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The Electric Power Industry: Economic, Technical, and Institutional Background

1 Introduction

Electricity and the industry that supplies it are of fundamental and growing importance to the U.S. economy. Both an important consumer of primary resources and a supplier of usable energy to homes, stores, and factories, the electric utility industry makes possible the many services that we associate with modern life in a developed economy.

In 1981 electric utilities accounted for a third of US energy consumption, up from 15 percent in 1951. During this period the production of electricity increased at a rate more than twice that of the real (inflationadjusted) gross national product.² The relative importance of electricity as a source of energy in the economy has continued to increase since the 1973 oil embargo and is likely to continue to increase. Today revenues from final sales of electricity are nearly \$100 billion per year. Not only does electricity production account for a large fraction of primary energy consumption, it also requires enormous amounts of capital. The net book value of electric utility assets of investor-owned utilities was \$215 billion at the end of 1980.3 This figure reflects the historical costs of old, long-lived plant and equipment. The cost of replacing these assets today would be much higher. As a result of its rapid growth and capital intensity, the electric utility industry has been an important source of investment spending in the US economy. Between 1971 and 1980 construction expenditures by investor-owned utilities amounted to about 10 percent of gross private domestic nonresidential fixed investment.4

Electricity has played an important role in the growth of the US economy.⁵ It can play an important role in the future growth of the economy as well if an adequate supply of electricity, provided as efficiently as possible, is available to residential, commercial, and industrial consumers. Because of the important role that electricity has played historically and potentially may play in the growth and development

of the US economy, the behavior and performance of this industry is subject to ongoing public scrutiny. The fact that the industry is subject to pervasive government regulation and depends on public enterprises for a significant fraction of production has made such scrutiny more contentious than it otherwise might be.

Heated debates about public policy toward electric power have occurred throughout the industry's history. Indeed the structure, behavior, and performance of the electric power industry and the way it is regulated have been controversial almost from the day that Thomas Edison's first central station power plant was placed in operation in New York City in September 1882. Fifty years ago vigorous debate centered on whether the role of government in this industry should be increased, with public enterprise replacing regulated private enterprise. Currently in the wake of deregulation in other sectors of the US economy, a central issue is whether the role of government in electric power should be reduced, with market forces replacing government regulation as the guarantor of acceptable industry performance.

This study is concerned with evaluating proposals to deregulate various aspects of electricity production and pricing. To make such an evaluation, it is necessary to develop a clear and consistent analytical framework, to specify the objectives of public policy in this area, and to spell out the requirements for achieving those objectives. It is also necessary to understand the particular technical, economic, and institutional characteristics of this industry rather than to attempt to make judgments on the basis of real or imagined analogies with other sectors of the economy. Once these two important steps have been taken, appropriate theoretical and empirical tools can be brought to bear to evaluate the likely consequences of alternative reform proposals and to delineate the associated risks and uncertainties. This basic analytical approach, which combines attention to empirical detail with careful application of relevant theoretical principles, can and should be used to evaluate both deregulation and regulatory reform proposals for the electric power industry and for other industries as well.

Sources of Recent Interest in Reform

The current lively interest in reform of the electric power industry and its regulation has a number of sources. Consumers are dissatisfied with the rapidly rising costs of electricity. Although these increases can be explained by rises in fuel costs, construction costs, interest rates, and

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general inflation, regulation provides a natural forum for individual and collective expressions of dissatisfaction. During the 1960s both nominal and real electricity prices fell, and consumers showed little interest in electric utility regulation.⁶ During the 1970s, as electricity prices began to increase rapidly, especially after 1973, consumer discontent over rising prices became a potent force affecting regulators, governors, and legislators.

Despite rapidly rising electricity prices, the utility industry has also been extremely critical of recent regulatory performance. Within the industry there is a general belief that electricity prices have not risen fast enough to compensate utilities for increases in operating costs, construction costs, and interest rates. During the 1970s real earnings of electric utilities declined, their stock prices fell, and their bond ratings were reduced. The industry generally believes that the expected returns on new investments are not adequate to compensate investors for the capital they must provide, a view supported by substantial independent analysis.⁷

