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SUPPORT FOR SOCIAL GOALS IN A MORE COMPETITIVE ELECTRICITY INDUSTRY

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EXECUTIVE SUMMARY

What is a social goal? This is not a trivial question because of the subjectivity associated with the process that raises an activity to social goal status. The goal-defining process used in this research begins with a listing of the *unsubsidized* activities that a utility might be engaged in while producing and delivering electricity services. This list is then divided into those activities that an unregulated and profit-maximizing utility would engage in voluntarily and those that do not meet this criterion. The latter are considered to be social-goal candidates. Next, these candidates are ranked by the significance of their effects on society's quality of life. Those candidates appearing to have insignificant effects are discarded with the remainder representing *potential* social goals. At this point in the process, it is necessary to construct a correspondence that ties together the potential social goals and the available means to support them. Each potential social goal with a feasible means of support is classified as a *realizable* social goal with the remainder earning the designation of infeasible. Finally, legislators and regulators determine the levels of financial support that will be allotted to the realizable social goals.

Two examples are used to describe this process concretely. The first sketches pollution abatement's evolution to a social goal. The historical evidence strongly suggests that a utility is unlikely to voluntarily engage in unsubsidized pollution-abatement activities. However, a mountain of scientific evidence exists showing that pollution abatement has a significant positive effect on society's quality of life. Thus, pollution abatement is a potential social goal. Meanwhile, the economic research indicates that a variety of feasible means exist to encourage a utility to engage in this activity. Consequently, pollution abatement can be classified as a realizable social

goal. Lastly, reams of physical evidence from scientific research in this area can be used by legislators and regulators to set the acceptable levels of specific pollutants.

The second example traces the evolution of demand-side management (DSM) into a social goal. The starting point is the observation that the vigor of the policy debates surrounding the implementation of the *Public Utilities Regulatory Policies Act* strongly suggests that a utility prefers to shun unsubsidized DSM. However, the passage of this Act into law firmly establishes that the federal government had perceived DSM as having the potential to improve the quality of life in the United States.[1] Thus, DSM is a potential social goal.[2] It is well-known that scientific research dealing with energy conservation indicates that many ways exist to reduce energy consumption. Hence, DSM is placed properly in the category of realizable social goals. Lastly, economic research suggests that legislators and regulators could determine acceptable levels of DSM.

These examples of how an economic activity is transformed into a social goal are incomplete in the sense that they do not describe the welfare platform that lies beneath them. In this regard, it is important to note that the welfare platform underlying a social goal is free floating in every instance. As a result, a social goal is inherently unstable. At any specific point in time, a particular social goal might be very high on the government's priority list. At a later date, it may slide down to a low-priority position.

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[1] National security was enhanced because DSM made the United States less dependent on oil imports from nations whose foreign relations' policies were not always congruent with the foreign relations' policies of the United States. DSM stemmed the pressures pushing the United States' economy towards higher energy prices because DSM was cheaper than running oil-fired generating units to meet peak-period loads or building and fueling new generators to meet the rising demand for electric power and electricity in all periods.

[2] DSM is a feasible means to reduce pollutants. Every kilowatthour that is not consumed and every kilowatt that is not generated represent a reduction in the pollutants emitted by fossil-fueled generation plants or the radioactive waste created by nuclear plants. Still, this fact alone is insufficient to establish DSM as a social goal in its own right precisely because it uses pollution abatement to legitimize itself.

Eventually, it might disappear from the list completely. Hence, in the final analysis, every social goal is a transitory phenomenon.

The instability of a social goal is a problem for regulators. Although they know that the urgency of a particular social goal may change over time, they do not know how quickly the goal will move to a different priority category. This lack of knowledge forces them into the position of having to periodically revisit a social goal for the purpose of reassessing the information that supports it. This continual reassessment of the social-goal priority list raises the practical problem of whether any social goal should be viewed as permanent. A solution to this problem is to attach the presumption that a social goal is permanent until it is relatively certain that there are legitimate reasons for the government to remove it from its priority list in a short period of time. The following example describes how this solution is used to determine that DSM is no longer a permanent social goal.

For some time now, it appears that the United States has not felt that its national security is threatened by the current level of its dependence on imported oil. Furthermore, oil-fired generators have been replaced with facilities that use domestically produced fuels, and in addition, the need for new generation capacity is not pressing. These changes to the political and economic environments have caused DSM to slide down the government's priority list. With the current movement toward a more competitive generation market and the government's preference for lower wholesale and retail electricity prices, it is easily seen that *cost-increasing* DSM has fallen way down the list. In effect, competition has bifurcated the practice of DSM into cost-increasing and cost-decreasing techniques with the cost-increasing techniques threatened with extinction.

A more competitive generation market has created other influences that diminish a utility's desire to support social goals. More competition in generation is likely to prod a utility into discovering ways to recover its stranded costs. Soon after that, it will have to find means to recover the undepreciated costs of obsolete services and the new costs of providing interconnection and interoperability. Moreover, it has to accomplish these three tasks as its competitors are threatening its revenue stream. Under these conditions, it is natural for the utility to want to cut the costs that it incurs to achieve social goals. In effect, competition in generation and its spillover effects into the wholesale and retail markets reduce the probability that regulators can devise a mechanism to induce the utility to continue to support social goals.

Even if a utility voluntarily wants to support social goals, a more competitive generation market has put forces into motion that may prevent it from fully funding them. Given a choice of power and energy suppliers, some *profitable* customers may defect to a utility's competitors. These lost revenues are support for operating expenses, plant depreciation, a rate of return on investment, and social-goals-related fixed and variable costs. The general rule is that fewer revenues provide support for fewer costs. Thus, a utility may find it necessary to cut its costs in response to the lost revenues that are created by these defections. Support for social goals may be one area to cut costs. Consequently, competition in generation clearly can reduce a utility's capability in this area.

A utility's support of social goals is threatened further when market-based electricity prices and the utility's profits decline as a result of the spillover of competition into the wholesale and retail markets. Declining electricity prices for only some customers in either market ensure that a utility will incur the displeasure of its remaining customers if it tries to *raise* their prices in an effort to continue support for social goals. Meanwhile, declining profits ensure that a utility will be criticized by its stockholders if it does not cut its expenditures on social goals. In fact, it would appear that a utility is almost obligated to cut social-goals-related costs when the spillover effects of competition in generation do what they are supposed to do.

Cost-cutting in response to revenue losses or falling profits is always a troublesome problem. Fewer personnel often result in fewer tax dollars from individual income taxes. Furthermore, stranded costs may further depress the tax dollars received from a utility. These reduced tax payments come at an inopportune time, if a utility has not convinced the government to increase taxes obtained from nonutility sources in order to relieve the utility's burden of supporting social goals.

The observations in the preceding paragraphs strongly suggest that support for social goals has to become more broad based. In particular, a utility's competitors have to be treated as sources of *direct* support for social goals. There are several means that can be used for extracting support from competitors. The combination suggested herein contains: (1) a nonusage sensitive access fee for generators, (2) a usage-sensitive surcharge on distribution services, and, as a last resort, (3) an exit fee for direct-access retail customers.[3]

Funds for the support of social goals can be extracted *directly* from a utility's competitors because the markets downstream of the competitive generators are essentially noncompetitive. The transmission and distribution markets are monopolies, and perhaps, they may even be natural monopolies. This market characteristic suggests that price increases for transmission and distribution services can provide the funds that could be used to support social goals. In fact, the only market participant that would not supply *direct* support for social goals under this plan is a utility's stockholders. This omission can be rectified if a utility agrees to charitable contributions for the purpose of supporting social goals. Of course, the utility's stockholders recapture some of this money because the designation of the utility's contributions as charitable lowers the utility's taxes.

The question then is: What level of support for social goals is available from the *entire* electricity industry as the industry's generation market becomes more competitive? The analysis in this report demonstrates that the answer lies in part in tradeoffs. Social goals can be supported if transmission and distribution companies

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[3] If the FERC cooperated with the state commissions, a fee for accessing the transmission system and a surcharge on transmission services could be levied for the purpose of supporting social goals.

can earn supranormal profits. Direct-access retail customers and energy service entrepreneurs can be conscripted into the support of social goals by requiring them to pay surcharges on transmission and distribution services. Access fees for transmission and distribution can be used to bring exempt wholesale generators, nonutility generators, and all other generators into the pool of market participants directly supporting social goals. Finally, an exit fee can be used to press particular types of direct-access retail customers into the service of further supporting social goals.

Even though the above-mentioned means to support social goals can have significant effects on the prices charged in the wholesale and retail markets, they do not guarantee that the electricity industry will be able to continue its current level of support for these goals. The main conclusion of this report is that all the sources of direct support for social goals have upper limits. These limits are determined by the behavior of a utility and its regulators. They are highest when a utility's distribution and transmission companies maximize their profits subject to regulatory and political feasibility constraints. The problem is that these supranormal profits, even if they are fully dedicated to the support of social goals, may not be sufficient to cover the current cost of supporting the existing social goals.

The effects of a more competitive generation market on a utility's profits warrants study because of the concern that less profits prevent a utility from supporting social goals. The analysis is this report shows that this concern is not unfounded at present and for the foreseeable future. Even so, there are intermediate markets for transmission and distribution services that a utility can use to extract supranormal profits for the support of social goals.

