RPS) to promote renewables and energy conservation. SB 300 currently requires investor-owned electric utilities to continue to offer the same percentage of electricity from renewable energy sources, at a "reasonably comparable cost," as the company provided in 1998. The legislation defines "renewable energy resources" as any of the following: solar, wind, tidal, geothermal, biomass (including waste-to-energy and landfill gas recovery), hydroelectric facilities, digester gas, and manufacturing of commercial waste-to-energy systems or facilities.

The PSC, in consultation with the Maryland Energy Administration, reported this year to the Governor and the General Assembly on the feasibility of requiring a renewable portfolio standard (RPS) in the state's restructuring rules. The parties are considering a variety of alternatives, including the possibility of implementing a two-tiered RPS. The assessment submitted by the parties will estimate the costs and benefits of adopting a RPS in Maryland.

Systems Benefits Charge

Prior to its restructuring legislation, Maryland had already established an Environmental Trust Fund, financed through a non-bypassable system benefits charge (SBC). The fund started on January 1, 1972, at a rate of 1 mill per kWh. Under the new restructuring law, this trust fund is maintained and is not to exceed a charge of 1.5 mills per kWh, or \$1000 per month for each retail customer, whichever is less. It is estimated that the total funds collected from the SBC will amount to approximately \$9 million per year. The Environmental Trust Fund will be utilized to fund research and development activities that support power plants designed to minimize environmental impacts. A total of no more than \$250,000 a year is also dedicated to funding the activities of the Maryland Energy Administration. The Public Service Commission (PSC), with the approval of the State General Assembly, may amend the amount of the Environmental Trust Fund surcharge on power generation.

Program Strengths and Weaknesses

Maryland's cautious approach to restructuring has allowed the State the time to consider the environmental impacts associated with the movement towards a competitive electric sector. The State requires its electricity suppliers to work in concert to prepare a report tracking the emissions impact of restructuring on Maryland's environment. This report will then be submitted to the relevant regulatory bodies to decide on whether to act on behalf of the State's environment and the State's residents. Maryland has also frozen the percentage of energy which utilities generate from renewable resources to their 1998 levels while it considers the inclusion of a renewable portfolio standard (RPS) in its restructuring package. Maryland also increased the amount of funding given to its Environmental Trust Fund through a system benefits charge

(SBC). The fund will continue to finance research and development activities to minimize the environmental impacts of electric power generation.

Overall, however, Maryland is expected to encounter many difficulties in implementing its restructuring package and fulfilling its environmental goals. This is largely due to the duality of its restructuring provisions. Although Maryland requires the disclosure of fuel mix and emission levels associated with power generation, electricity suppliers are allowed to disclose the regional emissions rather than that of their own generation. This defeats the intent of disclosure measures which is to supply customers with the environmental characteristics of individual supplier's generation portfolios, thus helping them make informed decisions regarding their energy usage and provider. Maryland's net metering efforts also display this duality. While net metering targets renewable energy sources, there are little incentives to join the program. Customers are not compensated in any for the excess electricity they generate. Moreover, the statewide net metering capacity is very limited. The State's Environmental Trust Fund does not explicitly target money for the research and development of renewable energy resources and technologies. This is a significant omission that could hinder the State's efforts to protect and enhance its environment. Maryland also does not mention customer aggregation in its restructuring package, and thus far no action has been officially taken regarding stricter air emissions or the establishment of a RPS. These findings indicate that although Maryland is still in the initial stages of implementing its restructuring package, a number of weaknesses have already surfaced.

F. Massachusetts

In November 1997, Massachusetts' Acting Governor Paul Cellucci signed into law HB 5117, entitled, An Act Relative to Restructuring the Electric Utility Industry in the Commonwealth, Regulating the Provision of Electricity and Other Services, and Promoting Enhanced Consumer Protections Therein. Under Massachusetts' deregulation bill, all electricity consumers were allowed to select their own power company starting in March 1998.

Background

The Massachusetts Department of Telecommunications and Energy (DTE) began its efforts to open up the state's electric utility industry to competition in December 1996. Soon after HB 5117 was passed by the Massachusetts state legislature and signed by the Governor, the DTE issued its "Rules Governing the Restructuring of the Electric Industry" on February 20, 1998. The issuance of these rules culminated a three-year process in which DTE, along with the state legislature, the Attorney General, the Division of Energy Resources (DOER) and key industry participants developed the guidelines to govern the restructured electric industry.

The overall purpose of the rules was to provide a regulatory framework for an efficient industry structure to minimize the costs to electricity consumers while maintaining safe and reliable electric services that do not have detrimental effects on the environment. These goals were kept in HB 5117. In order to ensure that consumers benefit from restructuring, HB 5117 reduced electricity rates by 10% beginning on March 1, 1998, and called for another 5% rate cut within 18 months of the first reduction. This gives electricity customers an aggregate rate reduction of 15%. HB 5117 and the rules enacted by DTE to implement its provisions also provide other measures to enhance consumer choice and protect the environment.

Consumer Education

Massachusetts' Division of Energy Resources (DOER) is the primary agency in charge of consumer education activities related to electricity restructuring. In accordance with HB 5117, DOER has provided various educational materials and a toll-free hotline for customers on the price of power generation, the length and kind of contract, fuel mixes and power generation sources, and the level of air emissions associated with generation. Educational services were approved by the Department of Telecommunications and Energy (DTE) to ensure they did not duplicate educational or consumer protection services that were already provided by DTE's Consumer Division. The DOER is also required to recommend when the termination of its educational activities should occur based on the status of electric utility restructuring or the public interest.

Customer Aggregation

HB 5117 defines an aggregator as "an entity which groups together electricity customers for retail sale purposes, except for public entities, quasi-public entities or authorities, or subsidiaries of these public or quasi-public entities or authorities, or subsidiary organizations thereof." Municipalities (city and county governments) may offer the "opt-out" type of aggregation. However, non-municipality aggregators must affirmatively register their customers (known as the "opt-in" method of aggregation). As of November 1999, the State has yet to approve any municipality aggregator plans, and is still working out many of the details of exactly what kind

of opt-out aggregation is allowable. Any aggregator, whether municipality or non-municipality, can apply to receive energy efficiency funding through the system benefits charge.

Environmental Disclosure

According to Massachusetts' restructuring legislation and rules, each competitive electricity supplier and distribution company providing standard or default generation service must disclose, in label format, information on its fuel mix and emissions for all retail customers. Labeling must provide information on the percentages of the following power sources: biomass, coal, large hydroelectric, small hydroelectric, municipal trash, natural gas, nuclear, oil, solar, wind, and other renewables. The following emissions must also be included on the label: sulfur dioxide (SO₂), nitrogen oxides (NO_x), carbon dioxide (CO₂), and heavy metals. Additionally, electricity suppliers must show how the emission rates from their generation sources compare to the regional average and to the emission rates of new generation units. The DTE, in conjunction with other agencies, may include any other emission data that it determines (through sufficiently accurate and reliable data) can cause significant health or environmental impacts.

HB 5117 also requires electricity providers to disclose generation price and contract length and terms of service on their information labels. In addition, electricity providers must note the percentage of unionized and replacement workers that the company's generation facilities employ in power generation.

Emissions Standards

Massachusetts is enacting stricter emission standards to ensure that electricity restructuring will not negatively affect the environment. The Department of Environmental Protection (DEP), in conjunction with the Attorney General, will promulgate standards for any pollutant determined by the DEP to be of concern to public health, and produced in quantity by electric generation facilities. These pollutants include: sulfur dioxide (SO₂), nitrogen oxides (NO_x), carbon dioxide (CO₂), carbon monoxide (CO), particulate matter, volatile organic compounds (VOCs), and heavy metals.

DEP must draw up standards for at least one of these pollutants by 2003 or earlier if standards are adopted by three other northeast states. In addition, HB 5117 allows the DTE to assess the operator of each existing and proposed state nuclear power plant for costs up to \$90,000 per year per facility incurred by the department's radiation control program during the previous fiscal year. Revenue collected from this assessment will be put into the general fund and credited to the DTE.

Green Pricing and Certification

HB 5117 does not include any legislation or rules that establish a green pricing program throughout the state for electricity customers. There are no laws or rules, however, under restructuring that impede electric power producers from offering voluntary green pricing options for retail customers.

Net Metering

Massachusetts' restructuring legislation does not contain any measures directly related to net metering. In 1982, however, Massachusetts mandated that net metering be made available to all

customer classes in the State. Under that mandate, qualifying facilities were defined according to the Public Utilities Regulatory Policy Act (PURPA) and the Federal Energy Regulatory Commission (FERC) rules, and included renewable energy and other generation systems. These existing net metering provisions allow qualifying facilities with generation capacity levels of 30 kW or less to be eligible for the net metering program. Under Massachusetts' net metering program, net excess generation must be purchased by electric providers at the utility's avoided cost rate. In addition, there is no statewide limit to the overall net metering capacity.

Renewable Portfolio Standards and Set Asides

Prior to electricity restructuring, Massachusetts generated approximately 6 to 7% of its electricity from renewable energy resources. HB 5117 instituted a renewable portfolio standard (RPS) designed to promote the continued development of new renewables in the future. Under Massachusetts' restructuring legislation, eligible renewable energy technologies include solar photovoltaics, solar thermal, wind, ocean wave or tidal, fuel cells using renewable fuels, landfill gas, waste-to-energy plants, naturally flowing water and hydroelectric facilities, and advanced biomass power conversion systems.

HB 5117 charges the State to receive an additional 1% of its electricity sales from new renewables starting in 2003 or within one year of any renewable technology being within 10% of the competitive market price. This amount is scheduled to rise by an additional 0.5% per year through 2009, increasing to 1% per year thereafter (until a date determined by the Division of Energy Resources (DOER)). According to this RPS plan, Massachusetts will receive approximately 14% of its energy from renewables by 2010, and almost 25% by 2020. Tradable renewable credits cannot be used under the current legislation.

System Benefits Charge

Massachusetts' restructuring legislation sought to support existing and renewable energy technologies through establishing the "Renewable Energy Trust Fund." The fund, financed through a non-bypassable system benefits charge, will provide grants and loans for the development of all eligible renewable technologies. It will also be used to finance special grants to help municipalities and other governmental bodies pay for pre-existing renewable energy and waste-to-energy technologies. Additionally, funds can be used for investment by distribution companies in renewables and distributed generation opportunities and for appropriate joint energy efficiency and renewable projects.

The Renewable Energy Trust Fund will be financed at a total of roughly \$150 million over a five-year period. The fund will be financed with approximately \$20 million per year for an undefined period beyond 2002, pending legislative approval. HB 5117 establishes the following schedule of charges for the Renewable Energy Trust Fund: 0.075 cents per kilowatt-hour (kWh) in calendar year 1998; 0.1 cents per kWh in 1999; 0.125 cents per kWh in 2000; 0.1 cents per kWh in 2001; 0.075 cents per kWh in 2002; and 0.05 cents per kWh in each calendar year thereafter. The restructuring legislation also mandates an additional five-year funding totaling roughly \$500 million for energy efficiency investments. An outside consultant will oversee administration of the trust fund with assistance by the Division of Energy Resources (DOER) and an advisory committee.

HB 5117 also requires the Massachusetts Department of Revenue to issue a report on the potential revenue effects of proposed state income tax deductions for either the purchase of renewable energy equipment above the states renewable energy portfolio requirements or for the purchase of energy-efficient equipment.

Program Strengths and Weaknesses

Massachusetts has lead the way in many environmentally progressive restructuring efforts. It is the first state to begin implementing both a renewable portfolio standard (RPS) and a system benefits charge (SBC). The ambitious RPS, designed to promote the development of renewables, puts the State on track to receive 14% of all its energy from renewable resources by 2010, and almost 25% by 2020. The SBC finances the Renewable Energy Trust Fund at a rate of \$150 million over a five-year period for the development of renewables. It also provides \$20 million dollars per year after the initial five-year period (pending legislative approval). An additional five-year funding total of \$500 million is available for energy efficiency improvements. Massachusetts is also the first state to allow “opt-out” aggregation for its municipal aggregators. This will allow these aggregators to sign up customers much more easily, and therefore offer greater choices and lower prices. Massachusetts also has a strong consumer education program and a robust disclosure program. The disclosure program requires power providers to disclose to all their retail customers in label format the fuel mix and emissions characteristics of their generation resources, as well as whether the company operates under a collective bargaining agreement and uses replacement workers. Overall, the dissemination of this information will allow consumers to make informed decisions regarding their electricity usage and provider.

Although Massachusetts’ restructuring efforts are progressive, there are a number of obstacles to achieving its environmental goals. The State’s new emission standards are weak. While the state must set stricter emission standards, it is only required to do so for one pollutant by 2003. Additionally, although Massachusetts offers opt-out aggregation for cities and counties, other potential aggregate groups are limited to the more restrictive opt-in type of aggregation. Finally, Massachusetts’ net metering achievements have been limited. Only facilities with a generation capacity of 30 kW or less can qualify and customers can only receive the utility’s avoided cost (rather than retail rate) for their excess generation. These limitations have reduced consumers’ incentive to purchase renewable systems and enter into net metering programs.

G. New Jersey

New Jersey's electricity restructuring law, AB 16, was enacted by the New Jersey State Legislature on January 29, 1999, and signed by Governor Christine Todd Whitman on February 9, 1999. The Electric Discount and Energy Competition Act allows all electricity consumers to shop for their electric supplier by August 1999. Full implementation of the act is expected to be in place by December 31, 1999.

Background

New Jersey has welcomed electricity deregulation as an impetus to address the high electricity costs that exist in the State. Lowering New Jersey's historically high energy prices and improving the State's competitive position in regional, national and international markets has been New Jersey's primary motivation behind restructuring. In order to ensure that electricity consumers will benefit from electricity restructuring, AB 16 requires that all consumers receive a 5% discount off their electric bills when competition starts. In addition, at least another 5% bill reduction must occur over the following three years. The New Jersey Board of Public Utilities (BPU) must decide on the exact amount and time of the second rate discount. These reductions will lower electric bills by at least 10% over the next three years.

While environmental issues have not been the primary focus of New Jersey's restructuring efforts, the State has committed itself to meeting its energy needs in an environmentally sustainable manner. In particular, the State is concerned about the possibility of increased air emissions in the region with restructuring, which would negatively affect the environment, resident's health, and the state's ability to meet Federal Clean Air Act requirements. In addition, New Jersey has also sought to make sure that deregulation does not negatively affect the development of renewable energy and energy conservation programs and technologies.

Consumer Education

New Jersey's restructuring legislation requires the Board of Public Utilities (BPU), in consultation with the Division of Consumer Affairs, to establish a multi-lingual consumer education program to educate consumers about the implications of utility restructuring. The BPU will ensure that timely and accurate information is available to all consumers (through advertisements, reading materials, etc.) as a means to minimizing consumer confusion. It will also enact a financing mechanism to fund the consumer education program (costs will be recovered through customer billing). Though the BPU has yet to set final rules about the education program's message and timetable, there is some controversy over the proposed message's focus on prices, relative to other issues, in the changing market.