A conflict between consumers interested in lower prices and producers interested in higher prices is not completely unexpected; however, criticisms of the performance of existing institutional arrangements in the electric power industry go well beyond narrow short-run distributional issues. Academic and public interest commentaries have identified a variety of imperfections embodied in current institutional arrangements. Electricity rate structures in the United States have been criticized for not reflecting marginal costs as closely as rate structures elsewhere.8 Conventional rate-of-return or cost-of-service regulation has been criticized for providing inadequate incentives to supply electricity efficiently. Recent regulatory rules designed to accommodate administrative problems associated with regulating prices and profits in a world of rapid inflation, such as automatic fuel adjustment clauses, have been criticized for providing poor incentives to minimize costs. More recently the industry has been admonished for failing to take full advantage of all available technologies, including cogeneration, wind, solar, and smallscale hydro. Continued use of accounting practices that fail to account properly for inflation has also been pointed to.9 Finally the short-run and long-run efficiency implications of regulatory constraints so severe that expected rates of return on new investment are inadequate have also attracted considerable attention.10

Although critiques of the structure, behavior, and performance of the electric power industry have appeared almost continuously over the past century, this is probably the first time that the industry, consumers, and independent analysts all agree that the current system is not working well. They disagree, however, on precisely what the problems are and on the appropriate solutions.

In its recent efforts to find solutions to the problems faced by the electric utility industry, the federal government seems to have assumed that the industry's performance failures are attributable to regulatory constraints that are too severe and to the financial problems and incentives that these constraints create. The concern here goes beyond any narrow interest that utilities have in higher profits; it appears to be focused on the short-run and long-run efficiency consequences of the poor financial condition of most investor-owned utilities.

Prices charged by private utilities, and ultimately the returns that they can earn on their investments, are regulated by state and, to a much smaller degree, federal regulatory agencies. It is generally acknowledged that under current regulatory practice and given the inflation and interest rates that prevailed during the late 1970s and early 1980s, most private utilities expected to earn a return on new investments that was less than the full cost of making those investments (including the cost of the capital employed). Despite a universal requirement to serve and to provide reliable service at minimum cost, utilities responded to these regulatory incentives by reducing investments in new facilities. The response has included cancellation of capacity that may be needed in the long run to meet demands on the system and to replace economically obsolete equipment. Although there is little chance of shortages of generating capacity in the next few years, such shortages could emerge in some regions of the country by the early 1990s if the overall economy recovers. Given the long lead times needed to build new capacity, this problem must be of concern today. Perhaps of more quantitative importance, delays and cancellations of new plant and equipment, continued use of economically obsolete facilities, and installation of energy-intensive equipment to conserve on capital expenditures will lead (and probably already have led) to power supply costs that are higher than they could be if the most economical investments could be financed.12

The recent concern with the implications for economic efficiency of regulatory constraints that are too severe is certainly justified. We believe, however, that it would be shortsighted and inappropriate to evaluate the need for policy reform and the costs and benefits of alternative reform proposals from this perspective alone. If this were the

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only reason to be concerned about the performance of the electric power industry, we would be considering a problem that results largely from the failure of prevailing regulatory institutions to perform efficiently in the recent macroeconomic environment. The logical solution would be to try to make the existing regulatory process work better. Furthermore, current regulatory failures may simply be a consequence of the inability of existing regulatory institutions to cope with rapid inflation and high interest rates. At least the past four national administrations have been committed to reducing inflation and interest rates. Recent reductions in inflation and nominal (but not real) interest rates, although accompanied by sharp reductions in economic growth, appear to have improved the financial condition of the electric utility industry so conceivably the problems caused by regulation-induced financial constraints that are too severe will simply disappear in time.¹³ After all, from the financial perspective, the system worked well during the 1960s with essentially the same industry structure and the same regulatory institutions that we now have.

Any case for fundamental structural reform must be based on a broader, longer-term evaluation of the performance of the electric power industry. One must examine the strengths and weaknesses of the current system as it has functioned and is likely to function in a variety of macroeconomic environments. Any significant structural reform is likely to endure for decades, so it makes little sense to tailor it precisely to recent macroeconomic conditions. Interest in structural reform of the electric power sector predates the financial difficulties of the late 1970s. This historical interest reflects broader considerations of economic efficiency that include problems caused by regulation in a world of rapid inflation but that go far beyond these. We adopt this broader perspective here.

Many of those who have been concerned with the economic efficiency of the electric power system have argued for decades that power is neither supplied at least cost nor priced appropriately. Problems of this sort cannot persist in competitive markets; there the efficient are rewarded and the inefficient forced out. But serious inefficiencies of supply and pricing can persist in an industry, like electric power, in which most sellers have protected monopolies and regulated prices, so that they are insulated from the discipline of the marketplace.

Critics have also pointed to substantial inefficiency in the regulated transportation industries for decades, and most have called for deregulation of that sector.¹⁴ Many observers believe that the postderegulation