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FOREWORD

This report is the second of two research studies on this important subject (recall *Post-Reform Continuation of Social Goals*). The current study considers the level of support available from the entire electric industry for social goals as the industry's generation market becomes more competitive. It also deduces the nature of the tradeoffs required (mainly allowing above-normal profits from transmission and distribution companies and dedicating them to the support of social goals).

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CHAPTER 1

INTRODUCTION

The regulated utilities' dominance over wholesale and retail electricity is waning to the point that they want to be freed of legislative and regulatory mandates that obligate them to provide support for social goals. The economic basis of the competitive threat facing these utilities is the combined-cycle gas turbine's attractive total and average costs of production. Essentially, this new technology has mitigated the importance of the economies of scale often associated with nuclear and coal-fired plants.[1]

A prior report by the National Regulatory Research Institute (NRRI) addressed the feasibility of requiring regulated utilities to continue their support of social goals. That study concluded that the utilities' continued support is feasible as long as unregulated generation and energy service companies also contribute to this effort.[2] The earlier report is a suitable starting point for the present study, which takes a realistic look at how the utilities can continue to support social goals as the generation market becomes more competitive. The purposes of this research are to bring the realities of supporting social goals into focus and then to construct a social-goals-support plan that is consistent with these realities. In the course of doing so, it is

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[1] H. G. Thompson, et al., *Economies of Scale and Vertical Integration in the Investor-Owned Electric Utility Industry* (Columbus, OH: The National Regulatory Research Institute, 1996).

[2] R. J. Graniere, *Post-Reform Continuation of Social Goals* (Columbus, OH: The National Regulatory Research Institute, 1996.)

necessary to examine the regulated utilities' capabilities to support social goals, and how these capabilities can be used to extract support from their customers.

Some words of caution are in order as to how to use this report's conclusions. They should not be used to infer that all of the support for social goals should come solely from the regulated utilities. Also, they should not be used to infer that the existing levels of utility-supplied support for social goals should be continued. Nor should they be construed as evidence that these levels of support are optimal. Instead, these conclusions refer back solely to two questions: Does a more competitive electricity industry cause the utilities to reduce their support of social goals? How can legislators and regulators continue to use the regulated utilities to support social goals, while simultaneously allowing competition to flourish in the generation and energy service markets?

The remainder of this chapter discusses public policy decisions that have advanced competition in the electricity industry. The story begins with the *Public Utilities Regulatory Policies Act* (PURPA), which inserted competition into the generation and energy service markets. It ends with state-supported initiatives to induce the spillover of competition in generation into the retail market. Notable events lying in-between are the *Energy Policy Act* (EPACT) and the Federal Energy Regulatory Commission's (FERC) *Order 888*. The former elevated a competitive electricity industry to a national policy, while ensuring the spillover of competition into the wholesale market. The latter, among other things, required the full recovery of the mitigated and verifiable stranded costs that are created by the spillover of competition into the wholesale market.[3]

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[3] Stranded costs are existing fixed costs that are no longer covered by existing prices for regulated services. See K. Rose, *An Economic and Legal Perspective on Electric Utility Transition Costs* (Columbus, OH: The National Regulatory Research Institute, 1996).

First Signs of Competition

Crude oil prices were low and supplies were secure in the 1960s, and consequently, substantial amounts of oil were used to generate electric power during peak periods of demand. Moreover, despite the highly publicized "automobile gas crisis" in the early 1970s, the demand for electricity continued to grow throughout the decade. However during the 1970s, politically and economically motivated reductions in the supply of Middle Eastern oil caused rapid price increases for crude oil. The rising oil price contributed to a significant increase in the regulated utilities' total costs of production, which in turn pushed their profits downward. The fuel adjustment clause (FAC), which allowed the utilities to automatically adjust their rates upward to reflect their higher fuel costs, was the regulatory response to this problem.

In spite of the adoption of a FAC, many utilities submitted rate cases to state regulatory commissions. The primary cause of these rate cases could be traced back to the rapid growth in the demand for electricity during the 1960s. In response to these substantial growth rates, the utilities had undertaken ambitious plant construction programs in the 1970s. These programs were drawing to a close by the end of that decade, and the utilities were asking for significant rate increases for the purpose of recovering the fixed and variable costs of the associated generation facilities.[4] The economic impacts on consumers of a FAC and these rate cases were immediate. Electricity prices soared, and their volatility increased.

The economic hardship associated with high and fluctuating prices for oil imports created a political reality demanding that the United States reduce its dependence on Middle Eastern oil. However, it also was politically infeasible to use rising electricity, heating oil, and gasoline prices to put the brakes on the quantity of oil imports

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[4] Some of these costs were associated with the construction of nuclear power plants that encountered licensing and other safety-related problems causing construction delays and cost overruns.

demanded. Instead, the United States Congress and the President passed PURPA, which strongly suggested that the utilities conserve oil. This suggestion implied that the utilities had to reduce their peak-period demand because it was met by running oil-fired units. Time-of-day pricing, load management, and energy efficient appliances were the tools that were recommended to achieve this end. These tools clearly implied the management of the demand side of the electricity market. Thus, demand-side management (DSM) became the public policy of conservation.

It was always apparent that the regulated utilities did not have complete control over the development and deployment of DSM technologies. Nonutilities had previously installed insulation, and nonutilities were capable of doing energy audits. Moreover, there is a long economic history of nonutilities producing household appliances and light bulbs. Because PURPA had elevated DSM to the status of a national policy, these nonutilities were given greater access to the utilities' customers. Hence, competition was introduced to the energy service market.

At the same time, the nature of the firms producing and supplying electric power changed as a direct consequence of PURPA's promotion of co-generation and renewable resources. The provisions of PURPA mandated that the regulated utilities had to purchase the electric power that was produced by unaffiliated and unregulated co-generators and other firms using renewable resources to generate power. Thus, the presence of nonutility generators (NUGs) in the electricity industry became public policy. Essentially, the support supplied to co-generation and renewable resources by PURPA served to open the generation market to competition.

Strengthening of Competition

DSM caught the public's eye and appealed to the public's fancy during the early 1980s. Tax credits were given to homeowners who brought their homes up to the recommended insulation level. Tax credits also were used to promote solar heating in all sectors of the economy. Energy consumption ratings were put on light bulbs and household appliances. Utilities were ordered by their regulators to provide energy audits and to install shower restrictors, weather stripping, and other energy saving devices at low or no direct cost to their customers. In addition, regulators ordered utilities to submit energy conservation plans, and some state regulatory commissions ordered their utilities to meet energy conservation goals. Each of these actions reaffirmed again and again that consumers had access to nonutilities that provided alternatives to utility-supplied electricity. Thus, the precedent of competition in the energy service market was firmly established during the 1980s.

Competition also was gaining ground in the generation market during the 1980s. Co-generators were provided with a seemingly secure market for their excess power. Utilities were forced to accept the co-generator's power and to pay a price that was equal to the utilities' avoided cost. Firms using renewable resources to generate power, sometimes known as "qualifying facilities," also were provided with the same market guarantee. Over time, this guarantee was extended to independent power producers (IPPs).

The importance of the avoided-cost guarantee was minimized when it became a generalized practice to disallow some of the costs of coal-fired and nuclear plants and not to put the allowed portion of these costs immediately into rate base upon completion of the plant's construction. These regulatory actions strongly suggested that the utilities would not be allowed to earn the full expected return on their investments. In response to this signal, the utilities became reluctant to commit their shareholders to new plant construction programs. Instead, they turned to the newly introduced competitive bidding process to meet their needs for additional generation facilities. Hence, co-generators, qualifying facilities, and IPPs now competed directly against each other and the utilities.

Change in Competitive Circumstances

Although competition was noticeably present in the generation and energy service markets during the 1980s, it did not represent a financial threat to the utilities. Fuel prices started to fall steadily during the latter half of this decade, and tax credits for renewable resources and home insulation were not reapproved by Congress. The excess capacity created by aggressive construction programs had lowered the utilities' avoided costs, which in turn lowered the profit potential of co-generators, IPPs, and qualifying facilities. As a result, it was harder and harder to resort to the utilities' avoided costs as the economic justification for further expenditures on DSM. Simultaneously, fewer competitive bidding opportunities were surfacing since the initial investments in DSM and other factors had slowed the growth in the demand for electricity. Thus, it appeared that the competitive pressure on the electricity industry would fall to a moderately active level during the 1990s.

However, the expectation of less competitive pressure on regulated utilities was not fulfilled because of technological improvements to the combined-cycle gas turbine. These technical advances served to increase the competitive pressure on the regulated utilities because they pushed the average cost of electric power produced by a combined-cycle gas turbine to a level that currently is below the average cost of electric power that is produced from many of the utilities' existing generation units. How did this happen? The explanation is that falling avoided costs do not necessarily imply that the utilities can lower their prices. In fact, it often is the case that the regulated utilities must raise the prices for their regulated electricity services after they have *completed* their construction programs because the fixed costs of the new plants often exceed the cost savings that are associated with new fuel mixes burnt by the new plants. Consequently, the per-unit costs of many of the utilities' competitors are lower than the utilities' electricity prices.

The early 1990s also were witness to a concerted effort in Congress to allow competition to flourish in the electricity industry. The spirit of EPACT clearly signals that wholesale competition is the overarching public policy. For example, its language instructs the FERC to create new regulatory institutions that are compatible with more freedom for wholesale and retail customers to choose their own electricity suppliers. The open transmission access and comparable transmission service mandates found in Order 888 are the FERC's response to this Congressional directive. Open access and comparable services make it easier to attack the utilities' large market shares in generation. They mitigate the upstream market power that the utilities possess when they own and operate transmission facilities and compete in the generation market. Consequently, these mandates provide additional support for the FERC's prior decision not to regulate the nonutilities in the generation market.