Customer Aggregation

AB 16 allows government agencies, municipalities and counties to act as aggregators, and explicitly gives municipalities and counties the right to aggregate business and residential customers within their jurisdictions. Government aggregators may bundle electricity services with other services such as natural gas, and may also aggregate in conjunction with other government entities. New Jersey is unique in that it allows municipalities (cities and counties) to adopt ordinances granting them the right to aggregate default residential customers without the affirmative opt-in requirement. In these cases, customers are automatically assigned to an aggregator but they still have the ability to opt-out of the aggregation and choose a different

generation provider. With this opt-out method option, an aggregator's ability to sign up new customers is greatly enhanced. Non-municipality aggregators must affirmatively sign up their customers (this is known as "opt-in" aggregation).

Environmental Disclosure

AB 16 requires electricity suppliers to disclose the fuel mix and emissions characteristics of the energy that they provide. Fuel mix disclosures must be shown in terms of the percent of electricity provided that has been produced from the following sources: coal, gas, large hydroelectric, nuclear, oil, and renewable energy (including categories for captured methane gas, fuel cells, geothermal, small hydroelectric, solar, solid waste, wind, and wood or other biomass). Electricity suppliers for New Jersey must also disclose the emissions of carbon dioxide (CO₂), nitrogen oxides (NO_x), and sulfur oxides (SO₂), in pounds per megawatt-hour. In consultation with the Department of Environmental Protection, the BPU may also require that other air emissions, which may pose an environmental or health hazard, be disclosed.

All disclosure information regarding fuel mix and emissions must be presented in a uniform graphic format that is easily understandable. In addition, New Jersey is unique in that it requires electricity suppliers to disclose energy efficiency information. Power suppliers must reveal how much electricity, expressed in kW, has been saved through their investments in energy efficiency and subsequent retirements in emission credits.

Emissions Standards

New Jersey's restructuring law also takes into account environmental issues related to emissions standards. AB 16 authorizes the Board of Public Utilities (BPU), in consultation with the Department of Environmental Protection, to implement an emissions standard if any of the following market or environmental circumstances emerges: 1) the standard is necessary as part of a plan to enable the state to meet federal Clean Air Act (CAA) or State ambient air quality standards; 2) actions at the regional or federal level cannot reasonably be expected to achieve compliance with the federal standards; or 3) if two other states in the Pennsylvania/New Jersey/Maryland (PJM) power pool comprising at least 40% of the retail electric usage in the PJM independent system operator's (ISO) jurisdiction adopt such standards.

Green Pricing and Certification

AB 16 has no specific provisions defining or mandating green pricing options in New Jersey. The law does not impede electric generation companies from voluntarily offering their own green pricing programs.

Net Metering

New Jersey's restructuring legislation and rules implement specific net metering standards and guidelines. All electricity suppliers and generation default providers must offer net metering at non-discriminatory rates to residential and small commercial customers that generate excess power using solar or wind power systems. The maximum allowable capacity per customer generator is 100 kW. Net metering applies to power produced in excess of that supplied by the power supplier or default service provider, in addition to any kilowatt credits held over from the previous billing period. At the end of an annualized period the customer will be compensated by the power supplier or default service provider for any remaining credits at the provider's avoided

cost of wholesale power. Customers shall be allowed to use a single, non-demand, non-time differentiated meter.

The BPU may authorize electric power suppliers and default providers to cease offering net metering whenever the total generation capacity owned and operated by net metering customer-generators statewide equals 0.1% of the state's peak demand, or the annual aggregate financial impact on power suppliers or default providers statewide exceeds \$2 million, whichever is less.

Renewable Portfolio Standards and Set Asides

AB 16 establishes a two-tiered renewable portfolio standard for "Class I" and Class II renewables. Under the RPS, 2.5% of the kWh sold in New Jersey by each electricity supplier and default providers must be from these classes of renewables. Class I renewable energy is defined as electricity produced from solar thermal, solar photovoltaics, wind, geothermal, wave or tidal action, methane from landfills or biomass facilities (provided the biomass is cultivated and harvested in a sustainable manner) and fuel cell technologies. Class II renewable energy is defined as electricity produced at a small hydroelectric facility (up to 30 MW) or resource recovery facility. New Jersey's Commissioner of Environmental Protection must also determine that these facilities meet the highest environmental standards and minimize any impacts to the environment and local communities where they are located.

In addition to the initial 2.5% RPS on Class I and II renewables, beginning on January 1, 2001, a 0.5% RPS specifically on Class I renewables goes into effect. That RPS increases to 1.0% by January 1, 2006. By that date, 1% of all kW sales in New Jersey will be from Class I renewable sources. Beginning in 2006, the RPS on Class I will increase by 0.5% each year so that by January 1, 2012, 4% of all kilowatt sales shall be from Class I renewables. As a result, by 2012 6.5% of all electricity sold in New Jersey must come from renewable sources (2.5% for the initial RPS on Class I and Class II renewables and 4% for the additional 4% RPS on just Class I renewables). Electricity suppliers and default providers may also satisfy their RPS requirements by participating in a renewable energy trading program when one is developed and adopted by the BPU in conjunction with the Department of Environmental Protection.

System Benefits Charge

New Jersey's restructuring legislation creates a non-bypassable and adjustable system benefits charge (SBC) to fund energy efficiency and renewable energy programs in the State. Under the administration of the BPU, the SBC, known in New Jersey as the "Societal Benefit Charge," will provide more than \$1 billion over an eight-year period (from 2000 through 2007). Under existing regulations, rate-based demand-side management (DSM), or energy efficiency, expenditures total approximately \$235 million per year (that is expected to rise to \$280 million under the new SBC). Under AB 16 at least 50% of that amount, or \$140 million, is to be dedicated to investments in energy efficiency and renewable energy. Twenty-five percent (25%) of this amount, or approximately \$35 million, will be set aside specifically for Class I renewable energy technology investments annually.

After the eighth year of the program, the BPU, in consultation with the New Jersey Department of Environmental Protection, will rule on the appropriate level at which funding for these programs should continue as well as which renewables should continue to receive funding.

Overall, the maintenance of the societal benefits charge is to ensure suitable funding to provide financial incentives for energy efficiency and Class I renewable energy projects and technologies in the State.

Program Strengths and Weaknesses

The restructuring efforts undertaken by New Jersey provide a good example of how a State can begin moving toward environmental sustainability in its electricity sector. New Jersey now requires its electricity suppliers to disclose to their customers, the resource fuel mix and emissions information associated with their power generation. Electricity suppliers must also provide information related to energy efficiency, including how much energy they have saved. This information will allow customers to make more-informed decisions regarding their electricity use and provider. The State implemented a two-tiered renewable portfolio standard (RPS) which guarantees that 6.5% of all electricity generation will come from renewable resources by 2012. A system benefits charge (SBC), known as the “Societal Benefit Charge,” provides at least \$1 billion for investments in energy efficiency and renewable energy. Combined, the RPS and the SBC can significantly help New Jersey in its goal to actively facilitate the development of renewable resources and energy efficiency. Of the states surveyed, New Jersey is one of the most progressive regarding customer aggregation. The State allows public entities to pass ordinances granting the right to aggregate default customers within their jurisdictions without affirmative opt-in requirements. Although customers will still be able to opt-out of the aggregation if they desire to do so, this default method of aggregation will increase the ability of aggregators to sign up customers.

New Jersey, however, has experienced some difficulties in implementing its restructuring package. The State’s consumer education program has already been criticized for over-focusing on issues related to price, and neglecting environmental issues, aggregation opportunities, etc. In addition, although the Board of Public Utilities is empowered to institute universal emissions standards given certain market or regulatory developments, no official action has been taken in this regard. As a result, uncertainty still exists as to whether or not restructuring will increase pollutant emissions (with negative environmental and human health consequences to follow). New Jersey’s net metering efforts have also been found lacking. The State’s net metering program requires net metering customers to be compensated according to the utility’s avoided cost rate, rather than the retail rate of power generation. Moreover, net metering capacity is capped at 0.1% of the state’s peak demand or an annual aggregate financial impact to suppliers of \$2 million, whichever is less. These measures have limited the incentives of customers to purchase renewable energy systems and engage in net metering programs.

H. Pennsylvania

In December 1996, HB 1509—The Electric Generator Customer Choice and Competition Act—was passed by the Pennsylvania State Legislature and signed into law by Governor Tom Ridge. Beginning on January 1, 1999, a maximum of 33% of the peak load of each customer class (residential, commercial, and industrial) shall be able to choose their electricity provider. By January 1, 2000, that number will increase to 66% of each customer class. Full retail competition will be offered to everyone in all customer classes by January 1, 2001. Customers will be eligible for direct access in each class prior to full retail electric phase-in based on a first come, first served basis.

Background

The rationale for opening Pennsylvania's electric market to competition has focused on economic issues. This is due to the fact that Pennsylvania has traditionally had high electricity rates compared to the rest of the region and the U.S. as a whole. Pennsylvania's restructuring law specifically states that the transition to competition is a necessity if the state is to compete for industry and jobs. At the same time, however, Pennsylvania's Public Utilities Commission (PUC), which is responsible for regulating the electricity industry in the State, under the guidance of HB 1509, has sought to ensure that restructuring will not negatively impact electricity consumers and the environment.

To ensure price stability for electricity customers, utility generation charges may not exceed the total PUC-approved charges existing when the electricity restructuring act became effective. This mandatory cap rate will remain in effect for a period of 54 months after HB 1509 is initially implemented, or until a utility is no longer recovering its transition/stranded costs and all of the utility's customers are allowed to choose their own electricity supplier, whichever is shorter. Overall, most of Pennsylvania's electricity consumers are expected to realize at least a 10% savings in their power costs. Provisions of HB 1509 and PUC rules (which were finalized in May 1999) have also sought to emphasize consumer education and choice and potential environmental concerns.

Consumer Education

Under Pennsylvania's restructuring legislation, the Public Utility Commission (PUC) requires each electric distribution company to implement a consumer education program informing customers of the changes in the electric utility industry. Each program shall provide consumers with the information necessary to help them make appropriate choices as to their electric service provider, and shall be subject to approval by the PUC. Information packages sent to consumers must describe consumer choice and contain a list of competitive electricity suppliers serving their rate class and location. The PUC began its consumer education program in June 1998. It has also published a "Consumer's Dictionary for Electric Competition" and "A Short Glossary of Standard Terms for Customer Communications" which are available to the public. The electricity supplier's customers will fund the PUC's consumer education program with a \$5 charge per customer per year for three years. The education program will be broken down into two components: a statewide component, which will receive 65% of the funds, and a local education plan component, which will receive the remaining 35%.

The PUC also requires electric distribution companies to provide, on a biannual basis, detailed energy efficiency information to residential and small commercial consumers to enable them to use electricity more efficiently. Topics include insulation, lighting and appliance efficiency, conservation practices, load management techniques and other relevant technologies to advance customer understanding of cost-effective use of electricity. The PUC will conduct periodic reviews of the effectiveness of these education programs. Education programs also are provided to low-income residential customers to enable these customers to lower their utility bills through the employment of energy efficiency measures.

Customer Aggregation

HB 1509 allows entities to aggregate loads and provide electric services through such a process. Any customer from each of the retail customer classes may choose to opt-in to an aggregation group and purchase electricity through a broker, marketer or aggregator. These entities, however, may not require customers within their jurisdiction to purchase generation service from them through an opt-out approach.

Environmental Disclosure

In February 1997 an Information Working Group formed to establish specific rules regarding disclosure, which were later adopted by HB 1509. The group mandated that electricity service providers unbundle their services, itemize billing, and use common and consistent terminology in customer communications, including marketing, billing and terms of service, taken from the PUC's "Consumer's Dictionary for Electric Competition." It also permitted customer choices for generation pricing options; for example, fixed price per kW, time of day, demand, peak, off-peak, etc. The customer's bill shall also include the total annual electricity use for the past 12 months (in kWh, kW, or any other PUC-approved standard pricing unit) as well as the average monthly electricity use for the past 12 months.

The PUC's Chapter 56 requires electricity suppliers to provide a written disclosure statement of energy sources including a graph of the sources of the most recent annual average percentage of electricity supplied or the anticipated fuel mix. This list of sources will include renewable energy sources (solar photovoltaic energy, solar thermal energy, wind power, small hydro electric power, geothermal energy, landfill and mine-based methane gas, energy from waste and biomass energy). If the supplier cannot identify the energy source of its supply, as when the supply is purchased from a power pool, the supplier is required to disclose the average energy mix or equivalent information particular to the power pool. Electricity suppliers are required to disclose their energy sources upon customer inquiry, upon entering into agreements with new customers and as soon as possible when a significant change occurs in energy sources as specified in the terms of service with existing customers. One significant omission is that Pennsylvania does not require its electricity providers to disclose emissions information regarding energy generation.

Emissions Standards

HB 1509 acknowledges the fact that differential air emission standards across the Northeast, Southeast and Midwest regions may adversely impact Pennsylvania's air quality with the move to competitive retail generation markets. Pennsylvania's restructuring legislation does not, however, mandate universal emission standards that must be met by all suppliers selling

electricity services within the State. Instead, it urges stricter federal regulations to address the issue of additional transboundary and regional air pollution that may emerge with electricity restructuring. The Public Utilities Commission (PUC) stated it will consult with the Department of Environmental Protection regarding this issue to ensure that restructuring does not adversely affect residents and the environment.

Green Pricing and Certification

Pennsylvania's restructuring legislation mandates that electric services making a specific environmental claim cannot refer to themselves as being green. Instead, electricity suppliers must include in their terms of service the specific renewable energy technology that is being used and its beneficial environmental qualities. Power providers must notify the PUC when a significant change occurs in energy sources as specified in the terms of the service with existing customers or when representations cannot be met. Additionally, the PUC will hold power providers accountable for electricity generation claims to customers, and suppliers may not "sell the designated energy sources multiple times."

The "Green-e" Renewable Branding Program (which was first introduced in California in 1997) was established in Pennsylvania in 1998. Building off California's successful program design, Pennsylvania's voluntary certification and verification program sets uniform standards for renewable energy producers. Its main goal is to help consumers identify credible sources of renewable energy generation. Green-e program labels are available to energy producers who generate at least 50% of their electricity from renewable energy sources. As of October 1999, three electric service providers (Conectiv, Green Mountain and The Mack Services Group) are participating in Pennsylvania's Green-e program. These electricity suppliers offer at least 10 different green pricing options on a voluntary basis.

Net Metering

There are no legislative or regulatory provisions in Pennsylvania mandating or defining criteria for the implementation of net metering. However, electric generation companies have filed Renewable Energy Development Rider Tariff sheets with the PUC to allow all customers to install and operate renewable energy generation, including appropriate provisions of self-generation and net metering. These proceedings are still being considered at the PUC.

Renewable Portfolio Standards and Set Asides

Pennsylvania's Electric Distribution Restructuring plans provide a means to support renewables in Pennsylvania. These plans require that 20% of all residential customers be assigned to an electricity provider of last resort/default supplier other than their local electricity provider. The provider of last resort/default supplier is to be selected on the basis of a PUC-approved energy and capacity market price bidding process, known as "Competitive Default Service."

