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Electric utilities were, until recently, controlled by extensive government regulation, including direct rate regulation. Now a movement toward deregulation and competition is rapidly transforming the industry. These chapters offer a brief overview of the environmental implications of deregulation of U.S. utilities. The regulatory system that is being replaced had important strengths as well as weaknesses; in its final years it incorporated significant environmental initiatives. The impact of deregulation depends on the extent to which these initiatives survive in the competitive, industry of the future, or are replaced by other means of achieving environmental protection.

Environmental Quality

At the end of the nineteenth century, the first electric utilities led to an improvement in urban air quality, replacing countless gas-burning lamps with smokeless electric lights. Yet by the late twentieth century electric power plants had themselves become major sources of air pollution, accounting for two-thirds of the nation's sulfur dioxide emissions and about one-third of nitrogen oxides and carbon dioxide, as well as smaller amounts of air toxins and other pollutants.

Both federal and state regulations have addressed the problems of utility air pollution. The principal federal legislation is the Clean Air Act, which sets strict standards for new facilities. Unfortunately, much of the pollution comes from older facilities that were "grandfathered" and face much looser emission standards. As restructuring has proceeded, these plants have increasingly been targeted for increased pollution control efforts, partly to offset feared increases in sales from these low-cost plants.

Restructuring has also changed the ways state utility and air quality regulators have addressed power plant emissions. In some states, regulators first tried to determine the monetary value of environmental damages from emissions and added this cost into utilities' estimates of the costs of power supply. Traditional regulation required utilities to build and operate power plants that could meet their customers' needs at the lowest possible cost; this was amended to require production at the lowest social cost, i.e. the utility's actual costs plus the value of the environmental damages.

This approach has largely been discarded for a variety of reasons. Estimates of environmental damage costs were uncertain and controversial, application of environmental cost “adders” to new plants alone (the usual regulatory practice) increased the relative attractiveness of older, dirtier plants, and in general it became too difficult politically to monetize and insect non-market costs into a single portion of a single industry.

The risk of increased reliance on older, dirty facilities was also a concern in the first moves toward competition. In 1996, federal regulators ordered transmission lines to grant open access to wholesale transactions between utilities. Many large, low-cost coal plants in the midwest were operating well below capacity; increased transmission access meant that they could sell more power to other regions. Due to prevailing wind patterns, increased coal combustion in the midwest threatened to worsen pollution problems such as ozone and acid rain in the northeast and in eastern Canada. Estimates of the magnitude of this effect differ widely, but the problem underscores the need for broad regional responses to air pollution.

Another aspect of environmental changes triggered by deregulation involves siting, zoning and new technologies. The new plants being built by unregulated producers are almost always gas-fired plants, are highly fuel-efficient, and incorporate state-of-the-are emissions controls.

Additionally, many plant developers are using innovative siting strategies to reduce plant impacts. On the other hand, there are also reports that some developers are too cost-conscious to maximize environmental compatibility, perhaps choosing sites a regulated or local utility would not.

Perhaps the most interesting environmental development is a new emphasis on "combined heat and power" (CHP) systems and small-scale or "distributed" power technologies. By decentralizing energy production, using advanced non-combustion technologies such as fuel cells, and using the waste heat produced by power plants large and small, these new approaches promise a revolution in power generation and its environmental impacts. However, significant issues remain, including whether CHP will flourish under deregulation and the rate at which DG technologies penetrate the market and solve (rather than cause) environmental problems.

Finally, it should be noted that restructuring is credited with greatly expanding the market for renewable or "green" energy. Most renewable energy groups now strongly support restructuring because it increases their ability to sell power to a small but loyal group of power customers who want to "buy green."