Obviously, a more competitive generation market runs counter to the regulated utilities' economic interests. From their perspective, unregulated nonutilities improperly impose pricing and marketing pressures on them that are derived from the former's regulatory advantages. Predictably, they chose to plead for more flexibility to competitively price their generation services. Their pleas did not go unheeded by the federal government. In the course of passing EPACT, it has created the "exempt wholesale generator". This new organizational form provides the utilities with the means to enter the generation market on an unregulated basis.[5]

The expectation is that the exempt wholesale generators (EWGs) will be in the position to enter the generation market economically. As always, economic entry into an existing market raises the threat of stranded costs, especially when the regulated incumbents are high-cost firms with rigid price structures. Why? The incumbents' inability to respond vigorously to the pricing initiatives of the new entrants make them

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[5] An exempt wholesale generator is not subject to the ownership restrictions of the *Public Utilities Holding Companies Act*, and consequently, exempt wholesale generators can be owned and operated by holding companies that also own and operate regulated utilities.

slow-moving targets. They also are easy targets because their high-cost product lines can be attacked at will.

Although it is conceivable that EWGs (and NUGs) will dominate the generation market,[6] the stranded-cost effect could be restricted by initially limiting the sales of these unregulated firms. In particular, they could sell their power only to meet the *growth in demand* for electric power. This restriction would limit them to covering quantities demanded of electricity that had never been served by the utilities.[7]

However, elimination of stranded costs by restricting the EWGs and NUGs to serving the growth in the demand for electric power is inconsistent with the rapid spread of competition throughout the electricity industry. This practice clearly implies that the utilities will be the sole suppliers of the existing loads indefinitely, which surely must restrict the NUGs' and EWGs' growth potential. Still, competition in the generation market, so restricted, does eliminate the threat to the utilities' financial well-being because they continue to serve their existing wholesale and retail loads. Their financial positions are threatened only when competition is extended to their existing loads because then and only then are the utilities faced with the possibility of stranded costs.

Obviously, a threat to the utilities' financial well-being becomes more probable when the utilities' customers begin to complain that regulated electricity prices are too high. These complaints necessarily cause a build-up of political pressures that usually

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[6] A necessary condition for the realization of this conjecture is a continuous and significant fall in the average cost of power supplied by the EWGs and NUGs relative to the average cost of power supplied by the utility. This condition induces the replacement of retired regulated generation plants with unregulated generation facilities. See Rich Hyndman, Larry Charach, and Bryan DeNeve, "Restructuring the Alberta Electricity Industry," mimeo, presented by the Alberta Department of Energy at The Ninth Annual Regulatory Education Conference, sponsored by The Canadian Association of Members of Public Utility Tribunals (CAMPUT), at the Rimrock Resort Hotel in Banff, Alberta, Canada from May 7-10, 1995; Robert J. Graniere, *An Analysis of Electric Power Industry Reform in Alberta* (Columbus, OH: The National Regulatory Research Institute, 1996); Celine Belanger, "The Alberta Energy and Utilities Board 1996 Agenda," *NRRI Quarterly Bulletin* Vol. 17, no. 3 (1996): 367-372.

[7] If growth in demand for electric power is served by NUGs and EWGs, then the regulated utilities may be able to avoid deploying new generation facilities. However, utilities may be forced to build new generation facilities when NUGs and EWGs cannot fully meet the new demands for electric power.

lead to targeted price reductions. These price reductions often result in lower profits, thereby threatening the utilities' ability to meet their stockholders' expectations and to fulfill their existing obligations to support social goals. Arguably then, utilities might not be able to continue to support social goals as the generation market becomes more competitive.

Of course, it always is possible that a more competitive generation market will provide the utilities with cost savings that are sufficient to compensate them for their stranded costs.[8] However, the general feeling among legislators, regulators, and industry executives is that these cost savings will not represent full stranded-cost compensation. Therefore, the conventional wisdom is that the current regulated prices for wholesale and retail services are insufficient for the continued support of social goals at their existing levels.

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[8]If this possibility is realized, then the utilities' current prices for wholesale and retail services are sufficient to continue their existing support of social goals.

CHAPTER 2

INDUSTRY PROGRAMS AND RESOURCES IN SUPPORT OF SOCIAL GOALS

Introduction

Why do utilities provide financial support for social goals? In most instances, they are complying with mandates issued by legislative and regulatory authorities.[9] Government becomes involved because the utilities generally put forth only minimal effort in support of such goals. They behave in this manner because their private interests are inconsistent with society's interests, which left unaddressed lead to insufficient voluntary support for social goals.

The protection of the public interest is the primary reason for supporting social goals. Consider, for example, financial assistance for the utilities' low-income customers. It is in the public interest for the utilities (and others) to provide funds for this purpose because the availability of electricity at a reasonable price is essential and vital to society's well-being.[10] Meanwhile, the promotion of DSM is in the public interest for at least two reasons. It enhances national security and restrains the growth in the

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[9] Robert J. Graniere, *Regulatory Approaches for Renewable Resources* (Columbus, OH: The National Regulatory Research Institute, 1994).

[10] J. C. Bonbright, A. L. Danielsen, and D. R. Kamerschen, *Principles of Public Utility Rates* (Arlington: VA: Public Utilities Reports, 1988): 8. For a discussion of low-income assistance programs, see Robert Burns, et al., *Alternatives to Utility Service Disconnection* (Columbus, OH: The National Regulatory Research Institute, 1995).

demand for electricity. Lastly, the control of pollution is in the public interest because this activity improves the medical well-being of many individuals. Surely, there would be no pollution in an ideal world of immeasurably considerate individuals. No matter what the cost, each individual would do what is necessary to prevent it. However, pollution does exist because individuals acting on their private interests compare their private costs of not polluting with their private costs of pollution. The problem with the level of pollution thus determined is that the social cost of pollution is greater than the private cost of pollution.[11] Consequently, there is too little pollution control.[12]

Support for Low-Income Customers

The electric industry supports low-income customers in a variety of ways. Assistance programs include partial payment of electricity bills, income-based billing, budget billing, deferred billing, arrearage forgiveness, conservation loans, energy audits, weatherization assistance, budget counseling, referral services to social support agencies, targeted conservation, and targeted financial assistance. Table 2-1 describes the optional billing arrangements that are available to low-income customers. Each one has the effect of alleviating the low-income customers' stress levels. For example, budget billing helps to avoid the stress of very high electricity bills during the heating or cooling seasons. Deferred billing relieves some of the stress that is caused by job loss or severe injury. Income-based billing helps to avoid the stress of substandard living conditions. Finally, partial payment eliminates the stress that is caused by collection agencies and "dunning" notices.

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[11] W. Kip Viscousi, John M. Vernon, and Joseph E. Harrington, Jr., *Economics of Regulation and Antitrust* (Cambridge, MA.: The MIT Press, 1995).

[12] A.C. Pigou, *The Economics of Welfare*, 4th Edition (London: McMillan and Co. Limited, 1932 (reprinted 1952)). R. Coase, "The Problem of Social Cost," *The Journal of Law and Economics* Vol. 3 (October 1960): 1-44.

TABLE 2-1

BILLING ARRANGEMENTS IN SUPPORT OF LOW-INCOME CUSTOMERS

Billing Arrangement	Description
Partial Payment	The utility continues to serve the customer as long as the customer makes a predetermined partial payment against the outstanding total bill.
Income-based Billing	The utility uses a sliding-scale payment schedule to determine the percentage of the actual electricity bill that is paid for by the low-income customer.
Budget Billing	The utility receives the same monthly payment each month, which allows a low-income customer to avoid seasonal increases and decreases in the electricity bill.
Deferred Billing	The utility provides a customer experiencing temporary payment problems with the option to pay the total electricity bill at a later date.

Source: Authors' construct.

Table 2-2 depicts the types of "forgiveness" programs that have been made available to low-income customers. Their defining characteristic is that they retire all or a portion of the customer's debt in a systematic fashion over a specified period of time. As the text in the table indicates, these programs are most suitable for the utilities' customers with transitory income problems. In order to honor the terms of a full forgiveness program, these customers are expected to have access to financial resources that enable them to make full and timely payments on future electricity bills. To comply with the terms of partial forgiveness, they have to be able to simultaneously pay off their current electricity bills and the unforgiven portions of their past bills.

TABLE 2-2

FORGIVENESS PROGRAMS IN SUPPORT OF LOW-INCOME CUSTOMERS

Programs	Description
Full Forgiveness	The utility writes off the entire arrearage as a bad debt. The low-income customer agrees to pay future monthly bills in full and to participate in conservation and weatherization programs.
Partial Forgiveness	The utility writes off a portion of the arrearage as bad debt and waives any late payment charges on the remaining debt. The low-income customer pays off the debt over a predetermined period of time.

Source: Authors' construct.

Table 2-3 describes the targeted programs available to low-income customers. These programs approach low-customers from two different directions. On the one hand, they help provide access to additional sources of public funds that low-income customers may use to pay their electricity bills. On the other hand, they focus on altering consumption behavior so that the low-income customers can afford the electricity that they use. Obviously, these programs exist solely for the purpose of avoiding more drastic actions at a later date by the utilities against their customers.