To qualify for the Competitive Default Service bidding process, a provider must agree to provide at least 2% of their generation from renewables, increasing by 0.5% each year. The requirement to include these levels of sources in the resource mix may be lowered by the PUC if the cost of the power from these sources increases the cost of providing service by more than 2% over what the cost would be without these sources. The Competitive Default Service bidding process will begin on June 1, 2000.

System Benefits Charge

HB 1509 instituted separate system benefits charges (SBCs) and related renewable energy pilot programs for each of the distribution utilities. GPU Energy's "Sustainable Energy Fund" was funded by a one-time payment of \$12.1 million on December 31, 1998. Beginning January 1, 2005, the fund shall be supported through a 0.01 cents/kWh transmission and distribution (T&D) fee on all kWh sold after that date, unless the PUC establishes new distribution rates. The Sustainable Energy Fund will be used to promote the development and use of renewable and clean energy technologies, energy conservation and efficiency, sustainable energy businesses, and other projects which improve the environment. Additionally, GPU agreed to implement renewable energy pilot programs consisting of a solar hot water heater program, in 1999 and 2000, and a photovoltaic (PV) program in 1999 and 2000. Together these programs will install at least 40 new solar hot water heaters and PV systems. The budget for GPU's solar water heater program will be \$300,000 per year. For the PV pilot project, the 1999 budget will be \$350,000 and the 2000 budget will be \$750,000.

PECO Energy's "Sustainable Development Fund" will be supported from a 0.01 cents/kWh T&D fee on all power sold for all customers beginning January 1, 1999, and ending June 30, 2005, or until the PUC establishes new distribution rates, whichever is later. Half of the funds shall be used to promote the development and use of renewable energy and clean energy technologies, energy conservation and efficiency, and economic development. The remaining 50% will be used for economic development projects which have a job impact. PECO's renewable energy pilot program will consist of a solar hot water heater program in 1999 and 2000, and a PV program involving 50 installations in 1999 and 100 installations in 2000. The total budget for the pilot programs will be \$525,000 for 1999 and \$787,500 for 2000.

West Penn Power Company's "Sustainable Energy Fund" was funded by a payment of \$11,425,721 on December 31, 1998. Beginning January 1, 2006, the fund will be supported by a 0.01 cents/kWh T&D fee on all power sold after that date, unless the PUC establishes new distribution rates. The purpose of West Penn's fund is to promote the development and use of renewable and clean energy technologies, energy conservation and efficiency. West Penn Power Company will also implement a low-income solar hot water heater and PV program. The budget for the solar hot water heater program will be \$110,000 for each year. The PV program budget will be \$125,000 for 1999 and \$265,000 for the year 2000. The number of installations will be determined in a cooperative effort between the utility, the PUC and community organizations.

Finally, Duquesne Light Company has agreed to participate in the federal "Million Solar Roof Program." The Company was directed to develop a loan level of \$250,000 to participate in this program. The company may recover its costs through the Universal Service cost recovery mechanism.

It is estimated that the total funds collected from these programs will approximate \$55 million over a 6½ -year period.

Program Strengths and Weaknesses

Pennsylvania's restructuring efforts have sought to address the environmental issues associated with power generation through customer choice. The State has applied a system benefits charge,

coupled with mandatory renewable energy pilot projects, to each distribution utility. This unique approach will provide a fair amount of funding for energy efficiency and renewable energy development programs. The State is implementing a fairly comprehensive consumer education program that contains both statewide and local education components. The education program also requires power suppliers to provide their customers with information on how they can reduce their energy usage via conservation and efficiency measures. Pennsylvania has also put in place a “Green-e” Renewable Branding Program that will certify energy producers who generate at least 50% of their power from renewables. This will help electricity customers identify credible sources of renewable generation. As a result of the independent Green-e program, a number of electricity providers have begun offering green pricing options within the State. These successful programs are demonstrating to other electricity suppliers that a market for generating energy via renewables exists thereby promoting the development of renewable energy.

Overall, however, Pennsylvania’s efforts to implement its restructuring package have revealed a number of programmatic weaknesses. Although the State requires power providers to disclose their fuel mix, emissions tied to generation are not mentioned. In addition, a number of consumer advocates have criticized the utility-implemented consumer education programs. They claim that education programs are being skewed to benefit utility’s own marketing efforts and discourage consumers from choosing an alternative power provider. These circumstances indicate that customers may not be informed enough to make effective decisions regarding their electricity use or provider choice. The State does not provide any programs for net metering and only allows customers to aggregate through the opt-in approach (thereby limiting the amount of customers who will engage in aggregation). Finally, Pennsylvania has not instituted a renewable portfolio standard. These factors indicate that Pennsylvania still has a long way to go to ensure that its electricity restructuring efforts are beneficial to the environment.

I. Rhode Island

Rhode Island was the first state in the nation to enact comprehensive legislation on electricity restructuring. On August 7, 1996, Rhode Island Governor Lincoln Almond signed General Assembly Bill 96H8124b—The Electric Utility Restructuring Act—into law. According to the original timetable of the law, consumer choice in choosing their electricity supplier would be phased in over a twelve-month period. Electric utilities, with the approval of Rhode Island's Public Utility Commission (PUC) accelerated this schedule so that all electricity customers were eligible to choose their electricity suppliers on January 1, 1998.

Background

In 1995 Rhode Island's Public Utility Commission (PUC) established a collaborative Electric Restructuring Task Force to recommend principles to guide the state's transition to a restructured electricity industry. Rhode Island's primary concern in restructuring was to lower one of the highest average electricity rates in the U.S. In 1996, the State had the sixth most expensive electricity rate in the nation, at 10.48 cents per kWh. Restructuring legislation lowered electricity rates by approximately 7 percent. With the rate reductions, the PUC set investor-owned utility electric generation rates at a 3.2 cents per kWh standard (distribution and transmission rates, as part of the overall electricity kWh were unaffected by the PUC's policies). This low generation rate proved problematic, however, as only 2,000 out of Rhode Island's 456,000 electricity customers chose alternative generation suppliers in the first 18 months of retail competition. Consumers had little incentive to switch to alternative generators that were not able to offer lower prices than the standard offer. To increase competition, Rhode Island agreed to raise the standard electric generation rate for state-owned utilities by 6.5 % yearly until it reaches 7.1 cents per kWh.

With primarily gas-fired power plants and no coal plants in Rhode Island, the Rhode Island has not focused as much on environmental concerns as other states with dirtier electricity generation sources. In 1995, among all states, Rhode Island's emissions of sulfur dioxide (SO₂), nitrogen oxides (NO₂), and carbon dioxide (CO₂) ranked forty-ninth, forty-fifth, and forty-seventh respectively. Due to the small area of the State, however, Rhode Island has high concentrations of these pollutants and had enacted rules to reduce them prior to restructuring. In addition, the state has sought to address environmental concerns associated with electricity restructuring through legislation and regulatory orders.

Consumer Education

Rhode Island required its distribution companies to notify their electricity customers of the options that were available to them in a restructured market at least 90 days prior to their eligibility for consumer choice. To facilitate consumer awareness and knowledge, in February 1998, the Public Utilities Commission (PUC) began including electricity consumer guide inserts in local newspapers. These inserts provided information to consumers on choosing an electricity supplier in a restructured market. The PUC has also created a website for electricity consumers that answers frequently asked questions and provides information on making informed choices about electricity power providers. The website also offers suggested questions for consumers to ask potential electric suppliers.

Customer Aggregation

Aggregators in Rhode Island may be municipal cooperatives or consumer buying groups. Rhode Island's restructuring legislation defines "purchasing cooperatives" or aggregators as any "association of electricity consumers which join for the purpose of negotiating the purchase of power from a non-regulated power producer, provided, however, that purchasing cooperatives shall not be required to be legal entities and are prohibited from being engaged in the re-sale of electric power." Purchasing cooperatives/aggregators can serve residential, business, communities and/or other groups in Rhode Island through this opt-in method of aggregation. These entities, however, cannot require electricity consumers within their jurisdiction to purchase generation service from them or act as default aggregators (the opt-out approach to aggregation).

Environmental Disclosure

The Bill's disclosure provisions are consumer-oriented. The Electric Utility Restructuring Act mandates that customer bills must conspicuously display specified information including transition and conservation charges, taxes, number of kilowatt-hours consumed, cost of power, cost of distribution, and other costs. It does not, however, include any standard measures or definitions for the disclosure of resource mixes or air emissions.

Emissions Standards

Rhode Island's restructuring legislation acknowledges that reducing air emissions from power plants is a goal of electricity industry restructuring. Rhode Island coal-fired power plants, however, already have low emission rates compared to those in other states. As a result, electric restructuring plans did not address in-state air emission reductions. Electric generation companies with out-of state facilities, however, are required to reduce their levels of nitrogen oxides (NO_x), sulfur dioxide (SO₂) and particulate emissions of their out-of-state plants. Any wholesale power supplier in the State which received contract termination fees and owns and operates fossil-fired generation in another state as of December 31, 1995, and does not meet air emission standards for new generation facilities in that state, is subject to this rule.

These wholesale power suppliers must cooperate with the proper environmental officials in the states where the generating facilities are located to develop a plan for reducing the plants' emissions. Emission levels may be reduced through plant retirements, technology replacements, regulatory controls and offsets, or other emission reduction methods.

Green Pricing and Certification

The Bill does not contain any provisions specifically regarding green pricing options for Rhode Island. Electricity service providers, however, are not restricted from providing green pricing programs and options of their own initiative. Electricity suppliers are required to support their claims about the use of certain fuels or the environmental impacts of their power by filing information with the PUC.

Net Metering

The Electric Utility Restructuring Act expanded Rhode Island's existing net metering provisions. Prior to electricity restructuring, a net metering program for customer-owned small renewable generating facilities and co-generators had been in effect in Rhode Island since 1985. The

program's original purpose was to encourage the development of small wind generators, but customers with other renewable energy generating facilities were also eligible for net metering. The Bill expanded the definition of renewables eligible for net metering to match the Bill's list of renewables funded by Rhode Island's system benefits charge (SBC).

Under restructuring legislation, the size limit on energy systems was altered to 25 kilowatts for new facilities, and includes wind, hydroelectric (without the construction of new dams), solar, sustainably managed biomass, and fuel cells. Facilities must be located on the customer's premises and used to meet the customer's own energy needs. A net metering customer's usage and generation is to be netted over a 12-month period. Net metering customers in Rhode Island will be credited for surplus electricity production at the full retail rate of electricity (as opposed to the utility's avoided costs).

Renewable Portfolio Standards and Set Asides

Rhode Island's restructuring legislation does not include any provisions that would create and define the terms for a renewable portfolio standard (RPS).

System Benefits Charge

The Bill established a non-bypassable system benefits charge (SBC)—known in Rhode Island as the "Conservation Charge"—to support the development of renewable energy and demand-side management (DSM), or energy conservation, programs. The charge is 2.3 mills per kWh for a minimum of five years, and should collect approximately \$17 million per year. In the first year of the program, about seven percent of the money collected (approximately \$1 million) through the system benefits charge was earmarked for renewable energy projects. The Public Utilities Commission (PUC) may increase the per kWh charge before the end of the first five-year period and is responsible for determining the level of the charge thereafter. A collaborative stakeholder process, with oversight by the PUC, will guide renewable energy and energy-efficiency spending.

Program Strengths and Weaknesses

Restructuring efforts in Rhode Island have led to the implementation of some noteworthy environmental provisions. The State has established a system benefits charge (SBC), known as the "Conservation Charge," which will provide \$17 million per year to support the development of renewable energy, energy efficiency, and energy conservation. It has also expanded the definition of renewables eligible for net metering and allows net metering customers to be credited for their excess generation at the full retail rate. These actions, especially allowing customers to be compensated for the full retail rate of electricity, provide incentives for customers to purchase renewable energy systems and engage in net metering. Rhode Island also requires out-of-state generation facilities to work with the appropriate state-designated agency to reduce their emissions of certain pollutants.

Despite these positive environmental provisions, Rhode Island's restructuring efforts are lacking in a number of areas. Since Rhode Island has no requirement for the disclosure of fuel mix or air emissions, customers will be unable to make informed decisions relating to the environment when choosing their electricity provider. Moreover, the omission of a renewable portfolio standard (RPS) from the State's restructuring package has hindered the development of

renewable energy. Although customer aggregation is allowed if consumers affirmatively opt-in, aggregators are not allowed to hold default provider status—limiting the effectiveness of customer aggregation. Rhode Island’s ability to fully realize the benefits of net metering has also been constrained by a restrictive size limit for eligible facilities (25 kW). Finally, although the State has set higher standards for out-of-state generation facilities, it has not applied those standards universally across its in-state generation facilities.

J. Texas

Texas' restructuring legislation, SB 7, was passed by the State Legislature in May 1999 and later signed into law by Governor George Bush in June 1999. This bill gives electricity customers the right to choose their electricity supplier by opening up the electric industry to retail competition by January 1, 2002. The Public Utilities Commission of Texas (PUCT) has scheduled more than 40 rulemaking proceedings over the next two years to work out the details of the various provisions prescribed in the legislation.

Background

In August 1997 Lt. Governor Bob Bullock created the seven-member "Senate Interim Committee on Electric Utility Restructuring" to find ways for existing power plants to pay off debts and still compete in an open electricity market. The Committee's status report helped influence SB 7 in the direction of competition, consumer benefits and environmental protection. On or before September 1, 2000, each electric utility must separate its regulated activities from its competitive energy services. Utilities must divide themselves into three separate entities: a power generation company, a retail electric provider, and a transmission and distribution utility. Additionally, each electric utility that owns 400 MW or more of installed generation capacity must sell at least 15% of its capacity via auction. This obligation will continue for five years or until 40% of the utility's customers have been lost to competitors, whichever comes first.

Until the start of retail competition, utilities must provide retail electric service to their customers at the same rates as those in effect on September 1, 1999. From January 1, 2002, until January 1, 2007, affiliated retail providers must provide residential and small business customers with rates that are 6% less than those in effect on January 1, 1999. This is known as the "Price to Beat." Default providers cannot charge below the Price to Beat in their own service territory for three years or until 40% of their customers have been lost to competitors, whichever comes first. Low-income customers will receive an additional 10-20% rate reduction. SB 7 also includes a number of important provisions (such as its renewable portfolio standard and emissions standards) that seek to ensure that Texas will meet its future energy needs in an environmentally sustainable manner.

Consumer Education

By January 1, 2001, the Public Utility Commission of Texas (PUCT) must develop and begin implementing a consumer education program to help electricity customers understand the changes which are taking place in the electricity sector and how these changes will affect them. In particular, the consumer education program will highlight the options that will be available to electricity customers in a restructured market. PUCT will consult with the Office of Public Utility Counsel, the Department of Housing and Community Affairs, and electricity customer and provider representatives in constructing this program. As part of ongoing education, PUCT may provide customers information concerning specific retail electricity providers, including instances of complaints against them and records relating to quality of service. It may enter into contracts for professional services to carry out the consumer education program. PUCT must also report on the status of the educational program to the electric utility restructuring legislative oversight committee on or before December 1, 2001.