“It is possible - perhaps even likely - that restructuring will lead the nation down a path that ends in clean energy and a cleaner environment. It is also likely that the nation will first enter a substantial transition period in which some emissions will increase, perhaps significantly.” [345]

Energy Efficiency and Restructuring

Is energy just a private good, or is there a public interest in using energy efficiently? Arguments for the latter position rest on two grounds. First, the price paid for energy does not reflect the total environmental cost of energy use to society as a whole. Second, there are large economies

of scale in the provision of energy-saving programs and technologies; lack of information, or high transaction costs, may prevent customers from making profitable investments in energy-conserving activities such as insulation.

These arguments have led in the past to utility-sponsored energy efficiency, or demand-side management (DSM), expenditures. In many states, regulators ordered utilities to provide DSM programs, including rebates or reduced prices for energy-efficient equipment, low-interest loans for approved purchases, information and design assistance, cooperation with appliance manufacturers in promoting energy-efficient models, and solicitation of new DSM proposals from customers. Some states required utilities to compare the costs of DSM programs to new power plants, and to invest in DSM whenever it was cheaper than electricity supply. Starting on a small scale in the late 1970s, DSM programs grew rapidly; by 1994 DSM reduced U.S. peak electricity demand by 25,000 megawatts, the equivalent of 50 large power plants or about 3% of nationwide generating capacity.

Some economists claimed that most DSM programs cost more than the value of the energy they saved, while others vigorously disagreed. The heated controversy over this subject was never fully resolved. There is little disagreement, however, about the fact that utility DSM programs entered a period of decline in the mid-1990s as the industry began to prepare for competition and restructuring. DSM was made possible by the regulated utility's status as a monopoly supplier of electricity; in a competitive electricity market, there is no easy way to make a profit selling energy conservation to small customers.

To prevent the loss of energy efficiency programs under restructuring, some states are incorporating mandated minimum levels of DSM expenditures into their deregulation laws. New institutional arrangements are required to fund and administer DSM programs in a competitive industry; one approach is to collect a system benefits charge from all electricity customers, to be used for DSM programs by a state agency or by the local electricity distribution companies. For example, Vermont has created a statewide "energy efficiency utility" that will operate statewide efficiency programs, even after restructuring.

Renewable Energy

Renewable energy, aside from well-established hydroelectric plants, remains more expensive than conventional generation for most purposes. In the mid-1990s, only about 2% of electric generation came from renewable generators connected to the power grid (other than large hydropower). Costs for new technologies such as wind energy and solar photovoltaics have dropped rapidly as the infant industries have expanded; renewables have become competitive for providing service to some remote locations, or for use in particular (e.g., very windy) areas. Advocates have proposed many initiatives to increase production, in the hopes of achieving further cost reductions.

Recognizing the environmental benefits of renewables, many state regulators sought to promote their adoption. The use of environmental damage costs for planning purposes, as described above, gave a boost to renewables (since, unlike combustion plants, they cause little or no environmental harm).

Several proposals to protect renewables under deregulation have been discussed, and in some cases incorporated into state restructuring laws. One popular notion is a renewable portfolio standard, requiring each electricity producer to obtain a minimum percentage of its generation from renewable sources. Another option is a system benefits charge that could be used to fund new investments, similar to that discussed for DSM. Some proposals for restructuring, in fact, contain stronger mandates for renewables than exist today.

The simplest, but perhaps least effective, alternative is to encourage renewable energy producers to offer "green energy" at a premium price. Nevertheless, direct (unregulated) sales of green power are sufficiently brisk to have encouraged significant new investment and activity in some states. Coupled with continuing technology cost reductions, this is causing many traditional power plant builders to also begin investing in renewable plants. Indeed, many renewable technology companies are now part of larger energy conglomerates, including gas and oil companies. While many customers say they would pay more for green energy, early tests have found a small minority actually signing up for it.

Renewable energy with its environmental benefits is a public good, with a social value greater than its market price; there is no reason to think that voluntary individual purchases will produce the optimal level of investment.

The net impact of restructuring on renewable energy, as on DSM and on air pollution, is uncertain. Restructuring may propel environmentally sound alternatives forward into a new era of customer-driven, distributed resources, or backward into smaller niche applications.