TABLE 2-3

TARGETED PROGRAMS IN SUPPORT OF LOW-INCOME CUSTOMERS

Program	Description
Budget Counseling	The utility helps the low-income customer prepare a budget for utility and other costs.
Referral Services	The utility refers the low-income customer to appropriate social support agencies.

Source: Authors' construct.

Budget counseling contributes to the low-income customers' understanding of reasons for high or low electricity bills, thereby assisting them in their efforts to control the size of their electricity bills. Referral services are most effective when the utilities are dealing with emergencies or chronic cases of extreme financial hardship. Nonpayment often is one of the first signs that households are in financial distress.

Table 2-4 characterizes the proactive programs that the utilities can use to assist their low-income customers in avoiding service disconnections. The purpose fulfilled by these programs is to reduce the amounts of electricity that are used by these individuals and households. As a result, they tend to promote conservation in one form or another.

TABLE 2-4

CONSERVATION PROGRAMS IN SUPPORT OF LOW-INCOME CUSTOMERS

Program	Description
Conservation Loans	The utility provides a low-income customer with a loan that must be used to invest in cost-effective conservation or weatherization.
Weatherization	The utility finds and corrects the sources of air infiltration and energy loss that raise the low-income customer's electricity bill.
Conservation	The utility assists the low-income customer in the purchase of conservation devices.

Source: Authors' construct.

The three programs have two important characteristics in common. Each one has the potential to increase property values, while it simultaneously sets the stage for lower electricity bills. As a result, these programs often increase the wealth of others because low-income customers are less likely to own property. Thus, they sometimes create an objectionable situation where the use of public funds to solve the problems of the poor generates additional wealth for higher income individuals and households.

Support of DSM Programs

The electricity industry supports DSM programs that are designed to alleviate pressures for new generation facilities and to encourage the utilities' customers to modify their patterns of electricity consumption. Some DSM programs promote the use of high-efficiency appliances. Others attempt to clip peaks, fill valleys, shift loads, and create flexible load shapes. Table 2-5 describes the load-shaping objectives of DSM by the technologies that are used to achieve desired effects.

TABLE 2-5

DSM TECHNOLOGIES

Technology	Desired Effects
Energy Efficiency	These technologies are designed to reduce electricity consumption by specific end uses without adversely affecting the quality of the energy services that are provided to the utilities' customers.
Direct Load Control	These technologies are designed to periodically interrupt the electricity to specific customers during peak hours of demand without actually disconnecting them from the utilities.
Interruptible Loads	These technologies are designed to disconnect customers from the utilities when the utilities are at risk of widespread service outages or when electricity prices reach predetermined levels.
Load Shifting	These technologies are designed to allow the utilities' customers to respond to changes in the utilities' costs of producing power.

Source: Authors' construct.

Energy efficiency technologies make it possible to use less electricity to produce a specific amount of energy service such as lighting, heating, or cooling.[13] Direct load

[13] Energy efficiency technologies are associated with a wide range of complementary activities, which include energy audits, efficient building design, and the production of advanced electric motors.

control is an energy-saving option for residential subscribers who are comfortable with utilities affecting their water-heating and air-conditioning activities. An interruptible load is an option for an industrial or commercial customer who is willing to be disconnected from electricity service for the purpose of avoiding large-scale brownouts or blackouts. Lastly, load-shifting technologies such as storage and energy-management systems have to be teamed with time-of-use or real-time rates to be effective.

Through their effects on energy consumption and load shapes, DSM programs have helped to mitigate environmental problems that arise as a result of generating electric power. For example, Austin Texas' "Energy Star" home-rating program originally was developed to slow down the pace of constructing new fossil-fueled generation facilities. Subsequently, this program evolved to incorporate a "Green Builder" program, which promotes the use of environmentally benign building materials.

Support of the Environment

The protection of the environment from the undesirable aspects of generating electric power is a social goal in its own right.[14] Coal-fired generation facilities emit sulfur dioxide, which in turn lowers air quality and has been connected with acid rain.[15] Lowered air quality and acid rain are negative externalities because they adversely affect the well-being of nonpolluters.[16] Nuclear generation creates nuclear waste, which is comprised of long-lived radioactive isotopes. These isotopes pose a long-term health

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[14] As of 1994, seven states had explicit statutory requirements to address environmental externalities. See Edison Electric Institute, *Integrated Resource Planning in the States: 1994 Sourcebook* (Washington, D.C.: Edison Electric Institute, 1995).

[15] Nitrous oxides have been connected with acid rain and the depletion of the ozone layer. Carbon dioxide is believed to be responsible in part for global warming.

[16] Appendix A contains a list of the negative externalities that are associated with the production, delivery, and consumption of electricity.

risk to the public. The distribution of electricity is associated with "stray voltage," which is harmful to cattle. In addition, it is an unsettled question whether the health of humans is harmed by the low-frequency electromagnetic fields that are induced by the transmission and distribution of electricity.[17] Table 2-6 delineates the approaches that the United States government has selected to retard the degradation of the nation's air quality.

TABLE 2-6

APPROACHES FOR RESTRICTING THE EMISSION OF POLLUTANTS

Approach	Description
Emission Cap	The government determines the maximum amount of a pollutant that the polluter can emit into the atmosphere.
Emission Trading	The government assigns a pollution allowance to each polluter. Polluters can trade their allowances amongst themselves.

Source: Authors' construct.

An emission cap places limits on acceptable levels of pollution. However, it is not a particularly flexible form of environmental protection. The utilities are not free to transfer their property rights to other utilities or anyone else. Emission trading also begins with the assignment of property rights to the utilities. However unlike an emission cap, it permits utilities to transfer their property rights for a fee to other utilities or to those who suffer the effects of pollution.

[17] For an overview of issues related to electromagnetic fields, see Mohammad Harunuzzaman, "Electromagnetic Fields and Human Health: Revisiting the Issue," *NRRI Quarterly Bulletin*, Vol. 16, 2 (1995): 181-195.

Industry Support of Social Goals

Under current circumstances, the utilities expend their resources in support of social goals on personnel, rebates, subsidies, incentives, monitoring, record keeping, equipment and other facilities, and program development and implementation. These expenditures represent measurable links to the utilities' financial commitments to support social goals. Expenditure-related data for 1993 have been collected that pertain to the efforts of the investor-owned utilities in support of DSM and pollution abatement.[18] Data for 1993 on federal and state expenditures to avert heating and cooling crises for low-income customers have been collected for comparison purposes.[19] The state-wide financial assistance data do not distinguish between investor-owned and other utilities. Consequently, the data pertaining to support of DSM and pollution abatement have been aggregated up to the state level, and summary statistics for these data have been calculated on a state-by-state basis in an effort to sharpen the presentation.[20]

Table 2-7 shows combined federal and state expenditures on assistance for low-income customers. These data have been classified as assistance for heating, cooling,

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[18] DSM data for investor-owned utilities are available only for the year 1993. As a result, utility-by-utility data addressing the support of the environment also were collected only for the year 1993. The source of these data is The U.S. Department of Energy/Energy Information Administration. The official publications used for the extraction of data are: *Financial Statistics of Major Investor-Owned Utilities, 1993* (Washington, DC 1994) and *U.S. Electric Utility Demand-side Management Report of 1994* (Washington, DC 1995).

[19] The U.S. Department of Health and Human Services, *Low Income Home Energy Assistance Program-Report to Congress for Fiscal Year 1993* (Washington DC, 1994).

[20] Because the federal assistance data are available only on a state-by-state basis, it was useful to recast the investor-owned utilities' data on pollution abatement and DSM on a state-by-state basis. The recast investor-owned utilities' data are presented in Appendices B and C.

weatherization, and crisis.[21] Data on administrative costs are included for the purpose of suggesting the percentage of federal and state tax dollars that do not go directly to these customers. Although the vast majority of these expenditures are made by the federal government, some states have allocated some of their funds to support customers that need help to pay off their electricity bills. In all, eleven states have contributed approximately $14.5 million for the purposes of supplementing federal benefits or covering the states' shares of the appropriate administrative costs. These data reveal that state supplemented benefits were concentrated in the areas of weatherization, assistance to households receiving an Allowance for Dependent Children (AFDC), and those households participating in the federal government's Low-Income Rate Assistance Program. Several states reimbursed the utilities for the administrative costs of taking applications for the federal government's rate-assistance program. Lastly, some states' funds for low-income customers were increased by donations from private enterprises.

In 1993, state and federal governments spent approximately $1.25 billion exclusive of administration costs in the areas of heating, cooling, crisis, and weatherization assistance. Well over one-half of these expenditures were made to assist customers with their heating bills. Crisis assistance amounted to slightly less than 15 percent of the total expenditure in the four areas. Together, crisis prevention and heating assistance accounted for 87 percent of the total public expenditure. Weatherization assistance received the remaining 13 percent of total public expenditures in support of low-income customers.

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[21] Appendix D contains the state-by-state detail for the expenditures by area shown in Table 2-7. The entries in this appendix reveal that expenditures have been made in seven states to assist in the cooling of low-income homes; whereas each state has made expenditures to assist in the heating of low-income homes. Meanwhile, expenditures to alleviate crises have been made in forty-six states Lastly, weatherization programs for low-income subscribers have been financed in forty-one states.

TABLE 2-7

1993 PUBLIC EXPENDITURES ON ASSISTANCE
TO LOW-INCOME CUSTOMERS
(Areas of Support)

Heating	Cooling	Crisis	Weatherization	Administration
$895,113,359	$22,274,975	$185,606,250	$138,445,153	$121,981,046

Source: U.S. Department of Health and Human Services, *Low-income Energy Assistance Program - Report to the Congress for Fiscal Year 1993* (Washington DC 1994).