Customer Aggregation

Under SB 7, municipal governing bodies may join into a single purchasing unit to negotiate the purchase of electricity from retail electric providers or aggregation by a municipality. Electricity customers must affirmatively request to be included in the aggregation services of the aggregator (they must opt-in). The aggregator may use any mailing or advertisement to invite the participation by electricity customers (in this case the citizens of the municipality or other political subdivision). PUCT will work with Texas' Department of Economic Development to communicate information about aggregation opportunities to potential new aggregators.

Environmental Disclosure

Texas' electricity restructuring legislation requires electricity suppliers to disclose information concerning their rates, terms, conditions, environmental impacts and low-income assistance programs. This information must be provided to all electricity customers in a standard, easily understandable format and in languages other than English, if required. The specific rules and regulations regarding the disclosure of this information will be determined during the implementation stage by PUCT and other regulatory bodies.

Emissions Standards

SB 7 requires stricter emissions standards to ensure that restructuring will not have a detrimental affect on the environment. Total annual emissions of nitrogen oxides (NO_x) from electric generating facilities may not exceed levels equal to 50%, and emissions of sulfur dioxide (SO₂) from coal-fired facilities may not exceed 75%, of the total emissions of those pollutants in 1997. Generating facilities will be held to these conditions for every 12-month period starting May 1, 2003. Municipalities, electric cooperatives and river authorities may exclude smaller facilities (25 MW or less) from these requirements. These limitations may be met through an emissions allocation and allowance transfer system, to be developed and implemented by the Texas Natural Resource Conservation Commission (TNRCC) by January 1, 2000. Emission reductions may only be used to satisfy these requirements to the extent that they are beyond the requirements of any other state or federal standard, and facilities will only be allowed to trade emissions allocations with other electric generators in the same region.

Green Pricing and Certification

The Public Utility Commission of Texas' (PUCT) Rule 25.251 currently allows electric utilities to offer a renewable energy tariff to all retail customers. The renewable energy tariff rule was enacted to use market-based methods to promote the use of renewable energy technologies to supply electricity in Texas, to protect and enhance the quality of the State's environment, and to respond to customers' expressed preferences for renewable resources. Texas' restructuring legislation, SB 7, however, does not set any rules or provisions relating to state-led green pricing programs. It is unclear at this time whether PUCT will require electricity power providers to meet any specific green pricing rules once restructuring is implemented. Several utilities in Texas are currently leading the way by offering voluntary green pricing programs or options. Other electricity suppliers in the State are also considering developing green pricing programs or options.

Net Metering

SB 7 does not contain any specific language regarding net metering. Existing PUCT rules, however, require electric utilities to offer net metering options to qualifying facilities with a capacity of 100 kW or less (Substantive Rule 23.66). As a result of restructuring, these rules are currently being reconsidered.

Renewable Portfolio Standards and Set Asides

Texas's electricity restructuring legislation contains an ambitious renewable portfolio standard. According to SB 7, 2,000 megawatts (MW) of additional generating capacity from renewable energy technologies must be installed in Texas by January 1, 2009. The cumulative installed renewable capacity will total 1,280 MW by January 1, 2003; 1,730 MW by 2005; 2,280 MW by 2007; and 2,880 MW by 2009. Renewable energy technologies are defined as "those that rely on energy derived directly from the sun, on wind, geothermal, hydroelectric, wave, or tidal energy, or on biomass or biomass-based waste products, including landfill gas." The Public Utility Commission of Texas (PUCT) will adopt rules no later than January 1, 2000 to establish minimum annual renewable energy requirements for each power provider, municipalities and electric cooperatives, and specify reasonable performance standards that all renewable capacity additions must meet. PUCT will also establish a renewable energy credits trading program through which providers, municipalities and cooperatives can purchase credits to satisfy their renewable energy requirements.

Each electric utility will also be required to implement cost-effective energy efficiency measures to meet at least 10% of the electric utility's annual growth in demand. SB 7 also mandates an aggressive natural gas portfolio standard—by January 1, 2000, 50% of the state's total installed generating capacity will use natural gas. PUCT will establish a program to encourage utilities to comply with this goal by using natural gas produced in state as the preferential fuel. PUCT will also establish a natural gas energy credits trading program to allow electricity providers to satisfy their natural gas requirements in a cost-effective manner. In conjunction with the Texas Railroad Commission, PUCT will adopt rules that allow and encourage electricity providers to market natural gas produced in Texas as being environmentally beneficial. Specifically, providers will be encouraged to emphasize that natural gas is the cleanest-burning fossil fuel, and label in-state natural gas electricity generation as "green" electricity.

System Benefits Charge

SB 7 establishes a non-bypassable system benefits charge (SBC) to fund low-income reduced rate and energy efficiency programs, consumer education programs and school funding mechanisms. The SBC rate will be set by PUCT at an amount not to exceed 50 cents per MWh. PUCT may also increase the SBC rate to no more than 65 cents per MWh from January 1, 2002 to December 31, 2006. It can do so if the SBC rate is insufficient to fund the activities it is intended to support. The SBC will be allocated to customers based on consumption and will be reviewed and approved annually.

Program Strengths and Weaknesses

Texas has attempted to move away from its traditional role as being the highest emissions generator in the United States. Through the State's restructuring efforts, Texas has made significant progress toward meeting its energy needs in a more environmentally beneficial

manner. An ambitious emissions program, which requires substantial reductions in the emissions of certain pollutants from generation facilities, will place all generators on an equal playing field and make sure that restructuring will not lead to negative environmental impacts. The State's renewable portfolio standard (RPS) requires that an additional 2,000 MW of electricity generating capacity from renewable energy technologies must be installed by January 1, 2009. In addition, electricity generators are required to meet at least 10% of their growth in annual demand through energy efficiency measures. These requirements have helped promote the development of renewable energy and energy efficiency technologies and programs. Texas' renewable energy tariff rule, which allows power providers to offer a renewable energy tariff to all their customers, has also helped advance renewables. Along with green pricing programs which power providers are currently offering, the tariff program has helped protect and enhance the quality of the State's environment while demonstrating that a market exists for electricity supplied via renewable generation. The State also requires power providers to disclose information to their customers regarding the environmental impacts associated with the generation of electricity.

Despite these achievements, Texas has encountered a number of difficulties in implementing its restructuring package. In particular, the lack of a system benefits charge (SBC) to help finance and leverage money for renewable energy and energy efficiency is a significant impediment to environmental protection and enhancement efforts (Texas' current SBC does not specifically target these areas). By not offering the means to facilitate the shift to renewables and efficiency, Texas runs the risk of compromising its own environmental goals. The State's aggregation efforts display this duality as well. Although Texas provides aggregators, potential aggregators and customers with information regarding the benefits of aggregation, it only allows for the opt-in method of aggregation. Experience has shown, however, that this is not an effective way to promote aggregation—aggregation is best facilitated through granting default provider status. Another weakness of Texas' efforts is its undecided net metering rules. Until new net metering rules are implemented that encourage electric suppliers to pay for net excess generation at the retail rate, customers have little incentive to purchase renewable energy systems and engage in net metering.

VII. Key Findings from Selected States

A. Consumer Education

All of the states surveyed by CEEP implemented a consumer education program. Some education programs (California's, Connecticut's, Maine's, New Jersey's and Pennsylvania's) were stronger than others. However, none of the states surveyed went into the depth likely to be needed by consumers in order for them to make informed choices about their options in newly restructured markets, especially regarding information about environmental implications. Moreover, these states neglected customer aggregation options, giving only modest attention to this important tool.

B. Customer Aggregation

All of the states surveyed allow for "opt-in" aggregation, which may restrict potential aggregators' ability to sign up new customers. Massachusetts and New Jersey additionally add the "opt-out" option for cities and counties. As in all other states, Massachusetts and New Jersey customers must specifically declare their desire to participate in a government aggregation program through written signature. However, these states allow cities and counties to adopt ordinances granting them the right to aggregate default residential customers without the affirmative opt-in requirement. In those cases, customers are automatically assigned to an aggregator but they still have the ability to opt-out of the aggregation and choose a different generation provider. With this default opt-out method of aggregation, aggregators have a much greater chance of signing up customers, and can potentially offer greater choices and lower prices to their customers.

C. Environmental Disclosure

There are a number of states that have very strong environmental disclosure programs, including Illinois, Maine, Massachusetts and New Jersey. Illinois requires competitive electricity providers to disclose to all customers in their monthly bills standard information about fuel mix and emissions in the form of tables and pie charts. Providers must also disclose the amounts of high- and low-level nuclear wastes generated. Massachusetts has a similar program, but suppliers must also show how the emission rates from their generation sources compare to the regional average and to the emission rates of new generation units, and must note the percentage of unionized and replacement workers that the company's generation facilities employ. In Maine, electric providers must provide information on fuel mix and emissions on a regular basis to all customers with a demand of 100 kW or less, and to larger customers upon request. New Jersey requires electric providers to disclose not only fuel mix and emissions, but also how much electricity has been saved through a company's investments in energy efficiency and subsequent retirements in emission credits. Massachusetts, Maine and New Jersey all empower their public utility commissions with the authority to require that additional pollutants be disclosed when needed.

D. Emissions Standards

Texas (one of the highest emitters of CO₂ and SO₂ in the country) has implemented the strongest emissions reduction program of all the states surveyed. Texas' restructuring package mandates that total annual emissions of nitrogen oxides (NO_x) from electric generating facilities may not exceed levels equal to 50%, and emissions of sulfur dioxide (SO₂) from coal-fired facilities may not exceed 75%, of the total emissions of those pollutants in 1997. Further, emission reductions may only be used to satisfy these requirements to the extent that they are beyond the requirements of any other state or federal standard, and facilities will only be allowed to trade emissions allocations with other electric generators in the same region.

Some of the states surveyed – Connecticut, Massachusetts and New Jersey – mandated emissions regulations in which the state is required to implement stricter emissions standards should the other states in their respective power pools agree to adopt them. For example, New Jersey must impose stricter standards if two other states in the Pennsylvania/New Jersey/Maryland (PJM) power pool comprising at least 40% of the retail electric usage in the PJM independent system operator's (ISO) jurisdiction adopt such standards.

Though none of the other states surveyed require stricter emissions standards for their in-state plants in the immediate term, three – Rhode Island, Maryland and Massachusetts – incorporate programs to meet other emissions goals. Rhode Island requires its electric generation companies with out-of-state facilities to reduce the levels of nitrogen oxides (NO_x), sulfur dioxide (SO₂) and particulate emissions at those plants. In Maryland, power providers must study the effects of deregulation on emissions and report back to the state Public Service Commission (PSC) by July 1, 2001. Upon receipt of the report, the Maryland PSC will consider establishing an air quality surcharge or other mechanisms to reduce emissions. In Massachusetts, the Department of Environmental Protection (DEP) is working in conjunction with the U.S. EPA to draw up stricter standards for pollutants in the future.

E. Green Pricing and Certification

None of the states surveyed require electric providers to offer green pricing programs. A few states, though, including California and Pennsylvania, have robust voluntary programs. The Sacramento Municipal Utility District (SMUD) in California has established innovative green pricing options for its customers. Both California and Pennsylvania have also established "Green-e" voluntary certification and verification programs (developed by the non-profit Center for Resource Solutions) to set uniform standards for renewable energy producers. As of October 1999, nine electric service providers in California and three in Pennsylvania are participating in the Green-e program. Additionally, some states surveyed define "green energy" or "green power." All states require that companies who claim to offer green energy substantiate such claims to their state regulatory agency.

F. Net Metering

All but one of the states surveyed (Illinois) offers net metering. More than half of the states (Connecticut, Maine, Massachusetts, Pennsylvania, Rhode Island and Texas) allow all types of

renewable projects to qualify for net metering. Five states (Connecticut, Maine, Maryland, New Jersey and Texas) allow renewable systems of up to 80-100 kW to qualify. Two others (Massachusetts and Rhode Island) set limits of 25-30 kW. Two states (Maine and Massachusetts) do not impose statewide limits. One state, Rhode Island, credits customers for surplus electricity production at the full retail rate of electricity (as opposed to the utility's avoided cost, as in some of the other states).

G. Renewable Portfolio Standards

Five of the 10 states surveyed (Connecticut, Maine, Massachusetts, New Jersey, Pennsylvania and Texas) have implemented renewable portfolio standards. Some states have set relatively modest percentage goals, but ambitious deadlines by which to meet them. For example, Pennsylvania's default service providers must generate at least 2% of their electricity from renewables, increasing by 0.5% each year, starting June 1, 2000. Connecticut must reach a 13% goal by July 2009. Other states have set more challenging percentage targets. Probably the two most progressive renewable portfolio standards were mandated by the states of Maine and Texas. Maine requires that each product offered by every electricity provider meets a 30% renewables floor. In Texas 2,000 MW of additional generating capacity from renewable energy technologies must be installed by January 1, 2009. Additionally, each electric utility in the State will be required to implement energy efficiency measures to meet at least 10% of the electric utility's annual growth in demand.

H. System Benefits Charge

Of the ten states surveyed, nine have implemented system benefits charges (SBCs) to promote environmental programs (the only exception is Maine). Probably the most aggressive is California's "Public Purpose Program," which provides \$540 million over four years (\$135 million per year) to help renewable energy projects compete with conventional fossil fuel sources. In addition, between January 1998 and December 2001, California's Public Purpose Program will provide \$872 million for energy efficiency and conservation activities. Other especially innovative SBCs include Connecticut, which provides \$109 million annually to support renewables and conservation; Illinois, for its unique \$250 million Clean Energy Community Trust to benefit energy efficiency, renewable energy and plant and wildlife habitats; Massachusetts, which has dedicated \$500 million for energy efficiency programs; and New Jersey, for supporting renewables and efficiency in the amount of \$140 million per year.

VIII. Delaware and Electricity Deregulation

The path taken to restructure Delaware’s electricity sector mirrors that followed in other states. In response to federal deregulation efforts and the restructuring activities of other states, electricity restructuring efforts in Delaware began in 1996 and culminated with the passage of HB 10, “The Electric Utility Restructuring Act of 1999.”

As mentioned above, the generation of electricity to supply power is responsible for high levels of pollution, contributing to concerns about its negative environmental and health affects. Prior to deregulation, the primary method to address these concerns in Delaware was through demand-side management approaches, such as utility-run conservation programs. A restructured electricity sector in Delaware presents an opportunity to target these concerns through new mechanisms.

This section examines the environmental aspects of Delaware’s electricity deregulation experience. The State’s electricity characteristics and environmental implications are placed in their regional context. A history of the State’s deregulation is then offered along with a focus on the specific environmental provisions included in the “The Electric Utility Restructuring Act of 1999.”

A. State Electricity Characteristics

In 1997, electric utilities in Delaware served 357,243 customers who consumed over 10 billion kilowatt-hours of electricity at an average price of 7 cents per kWh. That total consumption is nearly evenly split between residential, consumer and industrial users (see Table 5). Residential users pay nearly double the rate of industrial users (9.22 versus 4.82 cents per kWh).

Table 5: Electricity Consumption Levels and Average Price by Customer (1997)

Type of Customer	Percent Consumed	Average Price (cents per kWh)
Residential	32.2%	9.22
Commercial	30.3%	7.19
Industrial	37.0%	4.82

Source: EIA (1999d).