Table 2-8 provides the 1993 breakdown of the utilities' expenditures on DSM. These data indicate that utilities of all types spent in the neighborhood of $2.75 billion on DSM programs.[22] The expenditures by the investor-owned utilities were approximately $2.25 billion in 1993 with about $88 million spent on DSM by the cooperatives.[23] Meanwhile, the federal government spent approximately one and one-half times the expenditures of the publicly-owned utilities.

[22] Appendix C contains 1993 DSM program costs by state.

[23] The utilities' expenditures on DSM fall into two categories. On the one hand, they purchase equipment and make other expenditures on energy efficiency, load management, interruptible load, and other load-related costs. On the other hand, they spend money on administration, marketing, monitoring, evaluation, and other costs.

TABLE 2-8

ELECTRIC UTILITY 1993 DSM PROGRAM COSTS
(Type of Utility)

Investor-Owned	Publicly-Owned	Cooperative	Federal
$2,251,227,000	$166,714,000	$87,818,000	$237,714,000

Source: The U.S. Department of Energy/ the Energy Information Administration, *U.S. Electric Utility Demand-side Management Report of 1994* (Washington DC 1995).

In the area of DSM expenditures, the investor-owned utilities occupy the same position that the federal government occupies with respect to providing assistance to low-income customers. The DSM programs of the investor-owned utilities account for 82 percent of total recorded DSM expenditures by all of the utilities in the sample. A more graphic statistic is that investor-owned utilities spent slightly more than $25.00 for every $1.00 that the cooperatives spent on DSM.[24] However, we must be careful not to overstate its importance. The investor-owned utilities most certainly have larger revenues and expenses than the cooperatives. It is indeed possible that the 25:1 ratio for DSM expenditures is associated with a situation where the investor-owned utilities devote a *smaller* percentage of their operating-expense budgets to DSM than do the cooperatives.

Tables 2-9 shows that 142 of the larger investor-owned utilities incurred approximately $144 billion of operating expenses in 1993. Of that amount, they spent in the neighborhood of 1.7 percent (approximately $2.4 billion) of their annual 1993 operating expenses on DSM activities. Because data pertaining to the cooperatives'

[24] Energy Information Administration, *U.S. Electric Utility Demand-side Management Report of 1994* (Washington D.C.: Department of Energy, 1995).

1993 operating expenses are not readily available, we could not compute the percentage of the expenses that these firms devoted to DSM. It may well be that they dedicated more than 2 percent to DSM. If this is the case, then the cooperatives actually made a significantly larger commitment to DSM than the investor-owned utilities.

The investor-owned utilities got a larger return from their DSM expenditures. On average, they saved 15.5 kilowatthours per year for each dollar that they spent on DSM in 1993, while the cooperatives, on average, saved 8 kilowatthours per year for each of their DSM dollars.[25] But even this comparison can be misleading. Perhaps, the customers of the investor-owned utilities had more opportunities for conservation savings as compared to the cooperatives' customers.

DSM and pollution abatement are complementary social goals. Pollution is reduced by DSM programs. A predetermined amount of pollution per kilowatthour is avoided as the utilities' customers consume fewer kilowatthours of electricity. However, DSM programs also can result in an increase in pollution when the saved energy defers the construction of less polluting generation facilities. Therefore, state and federal governments cannot always rely on DSM to solve a pollution problem.

Table 2-10 shows the 1993 expenditures of 142 of the larger investor-owned utilities on pollution control.[26] They spent nearly 1.7 times more on pollution control than on DSM programs in 1993. However, this expenditure was not evenly distributed across the utilities. One utility holding company spent $0.5 billion on pollution control, while another utility spent nothing. In fact, the standard deviation for investor-owned

[25] Ibid.

[26] If comparisons of DSM and pollution-control expenditures are made, it is most appropriate to compare the pollution-control expenditures to the DSM expenditures by investor-owned utilities. However, any such comparisons should recognize in some fashion that the DSM data are associated with a set of utilities that includes as a subset the aforementioned 142 of the larger investor-owned utilities. Therefore, there is a downward bias in the total 1993 expenditures on pollution abatement by the investor-owned utilities as compared to the total 1993 expenditures on DSM.

TABLE 2-9

OPERATING EXPENSES AND SOCIAL-GOALS-RELATED EXPENSES
(in thousands of dollars)

	Operating Expenses	DSM Expenses	Customer Assistance Expenses	Instruction and Informational Expenses	Environmental Protection Expenses	Research and Development Expenses
Total	143,824,773	2,435,875	1,247,936	125,531	3,789,327	34,968
Average*	1,065,369	18,178	9,244	930	28,069	259
Maximum	7,012,148	237,098	125,543	8,966	500,036	6,438
Minimum	0	0	0	0	0	0
STD**	1,401,682	32,698	18,318	1,649	73,153	990

* The averages are calculated using the formula $1/n(\sum_{i=1}^{n} E_i)$, where E_i denotes the social goals-related expense for each utility in the sample.

** Standard deviation

Source: The U.S. Department of Energy/Energy Information Administration, *Financial Statistics of Major Investor-owned Utilities, 1993* (Washington DC 1994). The U.S. Department of Energy/Energy Information Administration, *U.S. Electric Utility Demand-side Management Report of 1994* (Washington DC 1995).

utilities' expenditures on pollution abatement is 2.6 times the average expenditure on pollution control by these utilities.[27]

TABLE 2-10

1993 EXPENDITURES ON POLLUTION CONTROL
BY INVESTOR-OWNED UTILITIES

Total Expenditure	Average Expenditure *	Maximum Utility Expenditure	Minimum Utility Expenditure	Standard Deviation
$3,789,327,000	$28,069,000	$500,036,000	-0-	$73,153,000

* The average expenditure on pollution control is calculated using the formula $1/n(\sum_i P_i)$, where P_i denotes the pollution-control expenditure for each utility in the sample.

Source: The U.S. Department of Energy/Energy Information Administration, *Financial Statistics of Major Investor-owned Utilities, 1993* (Washington DC 1994).

Tables 2-9 and 2-10 also are useful for putting DSM and pollution-control expenditures in the proper perspective to each other. From the data in these tables, it is apparent that these 142 investor-owned utilities, on average, spent approximately 2 percent to 3 percent of their operating-expense budgets on the prevention of pollution. Thus in comparison to table 2-9, the "average" investor-owned utility in this sample spent in the neighborhood of 1.5 times more on pollution control than it did on DSM. Thus, pollution control has contributed more to the cost of a kilowatthour produced by the "average" utility than did DSM. However, the utility-by-utility distribution of the

[27] The standard deviation for DSM expenditures is not as large as the standard deviation for pollution-control expenditures. As indicated by the data in Table 2-9, the standard deviation for DSM expenses approaches 2 times the DSM expenses incurred by the "average" utility in the sample.

pollution-control expenditures is very skewed, which implies that the actual increase in the cost of a kilowatthour due to pollution abatement for many of these utilities could be significantly larger than the cost increase due to pollution control that would be experienced by the "average" investor-owned utility in this sample.

The uneven distribution of expenditures on pollution control by these utilities could create problems for the continued support of this social goal as the generation market becomes more competitive. Utilities with large pollution-control programs per kilowatthour may find themselves at a relative price disadvantage in the generation market as they attempt to recover their program costs from their direct-access customers who purchase their electric power independently of the utilities' transmission and distribution services.

Overall, the electricity industry spent approximately $6.5 billion on pollution control and DSM programs in 1993.[28] The 142 investor-owned utilities followed by the Energy Information Administration of the U.S. Department of Energy's spent slightly more than 95 percent of this amount; that is, they spent nearly $6.2 billion in support of these two social goals in 1993.[29] Surely, individuals throughout the United States have benefited from these expenditures. Less pollution suggests better air quality, which in turn suggests better health. Cost-effective DSM suggests lower electricity bills and less pressure on utilities to build new generation facilities, which frees resources for research and development and many other things.[30] Although the utilities' expenditures

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[28] The U.S. Department of Energy/Energy Information Administration, *Financial Statistics of Major Investor-owned Utilities, 1993* (Washington DC 1994). The U.S. Department of Energy/Energy Information Administration, *U.S. Electric Utility Demand-side Management Report of 1994* (Washington DC 1995)

[29] The U.S. Department of Energy/Energy Information Administration, *Financial Statistic of Major Investor-owned Utilities, 1993* (Washington DC 1994).

[30] Although research and development does not guarantee more profits, the utilities will find such efforts necessarily more important as they compete in the generation and energy service markets. The research and development expenses in 1993 for the 142 investor-owned utilities followed by the DOE/EIA were a relatively sparse $35 million, which is considerably less than their DSM and pollution-control

on pollution control and DSM are substantially greater than the federal and state governments' expenditures on financial assistance for low-income customers, these expenditures on pollution control and DSM pale in comparison to the utilities' total 1993 operating expenses. Table 2-11 presents this comparison.

TABLE 2-11

INVESTOR-OWNED UTILITIES' 1993 OPERATING EXPENSES AND SOCIAL GOAL EXPENDITURES
(in thousands of dollars)

Total Operating Expenses	Total DSM Expenditures	DSM as Percent of Operating Expenses	Total Pollution Control Expenses	Pollution Control Expenditure as a Percent of Operating Expenses
$143,824,773	$2,435,875	1.40	$3,789,327	2.10

Source: The U.S. Department of Energy/Energy Information Administration, *Financial Statistics of Major Investor-owned Utilities, 1993* (Washington DC 1994). The U.S. Department of Energy/Energy Information Administration, *U.S. Electric Utility Demand-side Management Report of 1994* (Washington DC 1995).