Delaware’s electricity industry is comprised of thirty generation units with a nameplate capacity of 2,287 MW (EIA, 1999d) and is one of the largest sources of pollution in the State. The bulk of both generation and emissions is attributable to 11 generation units, 10 of which are owned and operated by Conectiv (formerly Delmarva Power and Light). In 1997, these 11 units generated more than 7 million megawatt-hours of electricity and emitted 6,471,061 tons of CO₂, 40,930 tons of SO₂ and 15,728 tons of NO_x into the atmosphere (EPA, 1997a). Overall, electric power plants represent Delaware’s largest point sources of carbon dioxide, sulfur dioxide, nitrogen dioxide, and PM 10 particulate matter (EPA, 1999c).

The combustion of fossil fuel in power plants also accounts for the largest volume of fuel consumed in Delaware. The main fuels are bituminous coal, fuel oils (No.6 and No.2), and natural gas. In 1997, coal-fired plants accounted for 62.5% of generation, natural gas-fired plants for 19.5%, and fuel oil-fired plants for 18%. The combustion of coal produced 74.5% of CO₂ emissions from the utility sector, fuel oil accounted for 15.6%, and natural gas for 9.9% (see Table 6).

Table 6: Electricity Generation and CO₂ Emissions by Main Fuel Source (1997)

Plant Type	Electricity Generation (%)	CO₂ Emissions (%)
Coal plants	62.5%	74.5%
Fuel Oil plants	18.0%	15.6%
Natural Gas Plants	19.5%	9.9%

Sources: EIA (1999d); EPA (1997a).

B. Environmental Implications

Delaware is a member of the Pennsylvania-New Jersey-Maryland Power Pool (PJM) that operates the regional electricity grid. PJM has recently become an independent system operator in anticipation of regional deregulation, permitting it to maintain management of the system while allowing for operation of competitive generation markets. Delaware, Maryland, New Jersey, and Pennsylvania have all passed state electricity restructuring laws.

Within the region, Delaware is a low-cost state with an average rate of 7 cents per kWh and industrial rates averaging 4.82 cents per kWh. Maryland is also a low-cost state with an average rate of 6.98 cents per kWh and industrial rates of 4.2 cents per kWh. Prices in Pennsylvania and New Jersey are significantly higher. Rates in Pennsylvania average 7.99 cents per kWh, with industrial rates are typically 5.9 cents per kWh. In New Jersey, the average rate is 10.5 cents per kWh and industrial rates average 8.1 cents per kWh (see Table 7).

Table 7: Average and Industrial Electricity Rates by State (1997)

State	Average Rates (cents per kWh)	Industrial Rates (cents per kWh)
Delaware	7.00	4.82
Maryland	6.98	4.20
Pennsylvania	7.99	5.90
New Jersey	10.50	8.10

Source: EIA (1999c).

The average, and more significantly, industrial price differences within the region could induce an increase of electrical generation from plants in Delaware and nearby Maryland for export to higher-cost regions in Pennsylvania and New Jersey. Since the cheapest generation sources in Delaware are also the dirtiest, emissions of a number of pollutants in the State, namely sulfur

dioxide, nitrogen oxide, and particulate matter could increase, resulting in further negative environmental and health effects.

The combination of plant economics and the environmental characteristics of individual generation units are foremost in determining the emissions resulting from the production of electricity in the State. Emissions vary widely between generation units due to the difference in emission factors of different fuels (coal, fuel oil, and natural gas), the wide disparity in the age of the plants (Delaware's oldest plant was constructed over 35 years ago and its youngest just 6 years ago), and the efficiency of the installed generation capacity.

A comparison of Delaware's oldest and newest generation units demonstrates this relationship between environmental characteristics and operational economics. The oldest generation unit in Delaware, Edgemoor #3, began operation in 1954. The State's most recently built facilities, Hay Road #1-4, were brought on-line in 1993. The coal-fired Edgemoor #3 plant is one of the State's most polluting, with a CO₂ emission factor of 1.43 tons/MWh, an SO₂ emission factor of 15 lbs./kWh, and a NO_x rate of 0.64 lbs./million Btu. The natural gas-fired Hay Road #1-4 facilities, on the other hand, are by far the cleanest generation units in the State. They have a CO₂ emission factor under 0.5 tons/MWh, negligible SO₂ emissions, and a NO_x rate of only 0.07 lbs./million Btu. Edgemoor #3, however, is approximately 0.3 cents per kWh cheaper to operate than Hay Road #1-4—due primarily to the price disparity between coal and natural gas. Edgemoor #3 is also operated at a higher capacity factor than Hay Road #1-4. The result of these economic and environmental factors is that although the older, coal-fired Edgemoor #3 is more economical to operate than the newer natural gas-fired Hayroad #1-4, it is also responsible for much higher levels of pollution.

This example is indicative of a potential problem—the fuel, operation and maintenance costs for Delaware's coal-fired plants are significantly lower than for both fuel oil and natural gas-fired plants. When this is factored in with the electricity price differences that exist within the region and the very real possibility of electricity trading between states, a deregulated electric utility industry could result in an increase in production by Delaware's lower-cost, coal-fired generation units. This, in turn, will lead to higher levels of environmental pollution and health hazards. Electricity generation in Delaware, then, has important local and regional environmental and health implications. Therefore, it is critical that the policies to promote electricity restructuring in Delaware are responsive to environmental concerns. If effective policies are embraced, the restructuring of Delaware's electricity sector offers the opportunity to encourage the production and distribution of electricity in a more environmentally friendly manner.

C. Delaware Legislation

Beginning with the Delaware Restructuring Forum in 1996 and culminating with the passage of a restructuring bill in 1999, a major focus of the discussions regarding Delaware's efforts has been the environmental, health and community issues involved in deregulation and restructuring. Table 7 provides a brief overview of those efforts.

1. The Delaware Restructuring Forum

The process of restructuring Delaware’s electric industry officially began on April 9, 1996, when Delmarva Power and Light (DP&L) (now Conectiv) filed a motion with the Delaware Public Service Commission (PSC) requesting the creation of a public forum to discuss electricity deregulation. Specifically, DP&L requested that stakeholders gather to discuss whether the company’s customers should be allowed to choose their electricity suppliers. In response, the PSC initiated Docket No. 96-83 (PSC Order No. 4185) on April 16, 1996, creating a public forum dedicated to discussing issues related to the restructuring of the electric utility industry in the Delmarva region, and to identify, define, and discuss issues related to opening up the electricity market to competition in Delaware. The forum was instructed to submit a report by December 31, 1996 that addressed issues arising from the restructuring of the electricity sector and offered options.

Table 8: Delaware Restructuring Efforts Related to Environmental and Social Concerns

Delaware Restructuring Forum (DRF): Addressed issues of integrated resource planning (IRP), demand-side management (DSM), increased power plant emissions, and effects on energy efficiency and renewable energy technologies. While Delmarva Power (now Conectiv) and other industry interests claimed that a restructured industry would take into account environmental concerns, public interest groups and environmental experts argued that adverse environmental and health impacts would result in the absence of specific policies and programs.

DRF Planning and Environmental Issues Working Group (1996): Comprised of the Division of the Public Advocate (DPA), the Public Service Commission (PSC) Staff, and the Center for Energy and Environmental Policy (CEEP), the group argued that the restructured market would produce market failures and that support for “public goods” such as environmental quality, universal service, and integrated planning principals should be continued. To correct market failures the group advanced integrated resource reviews, IRRO, renewable energy and energy efficiency development, universal service requirements, consumer education planning, and the equal application of environmental regulations.

Delaware Public Service Commission (PSC) Staff Report (1997): Incorporated many of the ideas put forth by the DRF Planning and Environmental Issues Working Group. Focused primarily on two environmental issues: resource planning, including the development of efficiency and renewable technologies; and maintaining environmental quality and comparable environmental regulations within the region.

Delaware Public Service Commission (PSC) Formal Report (1997): Ignored previous recommendations by stating that responsibility for renewable energy promotion and environmental protection was with the Department of Natural Resources and Environmental Control (DNREC). Asserted the PSC’s oversight of energy efficiency services and advocated maintaining the integrated resource planning (IRP) model.

Delaware Restructuring Act (1999): HB 10, the Electric Utility Restructuring Act, mandates that all customers have access to retail competition with incumbent utilities acting as default providers. The bill included a consumer education program to increase awareness and understanding of electric choice, electricity generation fuel mix disclosure, a green pricing program for electricity generated from at least 50% renewable sources, a net metering program for small commercial and residential customers, and a systems benefits charge of \$1.5 million per year to fund conservation, energy efficiency and renewable energy programs.

Sources: Delaware PSC (1999a), (1999b), (1999c), (1998), (1997a), (1997b), (1996).

Forum participants included DP&L, the Delaware Electric Cooperative, large industrial customers, low-income residential customers, municipalities, power-marketers, alternative energy providers, and environmental advocates. Six restructuring forums were held to focus on

each of the major issues identified: industry structure, retail competition, stranded costs, ratemaking, consumer protection and public policy issues, and transition issues. Participants approached the forums with the goals of educating themselves on the issues in order to assist Delmarva in the development of a restructuring proposal and ensuring that stakeholder interests were incorporated into the plan.

The members of the forum, however, experienced difficulty in reaching consensus on several issues due to the complexity of the problems involved. Moreover, many participants indicated that they were unable to discuss issues in detail without a specific restructuring proposal from DP&L. In response, Delmarva provided a specific, confidential “straw man” proposal. Participants formed subcommittees to discuss the specifics of the proposal and issue recommendations that expanded upon those of the Docket 96-83 report mandated by the PSC. Subcommittees addressed the following issues: service provision to low income customers, electricity provider licensing, provider standards of conduct, metering and billing, integrated resource planning/demand side management, renewable energy, environmental impacts, issues pertaining to the operation of the Pennsylvania/New Jersey/Maryland power pool, and market power issues.

2. Environmental Issues Addressed by the Delaware Restructuring Forum

There were four major environmental issues addressed by the DRF: the future role of integrated resource planning in a restructured market, the future role of demand-side management, potential increased power plant emissions, and the effect of restructuring on the use of energy efficiency and renewable energy technologies.

Integrated Resource Planning

DP&L, independent power producers, and industrial electricity customers indicated that the integrated resource planning (IRP) process would be obsolete in a restructured market since competitive forces would dictate the expansion or contraction of generation capacity at the lowest cost. The Public Service Commission (PSC) staff, the Division of the Public Advocate (DPA), and the Center for Energy and Environmental Policy (CEEP) argued that the IRP process should be retained in a revised format to address environmental and reliability concerns and to ensure that the public had a voice in electricity sector planning.

Demand-Side Management

DP&L, the Delaware Electric Cooperative, large industrial customers, and independent power producers felt that market forces would promote cost-effective DSM programs and provide customers with programs that best suited their needs. The PSC staff, OPA, CEEP, and the Low-Income Energy Consumer Interest Group felt that the PSC should maintain a role in the oversight of demand-side management (DSM) programs. The PSC staff noted that although market forces should provide DSM in theory, a regulatory role might be needed in order to preserve environmental and economic benefits during the transition to a restructured market.

Power Plant Emissions

The PSC staff, OPA, and CEEP believed that a restructured market might have adverse impacts on air quality due to an increased reliance on Midwestern coal-fired generation, as well as

increased use of coal-fired plants by local utilities. However, the Delaware Energy Users Group (a consortium of large industrial electricity customers) and DP&L asserted that wholesale competition had not altered the dispatch of generation units within the PJM region. Delmarva also indicated that it did not foresee a significant change in the dispatching of its generation units with a move to retail competition.

Renewable Energy and Energy Efficiency

DP&L, Delaware Electric Coop, independent power producers, and large industrial customers maintained that the market should determine which renewable energy technologies and energy efficiency techniques are viable, and that marketers would actively target customers interested in “green” energy sources. The Center for Energy and Environmental Policy (CEEP) advocated the support of energy efficiency and renewable energy through a non-bypassable wire charge. The Delaware State Energy Office also supported the implementation of a non-bypassable charge to support these technologies.

3. Planning and Environmental Issues Working Group

As a subcommittee of the DRF, the Planning and Environmental Issues Working Group investigated the environmental aspects of restructuring and presented its recommendations to the Forum as a whole. The group was comprised of CEEP (coordinator), the Division of the Public Advocate, and PSC Staff. On June 6, 1997, the group issued its recommendations. It stated that market failures were likely to occur in a restructured sector due to environmental and public health impacts of electricity generation that would not be fully accounted for by market forces. As a result, market failures would distort resource and technology competition in the electricity sector, with adverse impacts specifically hindering the development of renewable energy and energy efficiency.

The group asserted that long-standing public policy aims supporting “public goods” such as environmental quality, universal service, and the continued pursuit of integrated planning principals should be maintained in a restructured market. The group identified five key areas to correct market failures: resource planning and review, renewable energy development, energy efficiency and conservation, research and development for advanced energy efficiency and renewable energy technologies, and environmental regulations.

The group proposed that the current integrated resource planning (IRP) model be adapted to the restructured market in the form of an integrated resource review (IRR). An IRR would track trends in system reliability, resource diversity, and the environmental impacts of competition on the region. It was also suggested that the current IRP process be applied to an integrated distribution planning (IDP) function to insure the provision of least-cost, environmentally responsible distribution services to Delaware’s customers.

Continued support of renewable energy development was encouraged through a proposed renewable energy portfolio standard (RPS). The RPS would be structured to allow suppliers to fulfill the requirement by: developing renewable generation capacity within the PJM region; purchasing credits from other suppliers developing renewable resources; or paying into a Delaware Sustainable Energy Fund (D-SEF) that would develop renewable energy projects.

The group also argued for a non-bypassable system benefits charge (SBC) of 2 mills/kWh to fund continued investments in energy efficiency. Funds collected through the SBC would then be administered by the Delaware Sustainable Energy Fund.

Finally, to ensure that restructuring did not encourage the increased use of older, dirtier generation sources, the group proposed that Delaware's entire portfolio of generation plants be required to meet the new emission performance standards mandated for new power plants under the Clean Air Act.

4. Delaware Public Service Commission Staff Report

Many of the ideas developed through the DRF were incorporated into the PSC Staff's Report, "Restructuring the Electric Industry in Delaware," which was submitted to the PSC on November 21, 1997 (PSC Docket No. 97-229). The report addressed two primary environmental issues: resource planning, including the promotion of energy efficiency and renewable energy technologies, and the maintenance of environmental quality and regional environmental regulatory comparability.

The PSC Staff Report supported the maintenance of the integrated resource planning (IRP) model at the transmission and distribution (T&D) level. It proposed that transmission and distribution utilities be required to perform modified versions of the IRP that focus on lowering T&D costs and increasing efficiency. Specifically, the report stated that this process should require T&D utilities to pay greater attention to distributed generation resources and targeted energy efficiency programs that are designed to avoid the need for system upgrades or additional T&D capacity.

It also recommended a system benefits charge (SBC) to maintain public support for energy efficiency services at historic levels. PSC staff believed this was necessary because the market for such services is not sufficiently mature in relation to the supply-side services with which it would be competing. Therefore, an SBC levied on a per kWh basis would create a mechanism that would partially balance load growth with support for energy efficiency.

To support the development of renewable energy, the Staff Report proposed that a renewable energy portfolio standard (RPS) be applied to all generation companies selling power in Delaware. It suggested that the level of the RPS reflect those set by other states in the PJM region or those proposed at the national level, and supported the creation of a regional market for renewable energy generation credits that would allow the RPS to be met at least cost. Support was also given to setting comprehensive and consistent environmental disclosure requirements to promote the market for "green power."

The report suggested that state environmental agencies and the Delaware General Assembly consider a number of approaches to ensure that market distortions were not created through the application of inequitable emission standards to different generation suppliers. PSC staff noted that this could be achieved through either: coupling emission requirements placed on suppliers selling power in Delaware with emission trading schemes that will be operable as a means of

implementing Clean Air Act requirements; a requirement mandating all generation facilities from which power is marketed in Delaware to meet the New Source Performance Standards mandated by the Clean Air Act for plants built after 1971; or the implementation of a “generation performance standard,” whereby a generation company’s entire fleet of plants would have to meet an overall average emission standard.

5. Public Service Commission Report

On January 27, 1998, the Delaware Public Service Commission (PSC) released its formal report to the Delaware General Assembly recommending policies for the restructuring of Delaware’s electric utility industry. The Commission’s report did not include several recommendations of the PSC Staff Report with regard to environmental issues. Specifically, the formal report stated that the PSC was not responsible for promoting renewable energy and environmental protection in a restructured electricity sector.

The Commission determined that it should continue a “modest level of oversight” of energy efficiency services after the introduction of retail competition. The PSC also advocated the maintenance of the integrated resource planning (IRP) model for the planning of transmission and distribution systems. The PSC formal report stated that utilities should evaluate a “broad range of options” in order to maintain a more cost-effective transmission and distribution system.

D. The Electric Utility Restructuring Act of 1999 (HB 10)

Background

Prior to deregulation, Delaware had a modest demand-side management portfolio. On January 27, 1998, the Delaware Public Service Commission (PSC) issued its report on restructuring Delaware’s electric industry to the General Assembly. The plan recommended that all customers have access to retail competition 12 months after the legislation was signed into law. Incumbent utilities would remain the “default” providers during the 12-month transition, but the PSC allows bidding for the right to fill this role. Initially, the PSC recommended a functional separation of generation with the authority to order divestiture if it became clear that cross-subsidies were not being avoided. Utilities were given the opportunity to recover all approved, non-mitigatable stranded costs.

The PSC’s final report was issued on January 27, 1998. On January 19, 1999, Representative Roger P. Roy introduced Delaware’s electric restructuring bill, HB 10, in the General Assembly. On March 31, 1999, Governor Tom Carper signed HB 10, which restructured Delaware’s electricity industry beginning October 1, 1999. Customers of Conectiv with peak monthly loads of 1,000 kW or higher could choose their own suppliers starting on that date. Customers with peak monthly loads of 300 kW or more were scheduled to choose their own suppliers starting January 15, 2000. All other customers, including residential customers, are to have choice starting October 1, 2000. Rates for non-residential Conectiv customers are frozen at their September 30, 1999 levels during the transition period (from October 1, 1999 to September 30, 2002). Rates for residential customers are frozen during the transition period at 7.5% below the September 30, 1999, rate.

Customers of Delaware Electric Cooperative with a peak monthly load of 1,000 kW or more can choose their own suppliers starting April 1, 2000. Customers with a peak monthly load of 300 kW or more can choose their own suppliers starting July 1, 2000, and all others, including residential customers, can choose their own suppliers starting April 1, 2001. All Delaware Electric Cooperative customers will receive a rate freeze from April 1, 2000 to March 31, 2005.

Conectiv is to remain the default service provider in its service territory during the transition period. After that, the PSC will designate which provider will act as the default provider in Conectiv's former service territory. During its transition period, DE Electric Cooperative (DEC) will be the default provider for customers in its service area. DEC will remain the default provider for all customers in its service area who do not switch after its transition period.

Consumer Education

A total of \$250,000 is to be collected from both Conectiv and the Delaware Electric Cooperative, based on the providers' 1998 kWh retail sales. In June 1999 the PSC established the Delaware Consumer Education Working Group, comprised of representatives of the PSC, electric utilities, electric suppliers, the Division of the Public Advocate, and other interested parties, to design and implement a consumer education program to prepare the citizens of Delaware for retail competition. The education program is to be designed to increase awareness and understanding of electric choice and to include information on "green power" options, among other topics. The target audience is to be primarily residential and small commercial users. The consumer education program begins a few months prior to each enrollment phase, and a longer-term program will run through mid-2001.

Customer Aggregation

HB 10 does not address customer aggregation.

Environmental Disclosure

In the summer of 1999, the PSC, pursuant to HB 10, issued regulations requiring fuel mix disclosure. The fuel mix used in generating electric power is to be disclosed on a quarterly basis to the Commission and to customers. The PSC did not specify how the information should be provided to customers, nor did it specify how electric suppliers are to calculate their fuel mix. The fuel mix is to be disclosed by percentage from the following categories: coal, oil, natural gas, nuclear, hydro, solar, wind, biomass, geothermal, and other. This information may further be used for consumer education programs. The Commission did not specifically mandate disclosure of emissions characteristics, but the Electric Utility Restructuring Act indicates that environmental factors are to be considered in its implementation.

Emissions Standards

HB 10 does not contain specific provisions regarding emissions standards. Electricity providers remain subject to the emissions regulations established by state and federal agencies.

Green Pricing and Certification

According to Title 26, Chapter 10, §1012(b), the PSC may establish new rules and regulations to protect customers after the implementation of retail competition, including rules regarding service terms and conditions, and “green power.” PSC Docket 49 defines “green power” as electric supply service generated with at least 50% renewable sources. Included in this definition of “green power” is hydroelectric power capacity of any size.

Net Metering

Senate Amendment 1 to HB10 allows for net metering and directs the Commission to devise and establish the rules and regulations of such a program. The bill allows net energy metering for small commercial and residential customers who own and operate electric generation facilities of no more than 25 kW that use solar, wind, hydro or other forms of renewable energy to generate electricity. The facility has to be located on the customer's property and connected to the existing electricity grid. The intent of the generating facility must be to offset or fulfill the customer's electricity requirements.

Renewable Portfolio Standards (RPS) and Set Asides

HB 10 does not include renewable portfolio standards.

System Benefits Charge

Title 26, Chapter 10, §1014, addresses funding for conservation, energy efficiency and consumer education activities. A System Benefits Charge (SBC) of approximately \$1.5 million annually will fund the Environmental Incentive Fund (EIF) to support conservation, energy efficiency and renewable energy (as a conservation technology) programs. An average of \$0.000178 per kilowatt-hour (kWh) of electric generation will be assessed to customers each month. The fund will be administered by the Delaware State Economic Development Office, in consultation with the Delaware Energy Office and the Division of the Public Advocate. Approximately \$800,000 per year (about \$0.000095 per kWh of generation from customers each month) will be allocated to fund low-income fuel assistance and weatherization programs. The Department of Health & Social Services will administer this program.

IX. Recommendations

Recommendations are now drawn from the ten states surveyed in this report. The survey of environmentally related programs in the ten states offers an opportunity to implement the “best” of what has been implemented elsewhere in the United States. Delaware’s electricity restructuring programs are compared to the programs of other states and recommendations are offered to implement and enhance the current environmental programs that accompanied electricity restructuring. The survey of environmental provisions offered in the ten states above gives Delaware an indication of where it stands in comparison to other states and what options are available.

Delaware has made a good start by including versions of consumer education, environmental disclosure, green pricing, net metering and system benefit charge programs. We now turn our attention to enhancing these programs and recommending the implementation of programs found around the country that were omitted from HB 10.

A. Consumer Education

The purpose of a comprehensive public education program should be to maximize public participation in the implementation of retail competition, minimize customer confusion about the changes being undertaken, and equip all customers with the means to participate effectively in the competitive market.

Delaware joins all the other states surveyed here in offering consumer education programs along with its electricity restructuring. After taking into account the small consumer base in Delaware relative to other states, the total of \$250,000 collected for this program is still modest by comparison. For instance, California is spending \$7.88 per residential customer, and Maine \$2.43 per residential customer; yet, Delaware is only spending \$.77 per residential customer.

While consumer education electricity pricing is important, the environmental quality of the electricity chosen also needs to be stressed. Delaware can be a leader in providing comprehensive information about the environmental implications of electricity alternatives. Delaware could list the “green power” options and furnish in-depth education for consumers to make meaningful choices that will improve environmental quality. A concerted long-range program, extending further than the 2001 horizon, may be needed to enable consumers to participate fully in the new competitive market.

Based on the experience of other states, an effective consumer education program in Delaware needs to include the following:

- An information and education initiative that explains the environmental implications of all energy sources;
- A well-designed and comprehensive strategy for public education (using all media) that ensures that all communities in Delaware can become aware of the ways in which change in the electricity industry will affect their lives; and

- A consumer education fund sufficient in amount and years of operation to implement more in-depth education and information dissemination (Delaware’s fund for this purpose seems modest and too short-lived to effectively serve the needs of all of the State’s communities).

B. Customer Aggregation

Delaware’s restructuring legislation did not address customer aggregation. By including a stronger customer aggregation element to its restructuring package, Delaware can better meet the needs of its residential and small business electricity customers, and more effectively promote competition.

A sound aggregation program would put Delaware in a leadership role on this important issue. The elements of a successful aggregation program include:

- Allowing all customer classes to form or participate in aggregate groups;
- Allowing municipalities, cities and counties, organizations and other entities to act as aggregators;
- Allowing for “opt-out” aggregation, which empowers aggregators to provide greater choices and lower prices for its customers; and
- Requiring aggregators to meet the best interests of their constituents, taking into account issues of reliability, price, protection of low-income customers, and improvement of environmental quality.

C. Environmental Disclosure

Policies to promote competitive electricity markets intend to reduce the role of regulators and substitute the decisions of individual consumers in resource allocation decisions. Policies to create genuinely competitive markets must be structured to enable consumers to exercise their buying power for the options they desire. Disclosure is a key tool for achieving this end. Delaware’s restructuring plan, as recently defined by the State’s regulatory body—the Delaware Public Service Commission (PSC)—requires electricity providers to disclose their fuel mix to the PSC and to customers on a quarterly basis. This is an important provision. However, it does not call for disclosure of emissions characteristics, nor does it specify how the information should be provided to customers or how electric suppliers are to determine their fuel mix.

Eight of the ten states surveyed for this report require fuel mix and emissions disclosure according to a uniform method of reporting. These states recognize that true competition, as well as the environmental benefits of customer choice, cannot be achieved without substantial disclosure requirements.

Relying on states’ experience to date in this key area, the essential ingredients for a successful disclosure program are:

- Requiring the disclosure of fuel mix *and* emissions information. Information needs to be provided on how much and what levels of air emissions (especially carbon dioxide, sulfur dioxide and particulates) are released per unit of generated electricity;

- Specifying that fuel mix, emissions characteristics and other information is to be disclosed in a uniform, easy to understand format, perhaps using standardized tables and/or charts to present the information;
- Requiring that suppliers calculate their actual fuel mix and emissions characteristics (not rely on an estimation based on regional averages); and
- Requiring suppliers to list all costs, not only generation costs. An unbundled bill should list transmission, distribution and other charges, in addition to generation prices.

D. Emissions Standards

If not done correctly, competition in the electric power industry could lead to more pollution. Currently, federal environmental laws allow older, dirtier fossil-fuel power plants to generate more pollution than new power plants. This feature of U.S. policy may cause increased use of older plants whose costs of operation are typically low.

To protect against a decline in environmental quality, many states have passed legislation concerning power plant emissions. Both NO_x and SO₂ emissions, for example, are singled out for reductions in Texas and Rhode Island. Other states have decided to require stricter emissions in coordination with regional power pool actions. New Jersey has agreed to abide by stricter emissions standards should they be implemented by at least two other states in the PJM power pool. Such an agreement represents a baseline action to maintain the same level of emissions as other neighboring states, recognizing that air pollution is a regional issue.

Delaware could borrow from other states' experiences on this issue and adopt the following strategy:

- It could join New Jersey in the PJM power pool in agreeing to adopt emission standards set by other states in the pool;
- Delaware could evaluate a rule requiring every power plant—regardless of age—to meet the standards set by the U.S. Environmental Protection Agency for emissions from new power plants.

E. Green Pricing and Certification

None of the states surveyed require electric providers to offer green pricing options. Similarly, Delaware's HB 10 does not mandate green electricity programs. However, green pricing programs are a crucial element in promoting environmentally sound electricity use, especially in states like Delaware, where power facilities in the State do not utilize renewable energy. Though no states obligate providers to offer green pricing programs, many are promoting green pricing on a voluntary basis. One of the best ways to promote voluntary green pricing programs and to tap the significant consumer interest in purchasing clean energy is the adoption of the "Green-e" certification program described earlier. Both California and Pennsylvania are participating in the Green-e program, and several other states, including all of the New England states, have indicated interest in becoming participants. (CEEP has been investigating this option by participating in the Mid-Atlantic Green-e Advisory Committee meetings.) The Green-e program

offers an environmentally responsible definition and certification standard that can be administered by an independent organization.

The experience of other states suggests that a successful green pricing and Green-e certification initiative would be helped by the following State and local actions:

- Promoting voluntary green pricing programs among all electric providers, municipalities, cooperatives and aggregators; and
- Adopting the Green-e certification program.

F. Net Metering

With its electricity restructuring legislation, Delaware joins all but one of the states surveyed (Illinois) in establishing a net metering program. Net metering is an attractive policy option that provides an economic incentive for promoting the commercialization of clean, renewable and sustainable energy technologies without the need for public funding. Delaware joins the other states surveyed with net metering programs in allowing all renewable energy sources to qualify for this program.

Two areas could be enhanced to make this program more attractive for bringing renewable energy on line through net metering. First, Delaware allows for commercial and residential generation of no more than 25 kW to participate in the net metering program. This standard falls short of the 80-100-kW capacity set by five of the states surveyed (Connecticut, Maine, Maryland, New Jersey and Texas), and two other states (Maine and Rhode Island) that do not have any limits to qualify. Setting higher limits enhances the economies of scope of electricity generated by renewables and provides incentives for bringing more electricity generators from renewable sources on line. Second, Delaware could encourage the implementation of renewable sources of electricity generation by offering full retail rates for renewable electricity sold to the grid.

Thus, the following two actions can be considered to help Delaware attract renewable energy investments into the State:

- Raise the kW standard of commercial and residential generators; and
- Offer the full retail rate for electricity generated by renewables and enrolled in the net metering program.

G. Renewable Portfolio Standards (RPS) and Set Asides

Policies that harness competitive forces guarantee a minimum level of resource diversity. A renewables portfolio standard (RPS) applied to all retail suppliers of electricity will increase resource diversity. Delaware does not currently utilize a renewable portfolio standard in its restructuring plan. By contrast, New Jersey and Pennsylvania have started with modest goals to promote electricity generation from renewable sources (2.5% and 2% of electricity generation, respectively).