This set of major investor-owned utilities spent slightly less than $144 billion in 1993 to operate and maintain their generation facilities and their transmission and distribution networks. As a result, their almost $3.8 billion expenditure on pollution abatement amounts to only 2.1 percent of their total operating expenses. Similarly, their expenditure of approximately $2.3 billion on DSM programs represents only 1.4 percent of their total operating expenses. Even though small in percentage terms, these expenses could significantly affect the utilities' profits.

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expenses.

Table 2-12 summarizes the analysis of the relationship between social-goal expenditures and total operating expenses. On average, an investor-owned utility spent slightly more than $18 million on DSM programs and a little more than $28 million on pollution control in 1993. The average DSM expenses amounted to 1.69 percent of the average utility's total operating expenses, while the average pollution-control expenditure amounted to 2.63 percent of total operating expenses. However, the investor-owned utilities in the sample varied widely in the resources that they devoted to support these two social goals. The largest annual DSM expenditure by a utility was slightly above $238 million, and the largest utility expenditure on pollution-control was slightly above $500 million. The $238 million DSM expenditure represents 9.58 percent of that utility's operating expenses, while the $500 million pollution-control expenditure represents 14.42 percent of the utility's operating expenses. Thus, the data in this table indicate that some of the 142 investor-owned utilities in the sample have made significant commitments to support these two social goals.

The standard deviations for pollution-control and DSM expenses shown in Table 2-12 suggest an interesting possibility. Namely, the utilities in the sample expend approximately the same proportional amount of their resources in the support of social goals regardless of their financial positions. Although the DSM standard deviation of slightly more than $32 million is almost twice as large as the average expenditure on DSM by an average utility in the sample, this standard deviation as a percent of total operating expenses (approximately 1.97 percent) is only slightly larger than the 1.69 percent of total operating expenses that an average utility in this sample devotes to the support of DSM. Similarly, the standard deviation for pollution-control expenses as a percent of operating expenses (in the neighborhood of 2.65 percent) is slightly larger than the 2.63 percent that an average utility dedicates to the support of a cleaner environment. The similarity of the two percentages related to pollution control is surprising because the $73 million standard deviation for pollution-control expenditures is two and one-half times as large as the expenditure on pollution control by the average utility. These rather small ratios of the DSM and pollution-control standard deviations to total operating expenses suggest that no discernible pattern exists between measures of the utilities' financial health and their expenditures in support of social goals.

TABLE 2-12

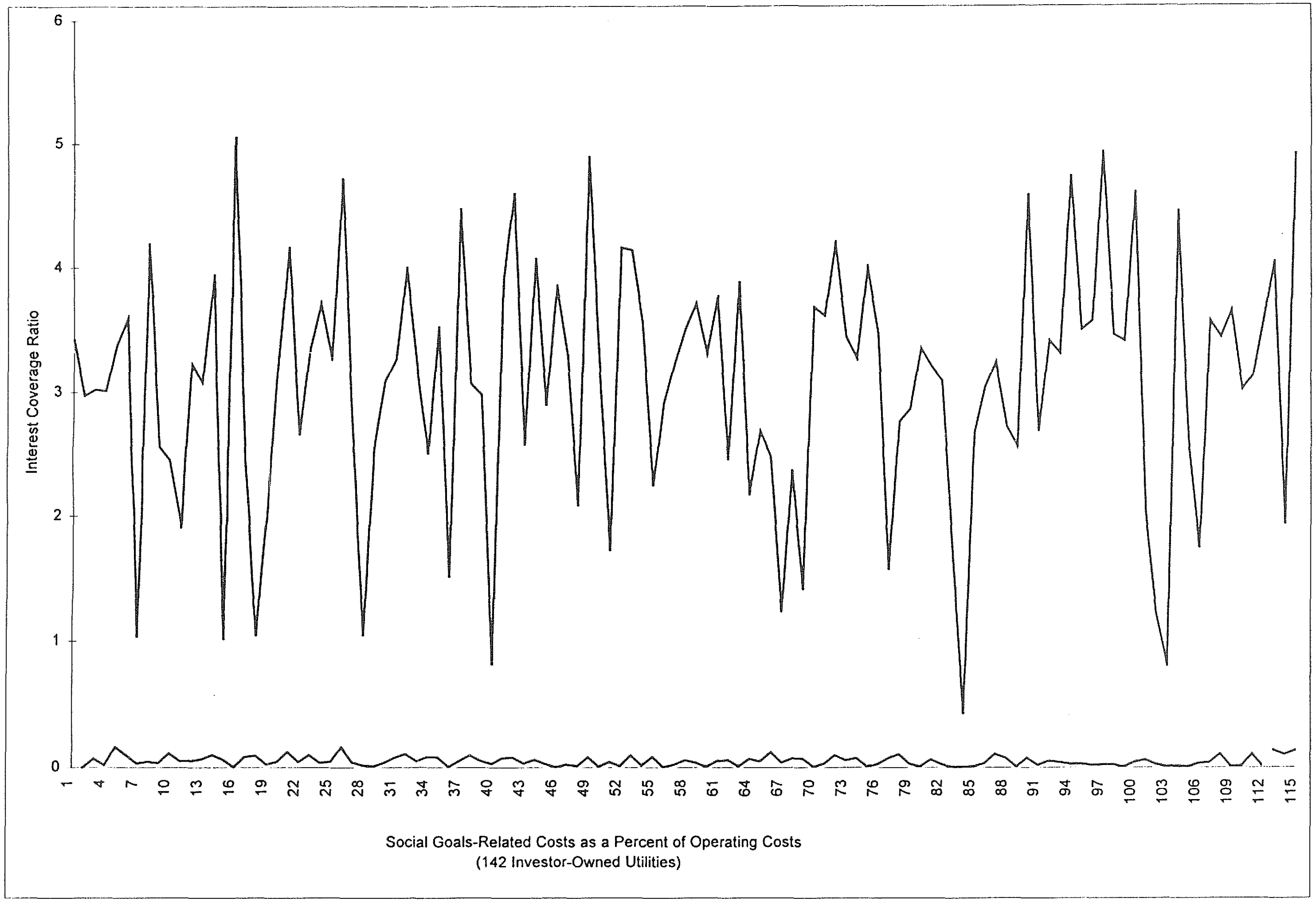
SUMMARY STATISTICS FOR THE INVESTOR-OWNED UTILITIES' 1993 OPERATING EXPENSES AND SOCIAL GOAL EXPENDITURES (in thousands of dollars)

	Demand-Side Management		Pollution Control	
	Expenses	Percent of Per Utility Operating Expenses	Expenses	Percent of Per Utility Operating Expenses
Average *	18,178	1.69	28,069	2.63
Maximum	237,098	9.58	500,036	14.42
Minimum	-0-	-0-	-0-	-0-
Standard Deviation	32,698	1.97	73.153	2.65

* The averages are computed using the formula: $1/n \sum_{i=1}^{n} E_i$, where E_i denotes the social goals-related expense for the utilities in the sample.

Source: The U.S. Department of Energy/Energy Information Administration, *Financial Statistics of Major Investor-owned Utilities, 1993* (Washington DC 1994). The U.S. Department of Energy/Energy Information Administration, *U.S. Electric Utility Demand-side Management Report of 1994* (Washington DC 1995).

Additional analysis was performed in an attempt to uncover any pattern that might have been created by the interplay of the utilities' financial health and their commitment to social goals. In particular, a plot (i.e. figure 2-1) was made of the data



Source: Authors' construct from 1993 data compiled by the U.S. Department of Energy

Fig. 2-1. Financial Impact of Social Goals pertaining to the utility's expenditure on these two social goals and its interest-coverage ratio. Figure 2-1 indicates the absence of any observable pattern between these pertinent summary statistics. Consequently, there is some support for the hypothesis that the utilities' support of the environment and support of DSM are independent of their financial health under the current regulatory regimes. Put another way, there is no indication that the utilities' support of these two social goals, *per se*, has either a favorable or unfavorable effect on their financial health.

CHAPTER 3

REALITIES OF INDUSTRY SUPPORT OF SOCIAL GOALS

Introduction

A widely held belief among utilities is that a more competitive generation market will diminish their capacity to support social goals. The reasoning supporting their belief is that a more competitive generation market will depress the price of generation services, which in turn will push down the price of wholesale and retail electricity. Because the demand schedules for the wholesale and retail services are likely to be price inelastic, the price decreases induced by a more competitive generation market imply reductions in wholesale and retail *profits*. As a result, the utilities must reduce their costs if they are to regain their lost profits. A cost-reduction candidate is their support of social goals because these costs also depress their profits. In fact, from their perspective, it would be improper to do otherwise because of their fiduciary responsibilities to their stockholders.

Interestingly, the utilities' belief that a more competitive generation market will diminish their capacity to support goals has little to do with whether existing social-goals-related programs have passed cost-benefit tests.[31] The fact that the programs' benefits exceed their costs is immaterial when utilities cannot recover the expenditures that they make on social goals. This second belief, that is that the utilities do not believe that they will be able to recover their social-goals-related expenditures, also has

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[31] If social-goal programs exhibit economies of scale and/or scope, then the utilities that support social goals more aggressively will have a better chance of passing cost-benefit tests.

little to do with whether utilities are using their resources in a cost-effective manner.[32] Simply put, the utilities' desire to efficiently allocate their financial and physical resources is secondary to their yearning to recover their costs. In fact, they may be more interested in exploiting the cost-shifting opportunities that often are available in a more competitive environment than with ensuring the efficient and cost-effective use of their resources. Therefore, it is useful at this time to summarize the market process that seems to suggest to utilities that they will experience diminished capacities to support social goals.

Utilities' Diminished Tendencies to Support Social Goals

What if the United States Congress had wrote EPACT in such a way that meaningful competition could only emerge in the markets for *new* wholesale or retail electric loads? Then the markets for existing wholesale and retail loads would be perfectly insulated from the heat of competition. In such a state of affairs, the worst outcome that could befall the utilities is that the unregulated EWGs and NUGs do not provide one penny towards the support of social goals. However, the absence of support from these sources does not represent a real problem for the utilities when they currently are recovering their social-goals-related costs. Therefore, competition for new electric loads does not necessarily diminish the utilities' existing capacity to support these goals.

The situation is much different when NUGs and EWGs are able to capture the regulated utilities' existing electric loads. If the lost existing loads cannot be replaced because all new electric load growth is served by unregulated firms, then these utilities

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[32] If the utilities' programs in support of social goals are cost effective, then their financial positions are expected to improve as they recover the costs of these programs, even though all of the benefits do not accrue to them.

continue to incur the lost loads' fixed costs of production without earning any corresponding revenue. At this point, they are faced with the possibility of having to divert revenues that previously supported social goals towards the recovery of these stranded costs.

If it is assumed that these utilities incur only variable costs as they support social goals, then they may immediately cover their stranded costs by simply eliminating their expenditures on these goals and leaving their prices unchanged.[33] Simply put, their problem may be easily solved by redirecting revenues away from supporting social goals and towards their bottom lines. Not surprisingly then, pressure quickly rises to discontinue support for social goals when utilities are losing existing loads to competitors and social-goals-related programs are dominated by variable costs.[34] Therefore, a more competitive generation market that spills over into competition for existing wholesale and retail loads is apt to diminish the utilities' tendencies to support social goals, especially when the social-goals-related program costs are predominantly variable.

The speed of the transition to a fully competition generation market also is a factor that diminishes the utilities' tendencies to support social goals. A rapid expansion of unregulated sales of generation services for the purpose of serving the utilities' existing wholesale and retail electric loads is likely to be uneven and

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[33] When the utilities incur fixed costs as they implement programs in support of social goals, they necessarily would create some stranded costs after they eliminated these programs. If these particular stranded costs are isolated, they can be denoted as the stranded benefits that are created by a more competitive electricity industry.

[34] The continued support of social programs by regulated utilities is a difficult call for the utilities when all of the program costs are fixed costs. If they decide to continue their programs, they would want to recover the associated costs from their customers. If they decide to discontinue their programs, then they would want to recover their newly created stranded costs from their customers. In either instance, the utilities need to maintain their revenue streams because they cannot shed any costs by discontinuing their social programs. Of course, regulation could make it easier for these utilities to continue to support social programs by giving the utilities an opportunity to recover 100 percent of the costs of social programs and an opportunity of something less than 100 percent to recover stranded benefits.

destabilizing. On the one hand, a quickly growing volume of unregulated generation sales provides huge benefits to customers with credible options to switch to the lower-cost NUGs and EWGs. On the other hand, a rapid expansion of unregulated generation services creates enormous pressures for price increases for customers without credible opportunities to switch suppliers.[35] Because the utilities' regulators are not too fond of price increases for captive customers, the utilities can be expected to make an attempt to mitigate them whenever possible. A mitigation approach for the utilities in this regard is to immediately reduce their expenditures that support social goals. Therefore, the utilities are less likely to continue their current levels of support for social goals when there is a rapid expansion of competition into the generation market that spills over into competition for the utilities' existing wholesale and retail electric loads.

Lastly, the lumpiness of the transition to a more competitive generation market is a factor that diminishes the utilities' tendencies to support social goals. Competitive transitions always occur in discrete steps because there are natural "breaks" where policy makers can take the opportunity to observe the effects of their decisions.[36] Surely, different effects on the utilities' abilities to support social goals are associated with the different ways that the effects of a more competitive generation market can spill over into the wholesale and retail electricity markets. A small number of discrete steps to a competition generation market with short interim periods between them puts more strain on the utilities' abilities to support social goals than a large series of discrete steps with long interim periods between them.

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[35] Price increases for customers without options are rational and necessary from the utilities' perspective because they need the additional revenue to support their stranded costs.

[36] One natural break is the spillover of competition in generation into competition for the utilities' existing wholesale loads with possible extension into competition for the utilities' retail loads. Another natural break is to restrict the firms in the generation market to competing only for new wholesale and retail electric loads with possible extension of this competition to existing wholesale and retail loads. Still, another natural break is to restrict the unregulated sales of generation services to a particular class of customers with possible extensions to other customer classes.

Factors Currently Affecting Tendencies to Support Social Goals

The mechanics of the spillover of a more competitive generation market into the wholesale electricity market are different from the mechanics of the spillover into the retail market. A more competitive generation market spills over into a nationwide wholesale market.[37] Meanwhile, only a small number of states permit full retail competition. In general, the states are considering the "pros and cons" of a competitive retail market that has been induced by a competitive generation market.[38] Another bit of reality is that the generation market did not reach this point in the transition to competition overnight. In fact, a dominant feature of this market's competitive metamorphosis thus far is that the competitive transition has occurred slowly.[39] Perhaps, the pace of change in the generation market has been slow because competition is not a forgiving process. Therefore, the parties to the effects of changes in the generation market need some time to adjust to the new competitive realities that these changes induce in the wholesale and retail markets. For example, regulators may need a respite from the spillover of competition into retail markets as they attempt to control and mitigate prices increases to captive retail customers. Simultaneously, a gradualist strategy slowing the spillover of competition in wholesale and retail markets gives the utilities some time to adjust their market strategies. Meanwhile, other stakeholders such as the utilities' residential customers are happy to be afforded the

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[37] Federal Energy Regulatory Commission, 18 CFR Parts 35 and 385, Docket Nos. RM 95-8-000 and RM 94-7-001, *Promoting Wholesale Competition Through Open Access Nondiscriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities*, Order No. 888 - Final Rule, mimeo, Issued April 24, 1996.

[38] J. E. Schuler, Jr., "Residential Pilot Programs: Who's doing, Who's dealing," *Public Utilities Fortnightly* Vol. 135, 1 (1997): 16-21.

[39] P. G. Conlon, "Comments Regarding California's Electric Restructuring Proposal," *The NRRI Quarterly Bulletin* Vol. 16, 4 (1995): 459-464. C. Gray and S. Hempling, "Toward a Rational Jurisdiction in the United States Electricity Industry," *The NRRI Quarterly Bulletin* Vol. 16, 3 (1995): 315-326.

protection that is supplied by a slow transition to a competitive generation market. Finally, a slow transition to competition in the generation market gives valuable time to all the stakeholders, which they can use to figure out how to continue their support for social goals as the effects of a competitive generation market spill over into wholesale and retail electricity markets.

The current slow transition to a competitive generation market and the resulting trickle of spillover effects into the wholesale and retail markets has been predictable.[40] Many discrete steps have been taken to remove administrative barriers that prevent the transition to a competitive electricity industry. Legislatures are enacting new laws or modifying old laws to redefine the role of competition in the industry's future. State public utility commissions are being charged with removing the regulatory practices that hinder the legislatively mandated changes in the industry's competitive structure. During the policy-making and implementation stages, various special-interest groups are arguing their cases in legislative and regulatory forums for more or less competition. These arguments carry different weights in different political and regulatory jurisdictions. These different weights affect how competition is perceived among the different states.

Whatever are the various perceptions of a competitive generation market and its effects on the remainder of the electricity industry, the discreteness of the current transition to a more competitive generation market does not guarantee that existing social goals will continue to be supported at their existing levels. The mere fact that this transition is taking place exerts an influence on the utilities' capability to continue to support social goals. This influence is felt through the strategic interaction between the anticipated length of the competitive-transition period and the anticipated length of the payback period for social-goals-related programs. The basic idea is that the utilities will

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[40] D. Fessler, "Social, Economic, and Political Perspectives on California's Role in the Changing Dynamics of the Electric Services Industry," *The NRRI Quarterly Bulletin* Vol. 17, 3 (1996) : 327-337. R. K. Kretschmer and R. Garcia, "Recovering Stranded Costs: Not "If", But "How"," *Public Utilities Fortnightly* Vol. 135, 2 (1997): 34-38.

not support social goals with planning horizons that are longer than the anticipated length of the competitive transition. For example, suppose that an existing DSM program has an anticipated payback period of ten years. If the utilities believe that they cannot fully recover the costs of this program before the generation market becomes competitive, then they are unlikely to implement it. If the utilities' regulators hold similar beliefs about the lengths of the competitive transition and payback periods, then they can be persuaded by the utilities to withhold their sanctions of many social-goal-related programs. Scenarios like these hold the potential to cause some social goals to fall out of sight as the generation market becomes more competitive and the effects of this competition spill over into the wholesale and retail markets.