According to the US Department of Energy's Energy Efficiency and Renewable Energy Network (EREN), Delaware has significant solar, wind, biomass and geothermal resources that can be harnessed for electricity production (EREN 1999: 1). The dedication of resources toward programs that support the development of these resources will go a long way in both helping Delaware meet its clean energy goals and promote new, as-of-yet untapped business markets in the state.

A recent study found that the renewable energy portfolio standard included in federal legislation to be proposed this year would have a negligible impact on electric rates across the country and would be an effective mechanism to level the playing field with regard to renewable energy technologies (Bernow et al, 1997). Based on state and federal proposals to date, Delaware could remain competitive if it required 1% of electricity sold in the State be from renewable energy sources by the year 2001 (CEEP, 2000).

In addition, Delaware might consider the highly successful investment tax credit strategies adopted in North Carolina and Virginia. (In its comments before the Delaware Senate, CEEP proposed such a policy.) Tax incentives have the advantage of stimulating investment in the State—an economic benefit that compliments the environmental advantages to Delaware of promoting electricity generation from renewables.

Guided by experiences in other states, CEEP's staff suggests that Delaware's policymakers consider the following actions:

- Adopt a RPS of 1% by 2001, 3% by 2005, and 4% by 2010.
- Provide an investment tax credit to investors in renewable energy facilities (Virginia and North Carolina offer a tax credit of 30% of the initial capital cost of the project with caps on the total amount of the credit allowed).

H. System Benefits Charge

Delaware's restructuring package calls for a System Benefits Charge (SBC) of approximately \$1.5 million annually to fund energy efficiency and consumer education activities. This is a positive step in promoting energy efficiency and educational programs which otherwise might be neglected in the newly restructured electricity market. End-use energy efficiency can help utilities lower the cost of electricity, reduce customer bills, assist low-income customers in making bill payments, and reduce environmental impacts. Renewable energy projects and consumer education can capture social benefits not readily reflected in market prices for electricity.

Delaware's SBC is an important tool for the promotion of long-term sustainable electricity development. A review of other states' experiences suggests two actions that would enhance the impact of Delaware's SBC. First, guidelines are needed that specifically identify renewable energy projects as eligible for SBC leverage funding when they add to the energy efficiency of the State's electricity infrastructure. Second, a comparison of Delaware's fund commitment with that of other states in the survey (see Table 9) reveals the State may have difficulty competing for sustainable energy investments. Thus, it may be appropriate for Delaware to increase its

SBC or use tax incentives to improve its ability to compete for sustainable energy investments in its communities.

Table 9: Cumulative Customer Contributions to SBC Funds for Environmental Programs

A. All Customers

Ranked in order of highest to lowest revenue per customer

State*	Total SBC Revenue	# Customers (All Customers)	Revenue per Customer
Connecticut	\$1,090,000,000	1,491,648	\$730.74
New Jersey	\$1,000,000,000	3,506,418	\$285.19
Massachusetts	\$750,000,000	2,805,497	\$267.33
Rhode Island	\$85,000,000	465,006	\$182.79
California	\$1,412,000,000	12,941,345	\$109.11
Illinois	\$350,000,000	5,289,828	\$66.16
Maryland	\$90,000,000	2,147,356	\$41.91
Delaware	\$15,000,000	362,843	\$41.34
Pennsylvania	\$55,000,000	5,535,815	\$9.94

B. Residential Customers

Ranked in order of highest to lowest revenue per residential customer

State*	Total SBC Revenue	# Customers (Residential)	Revenue per Customer
Connecticut	\$1,090,000,000	1,351,028	\$806.79
New Jersey	\$1,000,000,000	3,075,812	\$325.12
Massachusetts	\$750,000,000	2,473,175	\$303.25
Rhode Island	\$85,000,000	416,561	\$204.05
California	\$1,412,000,000	11,331,398	\$124.61
Illinois	\$350,000,000	4,751,245	\$73.66
Maryland	\$90,000,000	1,927,960	\$46.68
Delaware	\$15,000,000	324,562	\$46.22
Pennsylvania	\$55,000,000	4,908,255	\$11.21

Sources: EIA 1999d; states' restructuring acts/orders; personal communications with staff of state PUCs.

*Maine and Texas were not included for the purpose of this comparison. Maine's electricity restructuring legislation does not include a mandatory SBC; in Texas, the SBC is used primarily for consumer education purposes, with only a minimal amount going to low-income efficiency programs.

Delaware could take the following steps to improve the effectiveness of its SBC:

- Seek guidelines for the use of SBC funds to develop renewable energy technologies;
- Promote programs (such as tax incentives) that encourage private investment in renewable energy development; and
- Strengthen existing support for energy efficiency programs so that parity is achieved in the competition for sustainable energy investments.

Sources

- Abel, Amy and Larry Parker. 1998. *Electricity: The Road Toward Restructuring*. Congressional Research Service (CRS) Issue Brief for U.S. Congress, IB 96003, Washington, DC.
- American Local Power Project. 1997. *Massachusetts Legislature Passes Nation's First Electric Deregulation Bill with "Community Choice" Intact*. <<http://www.local.org>>.
- American Nuclear Society. 1997. "Late News." *Nuclear News* (February). Available from Lexis-Nexis. <<http://web.lexis-nexis.com/univers>>.
- American Solar Energy Society. 1997. *Disclosing Information for Customer Choice in a Retail Access Market*. American Solar Energy Society Call for Action Brochure.
- Bernow, S., B. Dougherty and M. Duckworth. 1997. "Qualifying the Impacts of a National, Tradable Renewables Portfolio Standard." *The Electricity Journal*, Vol. 10, No. 4 (May). Available on Lexis-Nexis Academic Universe, <<http://web.lexis-nexis.com/universe>>.
- Biewald, Bruce, David White, Tim Woolf, Frank Ackerman and William Moomaw. 1998. *Grandfathering and Environmental Comparability: An Economic Analysis of Air Emission Regulations and Electricity Market Distortions*. Prepared for the National Association of Regulatory Utility Commissioners (NARUC). <<http://www.naruc.org>>.
- Blackwell, Savannah. "Power to the People." *San Francisco Bay Guardian*, 28 January 1998.
- Brennan, Timothy J., K. Palmer, R. Kopp, A. Krupnick, V. Stagliano and D. Burtraw. 1996. *A Shock to the System*. Washington, DC: Resources for the Future.
- Bull, Mike. 1997. *Electricity Industry Restructuring in a Nutshell*. Prepared for the Minnesota House of Representatives (December).
- Bush, Bill. "Senate May Not Green Electricity Deregulation Law." *Springfield State Journal*, 4 March 1998.
<<http://www.web.lexis-nexis.com/univers...5=e00a7ad95ac83975ed0be9bf8368ce59>>.
- California, *Assembly Bill (AB) 1890: Public utilities: restructuring*, 1996.
<<http://www.energy.ca.gov/restructuring/ab1890.html>>.
- California Energy Commission. 1999a. *Customer Credit Account*. Renewable Energy Choice.
<<http://www.energy.ca.gov/greenpower>>.
- California Energy Commission. 1999b. *Renewable Energy Choice*.
<<http://www.energy.ca.gov/renewables>>.

- California Energy Commission. 1999c. *Restructuring California's Electric Utility Industry. Electricity Deregulation.* <<http://www.energy.ca.gov/restructuring>>.
- California Public Utilities Commission (CPUC). 1999. <<http://www.cpuc.ca.gov/>>.
- California Public Utilities Commission (CPUC) staff, personal communications, 1999.
- California Public Utilities Commission (CPUC). 1997. "CPUC Approves Plans to Educate About Electric Industry Changes," CPUC press release (March 31).
- Center for Energy and Environmental Policy. 2000. *Delaware Climate Change Action Plan.* Prepared for the National Renewable Energy Laboratory. Newark, DE: University of Delaware (May).
- Center for Energy and Environmental Policy. 1995. *The Delaware Greenhouse Gas Inventory.* Prepared for the U.S. Environmental Protection Agency. Newark, DE: University of Delaware.
- Citizen's Utility Board (CUB). 1999. *Summary of House Bill 362.* <<http://www.cuboard.org/hb362.html>>.
- Clemmer, Steven L., A. Noguee and M. Brower. 1999. *A Powerful Opportunity: Making Renewable Electricity the Standard.* Union of Concerned Scientists. <<http://www.ucsusa.org/energy/power.opp.html>>.
- Conectiv. 1999. *1999 Fuel Use Forecast.* Filed with the Delaware Public Service Commission.
- Congressional Research Service (CRS). 1997. *Electricity: The Road to Restructuring.* Paper #96003 (June 26).
- Connecticut, *Substitute House Bill (RB) 5005: An Act Concerning Electric Restructuring* (Public Act No. 98-28), 1998. <<http://www.cga.state.ct.us/ps98/act/pa/pa%2DOO28.htm>>.
- Connecticut Department of Public Utility Control (DPUC) staff, personal communications, 1999 and 2000.
- Convergence Research. 1999. *Electric Industry Restructuring OnLine.* Public OnLine Group, Portland, OR. <<http://www.ee.notes.org/glossary.htm>>.
- Database of State Incentives for Renewable Energy (DSIRE). 1999. *State Program and Regulatory Policies Summary Page.* <<http://www-solar.mck.ncsu.edu/dsire.htm>>.
- Delaware Public Service Commission (PSC). 1999a. *HB 10 Summary.* Electric Industry Restructuring (October 1999). <<http://www.state.de.us/delpsc/major/erestructuringlhtml#hb10>>.

- Delaware Public Service Commission (PSC). 1999b. *Rules for Certification and Regulation of Electric Suppliers*. Final rules, PSC Regulation Docket No. 49 (31 August).
- Delaware Public Service Commission (PSC). 1999c. *Consumer Education Plan*. Consumer Education Working Group, Docket 99-156, adopted 13 July.
- Delaware Public Service Commission (PSC). 1998. *Restructuring the Electric Utility Industry In Delaware: A Report to the House of Representatives of the 139th General Assembly from the Delaware Public Service Commission*. PSC Docket No. 97-229 (27 January).
- Delaware Public Service Commission (PSC). 1997a. *Restructuring the Electric Utility Industry in Delaware, Final Draft Report by the Delaware Public Service Commission Staff*. PSC Docket No. 97-229 (21 November).
- Delaware Public Service Commission (PSC). 1997b. *Group Report*. Planning and Environmental Issues Working Group, PSC Docket No. 96-83 (Revised 6 June).
- Delaware Public Service Commission (PSC). 1996. *Report to the Commission in the Matter of the Motion of Delmarva Power and Light Company for the Establishment of A Forum to Examine the Merits of and Develop the Methods for Allowing Customers to Choose Their Electricity Suppliers*. PSC Docket No. 96-83 (31 December).
- Delaware Public Service Commission (PSC) staff, personal communications, 1999 and 2000.
- Delaware River Keeper Network. 1998. *Salem Nuclear Generation Station: Killing Both Marsh and Fish*. Washington Crossing, PA.
- Delaware State Senate. (No date). *Senate Amendment No. 1 to House Bill No. 10*. <[http://Aosta.state.de.us/LIS/LIS140.nsf/d46493839e7692a4852565710057706b/f0bc457839e73ce9854567df005a2541/\\$FILE/Legis.html](http://Aosta.state.de.us/LIS/LIS140.nsf/d46493839e7692a4852565710057706b/f0bc457839e73ce9854567df005a2541/$FILE/Legis.html)>.
- Diamond, J. and J.D. Edwards. 1997. *Mergers, Acquisitions, and Market Power in the Electric Power Industry*. California Energy Commission, Sacramento, CA (April 4). <http://www.energy.ca.gov/restructuring/papers/97-04-04_mergers.html>.
- Energy Efficiency and Renewable Energy Network (EREN). 1999. *States Technical Resource: State of Delaware*. US Department of Energy, Washington, DC. <http://www.eren.doe.gov/state_energy/states_techresource.dfm?state=DE>.
- Energy Efficiency and Renewable Energy Network (EREN). 1998a. *Electric Utility Restructuring Weekly Update*. US Department of Energy. <http://www.eren.doe.gov/electricity_restructuring/weekly.html>.
- Energy Efficiency and Renewable Energy Network (EREN). 1998b. *Green Power Network*. US Department of Energy. <<http://www.eren.doe.gov/greenpower/>>.

- Energy Information Administration (EIA). 1999a. *Status of State Electric Industry Restructuring Activity as of September 1, 1999*. US Department of Energy, Washington, DC. <http://www.eia.doe.gov/cneaf/electricity/chg_str/regmap.html>.
- Energy Information Administration (EIA). 1999b. *Electric Power Annual 1998, Volume I*. U.S. Department of Energy (December). <<http://www.eia.doe.gov/cneaf/electricity/epav1/epav1.html#elecpower>>.
- Energy Information Administration (EIA). 1999c. *Existing Generating Units by State, Company and Plant*. Electricity. Electric Generating Unit Inventory. <http://www.eia.doe.gov/cneaf/electricity/page/at_a_glance/gu_tabs.html>.
- Energy Information Administration (EIA). 1999d. *Existing Generating Units by State, Company and Plant: Delaware*. Electricity. Electric Generating Unit Inventory. <<http://www.eia.doe.gov/cneaf/electricity/ipp/c20p01.txt>>.
- Energy Information Administration (EIA). 1998a. *The Changing Structure of the Electric Power Industry: Selected Issues, 1998*. Washington, DC: U.S. Department of Energy (July).
- Energy Information Administration (EIA). 1998b. *Electric Trade in the United States, 1996*. Washington, DC: U.S. Department of Energy (September).
- Energy Information Administration (EIA). 1998c. *Greenhouse Gases, Global Climate Change and Energy*. US Department of Energy, Washington, DC. <<http://www.eia.doe.gov/oiaf/1605/ggcebro/chapter1.html>>.
- Energy Information Administration (EIA). 1997a. *The Changing Structure of the Electric Power Industry: An Update*. US Department of Energy, Washington, DC (May 30). <http://www.eia.doe.gov/cneaf/electricity/chg_str>.
- Energy Information Administration (EIA). 1997b. *Electric Generator Data: 1997 Inventory of Power Plants*. Washington, DC: U.S. Department of Energy.
- Energy Information Administration (EIA). 1997c. *Electric Sales and Revenue, 1997*. Washington, DC: U.S. Department of Energy.
- Energy Information Administration (EIA). 1995. *Annual Electric Generator Data*. EIA-860 Data File. Washington, DC: U.S. Department of Energy.
- Fahrar, Barbara. 1996. *Energy and the Environment: The Public View*. Renewable Energy Policy Project Issue Brief, No. 3, Washington, DC (October).
- Gallager, Brian, Delaware Division of the Public Advocate, personal communications, 1998, 1999 and 2000.

- Green-e Renewable Electricity Program. 1999. <<http://www.green-e.org>>.
- The Green Power Network. 1999a. *U.S. Green Marketing Activities*. <<http://www.eren.doe.gov/greenpower/marketing.shtml>>.
- The Green Power Network. 1999b. *U.S. Green Pricing Activities*. <<http://www.eren.doe.gov/greenpower/pricing.shtml>>.
- Hirsh, Richard F. 1995. *Teaching About Values and Engineering: The American Electric Utility Industry as a Case Study*. Proceedings of the American Society for Engineering Education and the Institute of Electrical and Electronic Engineers, Inc., Frontiers in Education 95 Conference. <<http://fre.www.ecn.purdue.edu/FrE/asee/fie95/3b4/3b43/3b43.htm>>.
- Hirst, Eric and Bruce Tonn. 1996. "Social Goals and Electric Utility Deregulation." *Issues in Science and Technology*, Vol. 12, No. 3 (Spring): 43-8.
- Hoge, Nettie. 1997. *California's Stranded Consumers*. American Local Power Project. <<http://www.local.org/hoge.html>>.
- Holt, Ed A. 1997. *Disclosure and Certification: Truth and Labeling for Electric Power*. Renewable Energy Policy Project, Issue Brief No. 5 (January).
- Houghton, J.T. et al., (editors). 1996. *Climate Change 1995: The Science of Climate Change*. Contributions of Working Group I to the Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). New York: Cambridge University Press.
- Hwang, Roland. 1995. *Money Down the Pipeline: Uncovering the Hidden Subsidies to the Oil Industry*. Union of Concerned Scientists (September).
- Illinois, *House Bill (HB) 362: Electric Service Customer Choice and Rate Relief Law of 1997* (Public Act 90-0561), 1997. <<http://www.legis.state.il.us/publicacts/pubact90/acts/90-0561.html>>.
- Intergovernmental Panel on Climate Change (IPCC). 1992. *Climate Change 1992: The Supplementary Report to the IPCC Scientific Assessment*. Cambridge, UK: Cambridge University Press.
- Kahn, Edward. 1991. *Electric Utility Planning and Regulation*. Washington, DC: American Council for an Energy Efficient Economy (ACEEE).
- Library of Congress. 1999a. *Bill Summary and Status: 106th Congress*. Thomas: Legislative Information on the Internet. <<http://thomas.loc.gov/bss/d106query.html>>.
- Library of Congress. 1999b. *Bill Summary and Status: 105th Congress*. Thomas: Legislative Information on the Internet. <<http://thomas.loc.gov/bss/d105query.html>>.

- Library of Congress. 1999c. *Thomas: Legislative Information on the Internet*.
<<http://thomas.loc.gov>>.
- Lochbaum, David. 1998. *The Good, the Bad, and the Ugly: A Report on Safety in America's Nuclear Power Industry*. Cambridge, MA: Union of Concerned Scientists (June).
- Maine, *LD 1804: An Act to Restructure the State's Electric Industry* (Ch. 32 of Title 35A, MRSA), 1997. <<http://janus.state.me.us/legis/statutes/35-A/title35-Ach00seco.html>>.
- Maine Public Utilities Commission (PUC). 1999. <<http://www.janus.state.me.us/mpuc>>.
- Maine Public Utilities Commission (PUC) staff, personal communications, 1999.
- Maloney, Michael T., David W. Riggs and Raymond D. Sauer. 1998. *Restructuring Minnesota's Electric Industry*. <<http://www.amexp.org/tp3.10.98.html>>.
- Maryland, *Senate Bill (SB) 300: Electric Utility Industry Restructuring*, 1999.
<<http://mlis.state.md.us/1999rs/billfile/sb0300.htm#Title>>.
- Maryland Public Service Commission (PSC), *In the Matter of the Commission's Inquiry into the Provision and Regulation of Electric Service...* (Order No. 73834, Case No. 8738), 1997.
<<http://www.psc.state.md.us/psc/Proceedings/orders/8738.zip>>.
- Maryland Public Service Commission (PSC), *Electric Service, Market Competition and Regulatory Policies* (Order No. 72136, Case No. 8678, 86 Md. PSC 271, 285-286), 1995.
- Maryland Public Service Commission (PSC) staff, personal communications, 2000.
- Massachusetts, *House Bill (HB) 5117: An Act Relative to Restructuring the Electric Utility Industry in the Commonwealth, Regulating the Provision of Electricity and Other Services, and Promoting Enhanced Consumer Protections Therein* (Chapter 164), 1997.
<<http://www.magnet.state.ma.us/legis/lwas/seslaw97/s1970164.htm>>.
- Messing, M., P. Friesema, and D. Morell. 1979. *Centralized Power: The Politics of Scale in Electricity Generation*. Cambridge, Massachusetts: Oelgeschlager, Gunn & Hain Publishers.
- National Association of Regulatory Utility Commissioners (NARUC). 1999a. *Electric Restructuring Database*.
<<http://ragtime.xenergy.com/client/NARUC/Production/naruc.nsf>>.
- National Association of Regulatory Utility Commissioners (NARUC). 1999b. *How Federal Bills Address Electric Utility Restructuring Issues (June 2)*.
<http://www.naruc.org/Congressional/how_1999federal_bills_address.htm>.

- National Association of Regulatory Utility Commissioners (NARUC). 1998. *How Federal Bills Address Electricity Restructuring Issues* (May).
<<http://www.naruc.org/Congressional/restructuringmatrix.htm>>.
- National Association of Regulatory Utility Commissioners (NARUC). 1996. *Information Disclosure for Effective Customer Choice*. Regulatory Assistance Project (October).
- National Association of Regulatory Utility Commissioners (NARUC). 1996. *Summary of Each State's Restructuring Activities* (March 1). <<http://www.naruc.org/naru-all.htm>>.
- National Conference of State Legislatures. 1998. *Comparison of Federal Electric Utility Restructuring Proposals* (16 April). <<http://www.ncsl.org/statefed/elechart.htm>>.
- National Council of State Legislators. 1998. *Comparison of Selected Electricity Restructuring Legislation*. <<http://www.ncsl.org/programs/esnr/compare.htm#comp>>.
- National Rural Electric Cooperative Association. 1998. *Retail Wheeling Report* (December).
<http://www.nreca.org/ele_restruct.htm>.
- National Grid USA (formerly New England Electric System). 1999. <<http://www.nees.com>>.
- National Renewable Energy Laboratory (NREL). 1998. *State Renewable Energy News: A Compilation of Renewable Electric Activities in the States*. Prepared for the NARUC Subcommittee on Renewable Energy, Vol. 7, No. 3 (Fall).
<<http://222nrel.gov/analysis/ema/ma/projects/sren/sren21.pdf>>.
- National Renewable Energy Laboratory (NREL). 1996. *State Renewable Energy News: A Compilation of Utility-Oriented Renewable Energy Activities in the States*. Prepared by the NARUC Subcommittee on Renewable Energy, Vol. 5, No. 1 (Winter).
<<http://222nrel.gov/analysis/ema/ma/projects/sren/sren13.html>>.
- New Jersey, *Assembly Bill (AB) 16: Electric Discount and Energy Competition Act* (Chapter 23), 1999. <<http://www.bpu.state.nj.us/wwwroot/energy/Dereglaw.pdf>>.
- Nogee, Alan, S. Clemmer, B. Paulos and B. Haddad. 1999. *Powerful Solutions: Seven Ways to Switch America to Renewable Electricity*. Union of Concerned Scientists.
<<http://www.ucsusa.org/energy/power.solns.html>>.
- Northeast States for Coordinated Air Use Management (NESCAUM). 1998. *Air Pollution Impacts of Increased Deregulation in the Electric Power Industry: An Initial Analysis*. Boston: NESCAUM.
- Office of Utility Technologies, U.S. Department of Energy and Electric Power Research Institute (EPRI). 1997. *Renewable Energy Technology Characterizations*.
<<http://www.eren.doe.gov/utilities/techchar.html>>.

- Ottinger, Richard L., D. Wooley, N. Robinson, D. Hodas and S. Babb. 1991. *Environmental Costs of Electricity*. Pace University Center for Environmental Legal Studies. New York: Oceana Publications.
- Pennsylvania, *House Bill (HB) 1509: Electric Generation Customer Choice and Competition Act* (No. 1509), 1995. <http://puc.paonline.com/electric/elect_comp_act.asp>.
- Pennsylvania Public Utilities Commission (PUC), *Rulemaking: Customer Information Disclosure for Electricity Providers*, November 6, 1997.
- Pennsylvania Public Utilities Commission (PUC), *Tentative Order Re: Guidelines for Universal Service and Energy Conservation Programs Made Pursuant to 66 PA CS 2803, 2802(17), 2804(8), and 2804(9) – C-2; Docket No. M-00960890 f 0010*, 1997.
- Pennsylvania Public Utilities Commission (PUC) staff, personal communications, 2000.
- Pennsylvania Office of Consumer Advocate. 2000. *PA Electric Shopping Statistics*. (January 1) http://www.state.pa.us/PA_Exec/Attorney_General/Consumer_Advocate/cinfo/stat.htm
- Pierobon, James R. 1995. “Merging for Critical Mass.” *Public Utilities Fortnightly*, October. As cited in Diamond, J. and J.D. Edwards. 1997. *Mergers, Acquisitions, and Market Power in the Electric Power Industry*. California Energy Commission, Sacramento, CA (April 4). <http://www.energy.ca.gov/restructuring/papers/97-04-04_mergers.html>.
- Plug-In California! 1999. California’s Changing Electric Utility Industry. <<http://www.knowledgeispower.org>>.
- Pospisil, Ray. 1995. “Nuclear Plants Under Deregulation.” *Electrical World*, Vol. 209, No. 1 (January): 56-8.
- President’s Council on Sustainable Development (PCSD). 1996. *Sustainable America: A New Consensus for Prosperity, Opportunity, and a Healthy Environment for the Future*.
- PURPA Reform Group. (No date). *Overview of PURPA and Rationale for Reform*. <<http://www.purpareform.org/rational.htm>>.
- Public Citizen. 1996. *DOE Releases FY 1997 Budget* (March 19).
- Public Citizen. 1995. *Renewable Energy Sourcebook: a Primer for Action (Section I)*. Critical Mass Energy Project (CMEP) (April). <http://www.citizen.org/orgs/public_citizen/CMEP/renewables/renproj.html>.
- Resource Data International. 1997. *Power Markets in the U.S.* <<http://www.powerdat.com/STUDIES/PowerMarket2.htm>>.

Rhode Island, *96H8124b: Electric Utility Restructuring Act* (Chapter 316, Title 39-1-27), 1996. <<http://www.ripic.org/electric/96h8124b.htm>>.

Rhode Island Public Utilities Commission (RIPUC). 1999. <<http://www.ripuc.org>>.

Rhode Island Public Utilities Commission (RIPUC) staff, personal communications, 2000.

Sacramento Municipal Utility District (SMUD). 1999. <<http://www.smud.org>>.

Sissine, Fred J. 1994. *Renewable Energy: A New National Commitment?* Science Policy Research Division, Congressional Research Service, Library of Congress (updated 26 August 26).

Spratley, William. 1997. *Key Solar Questions in Electric Industry Restructuring*. PV4U National Consumer Project.

Starrs, Thomas. 1996. *Net Metering: New Opportunities for Home Power*. Renewable Energy Policy Project Issue Brief No. 2, College Park, MD (September).

Sullivan, Allanna. 1996. "Enron Deal Signals Trend in Utilities." *The Wall Street Journal*, 23 July: A9.

Texas, *Senate Bill (SB) 7: An act relating to electric utility restructuring and to the powers and duties of the Public Utility Commission of Texas, Office of Public Utility Counsel, and Texas Natural Resource Conservation Commission*, 1999. <<http://www.capitol.state.tx.us/tlo/76R/billtext/SB00007F.HTM>>.

Union of Concerned Scientists (UCS). 1977. *The Risks of Nuclear Power Reactors: A Review of the NRC Reactor Safety Study*. Cambridge, MA: Union of Concerned Scientists.

US Department of Energy. 1999. *Comprehensive Electricity Competition Plan* (April 15). <<http://home.doe.gov/policy/ceca>>.

US Department of Energy (DOE). 1998. *Comprehensive Electricity Competition Act*. <<http://www.hr.doe.gov/electric/plan.htm>>.

US Department of Energy (DOE). (No date.) *Comprehensive Electricity Competition Plan*. <<http://www.hr.doe.gov/electric>>.

US Environmental Protection Agency (EPA). 1999a. *Sec. 405. Phase II Sulfur Dioxide Requirements*. Office of Air and Radiation, Regulations, Clean Air Act, Title IV. Acid Deposition Control. <<http://www.epa.gov/oar/caa/caa405.txt>>.

US Environmental Protection Agency (EPA). 1999b. *Report to Congress on Wastes From the Combustion of Fossil Fuels*. Office of Solid Waste and Emergency Response, Washington, DC (March).

- US Environmental Protection Agency (EPA). 1999c. *AIRS Data*. Aerometric Information Retrieval System, Office of Air Quality Planning and Standards, Information Transfer and Program Integration Division, Information Transfer Group. <<http://www.epa.gov/airsdata/>>.
- US Environmental Protection Agency (EPA). 1998. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-1996*. Office of Policy, Planning and Evaluation, Washington, DC.
- US Environmental Protection Agency (EPA). 1997a. *Emissions Scorecard 1997*. Acid Rain Program. <<http://www.epa.gov/ardpubl/acidrain/score97/es1997.htm>>.
- US Environmental Protection Agency (EPA). 1997b. *National Air Pollutant Emission Trends, 1900-1996*. Office of Air Quality Planning and Standards, Washington, DC, EPA-454/R-97-011 (December). <<http://www.epa.gov/ttn/chief/trends96/contents.pdf>>.
- US Environmental Protection Agency (EPA). 1996. *National Air Quality and Emissions Trends Report*.
- US Environmental Protection Agency (EPA). 1995. *National Air Pollutant Emission Trends: 1990-1994*. Washington, DC (October).
- US General Accounting Office (GAO). 1997. *Nuclear Regulation: Preventing Problem Plants Requires More Effective NRC Action*. RCED-97-145.
- US 105th Congress. 1997a. *Electric Consumers' Power to Choose Act of 1997, H.R. 655*, Representative Robert Schaeffer (R-CO).
- US 105th Congress. 1997b. *Electric System Public Benefits Protection Act of 1997, S.687*, Senator James Jeffords (R-VT).
- US 105th Congress. 1997c. *Electric Power Competition and Consumer Choice Act of 1997, H.R. 1960*, Representative Edward Markey (D-Mass.).
- US Nuclear Regulatory Commission (NRC). 1996. *Independent Safety Assessment Report for Maine Yankee Atomic Power Company*.
- Wan, Yih-huei. 1996. *Net Metering Programs*. Topical Issues Brief for the National Renewable Energy Laboratory (NREL), Golden, CO, NREL/SP-460-21651 (December).
- Winneg, K., M. Herman, A. Levy and B. Roe. 1998. *Summary Report, Baseline Survey: Consumer Knowledge, Practices, and Attitudes – Utility Deregulation and Consumer Choice*. National Council on Competition and the Electricity Industry, National Association of Regulatory Utility Commissioners (NARUC) (January).

World Commission on Environment and Development. 1987. *Our Common Future*. New York: Oxford University Press.

Zucchert, Michael. 1997. *Renewable Resource Electricity in the Changing Regulatory Environment*. Prepared for the Energy Information Administration (EIA). <<http://www.eia.doe.gov>>.