The slowness and discreteness of the transition to a competitive generation market are not the only realities that have to be faced as regulators examine whether utilities should continue their support of social goals. In addition, regulators must deal with the fact that the costs of social-goals-related programs are mixtures of fixed and variable costs. As a result, there are economic reasons to keep or discard some of these programs as competitive pressures build within the generation market and spill over into the wholesale and retail electricity markets. Although the shedding of the variable costs of social-goal-related programs helps the utilities to withstand the mounting competitive pressure in the generation market, their retention of the unrecoverable, nonused, and nonuseful fixed costs of these programs makes it difficult for them to find profitable responses to the rising competitive pressures.

Another reality affecting the continued support of social goals by utilities is how the regulators allow the utilities to respond to a more competitive generation market and its spillover effects into other markets. Consider the following possible set of competitive-response parameters *for* the utilities that will affect the market behavior of the utilities' competitors. Suppose a particular group of states has chosen to speedily remove institutions that restrict how the utilities might respond to growing competition in the generation market and its effects elsewhere, and also suppose that another group of states has chosen to slowly remove these institutions. When confronted with these two environments, the utilities' high-cost competitors will gravitate toward the group of states that is not eliminating these institutions quickly because their profit potential is enhanced by this strategy. However, it also is in the best interests of the utilities' low-cost competitors to enter these "cautious" states. Obviously, the influx of low-cost competitors will make it more difficult for the utilities in cautious states to continue their support of social goals. Meanwhile, the protection that is afforded to the utilities in the other group of states, by the rapid removal of regulatory institutions restricting their competitiveness, makes it less difficult for them to continue their support of social goals.

Still, another reality pertinent to the utilities' financial well-being is the regulators' views concerning whether the utilities' competitors should also contribute to the support of social goals. Consider, for example, two competitively minded state public utility commissions. On the one hand, suppose that commission A believes that it is counterproductive to induce the utilities' competitors to contribute to the support of social goals, while it is speedily removing institutions that restrict the growth of competition. On the other hand, suppose that commission B believes that it is appropriate to rapidly remove anticompetitive institutions and to require the utilities' competitors to assist in the support of social goals. In this instance, the low-cost competitors will enter into commission A's jurisdiction because this commission does not require them to contribute toward the support of social goals. The presence of these competitors puts significant pressure on the utilities subject to commission A's jurisdiction to discontinue their support of social goals. Meanwhile, the high-cost competitors will stay out of either state as long as the utilities are permitted to respond to their competitors' pricing initiatives. As a result, the utilities that are subject to commission B's jurisdiction can continue their support of social goals without much concern about lost profits. However, the customers of the utilities regulated by commission B will not benefit from any of the procompetitive policies that have been instituted by this commission.

The last reality considered in this chapter is how the regulators choose to phase-in the transition to a more competitive generation market. In general, the phasing-in of competition only makes specific classes of customers be subject to the costs and benefits of competition. If there are large numbers of customers in these classes, then the utilities are exposed to the risk of a large exodus of customers from their systems. If these particular classes of customers also represent a disproportionately large percentage of the utilities' gross and net revenues, then the utilities are exposed to the risks of rapid and significant reductions in their profits. Either of these outcomes is detrimental to the utilities' capacity to support existing social goals.

CHAPTER 4

MODEL OF SUPPORT OF SOCIAL GOALS: A TECHNICAL ANALYSIS

Introduction

The modeling of support for social goals necessarily starts with a brief introduction as to why utilities might be interested in *voluntarily* performing this task. If they had reason to freely support social goals at optimal levels, then many of the concerns about the effects of competition on this activity are ill-founded. It is seems reasonable to suggest that utilities would choose to support social goals voluntarily when they are convinced that this activity is part of their normal profit-making business opportunities. In this instance, they would create lists of business opportunities that include the support of social goals along with their other private corporate and strategic goals. As a result, only *profitable* social-goals-related programs would be on these lists.[41]

However, in general, the utilities do not have the option of choosing to support social goals. Instead, they are forced to do so. Hesitant behavior is their reaction. Hesitancy is not unreasonable because they obviously believe that there are higher privately valued uses for their resources. In other words, they believe that their support

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[41] It is not impossible for utilities to engage in the profitable support of social goals. For example, there was a time when some utilities found DSM to be more profitable than building a coal-fired or nuclear plant, or running oil-fired units during periods of peak demands.

of social goals is beyond their fiduciary responsibilities to their owners. The *involuntary* nature of the utilities' support of social goals is the starting point for this model..

Modeling Assumptions

The bedrock assumption for this model is that the utilities are forced to support social goals. Because the utilities are regulated firms, it must be the legislators and regulators prodding them to protect the environment, assist low-income customers, and encourage the conservation of energy. Consequently, it is further assumed that the specific activities involved in providing support for social goals are determined through mandates passed by legislators or initiatives begun by regulators.[42] But to the chagrin of the utilities and many others, governmentally sanctioned actions mandating the support of social goals do not obligate the legislators to apportion funds from general tax revenues for this purpose.[43] Therefore, it is assumed that law makers do not make any effort to assist the utilities in their support of social goals during the transition to a more competitive generation market. Furthermore, along the same lines, it is assumed that federal regulators do not use their rate-making authority to support social goals. As a result, the utilities must rely on state regulators to assist them in devising mechanisms that are suitable for this purpose.

Although the utilities, in general, have had to turn to the state regulators for the means to support social goals, some state regulators have encouraged the spillover of competition into the retail markets that they regulate. Sometimes, these regulators

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[42] Social goals do not appear to the states out of thin air. Typically, they have been suggested in federal laws. However, these laws generally do not provide for the full funding of the proposed social goals.

[43] Federal law makers have not rushed to raise taxes in order to provide the funds that would be used to support the social goals that are currently supported by the utilities and their customers. State law makers have similar tendencies. The implication is that shifting the burden for the support of social goals to general tax revenues will result in too little support for the social-goals-related programs.

have promoted competitive forms that may be described as cut-throat. That is, they have allowed competitive practices that can be sufficiently intense to drive the prices for retail services down to their production costs. However, there are other regulators who have approved competitive forms that are consistent with the utilities setting prices for their retail services that exceed their retail production costs. In this model, it is assumed that the spillover effects of competition in the generation market are strong enough to prevent the utilities from setting prices for most of their *retail* services high enough to include any *direct* contributions towards the support of social goals. In other words, it is not possible to put social-goals surcharges on many retail services.

The closing off of a large portion of retail services as a means available for the support of social goals forces the utilities and their state regulators to look elsewhere for the funding that is required for this purpose. "Elsewhere" for them can be the market for distribution services. It is assumed that this market is a monopoly. Consequently, the utilities with the approval of their state regulators can extract some contribution for the support of social goals from the prices that are set for distribution services.

Institutionally speaking, new open access and service comparability rules at the state level are expected to restrain the utilities' use of their monopoly power derived from the distribution market, similar to how federal open access and service comparability rules are expected to restrain the use of monopoly power derived from the transmission market. Technologically, recent advances in generation have eliminated many of the economies of scale that previously characterized this sector of the electricity industry, which in turn has contributed to the disappearance of the functionally integrated utility. Therefore, it is assumed that the utilities and their regulators have agreed to functionally separate generation, transmission, distribution, and merchant activities and have passed open access and service comparability rules for distribution markets. The new rules are needed to ensure that the utilities do not use their ownership of bottleneck and essential distribution facilities in an anticompetitive manner.[44] However, in order to reduce the complexity of the model and without loss of generality, it is assumed further that state regulators have exclusive jurisdiction over distribution markets.[45]

In this model, functional separation means that cost-accounting procedures are used to assign and allocate the utilities' costs.[46] It also means that nonstructural safeguards, such as open access and comparable services, are used to protect the interests of the utilities' customers and competitors. Clearly, nonstructural safeguards are needed because the potential for the utilities to engage in anticompetitive practices, such as cross subsidization, is greatest under functional separation. For example, functionally separate state-regulated telephone utilities often find it profitable to use their market power in the distribution market in a manner that favors their divisions that produce intrastate toll services.[47] However, it is assumed that the market-power problems associated with functional separation are not sufficiently strong to force the creation of an independent system operator (ISO) for the distribution market.[48]

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[44] State regulators remain well within their existing powers when they order the functional separation of the utilities under their jurisdiction. The divestiture of companies, including utilities, is an antitrust remedy that typically is reserved for the courts.

[45] A corollary assumption is that federal regulators have exclusive jurisdiction over the transmission market and transmission pricing. If it also is assumed that the transmission market is a monopoly, then the federally regulated prices for transmission services could contain contributions towards the support of social goals. However, it also was assumed previously that federal regulators do not make any effort to support social goals Therefore, exclusive federal regulatory jurisdiction over transmission implies that the prices for transmission services will not contain any contributions towards the support of social goals.

[46] When regulators choose to rely on cost-accounting procedures as the means to implement functional separation, they create a need to monitor the costs of the utilities' internal transactions and coordination activities. Consequently, the regulators need access to the utilities' internal contracts that govern the transfer of electric power from the utilities' generation companies to the customers of the utilities' transmission or distribution companies.

[47] R. J. Graniere, *Almost Second-best Pricing for Regulated Markets Affected by Competition* (Columbus, OH: The National Regulatory Research Institute, 1996).

[48] The absence of ISOs for distribution markets is not a defining characteristic of the model. Regulated ISOs for these markets can set "above cost" prices for the purpose of supporting social goals

In general, compensation schedules for the utilities' field managers are designed to provide them with incentives to balance the financial interests of the holding company against the financial interests of the field companies. In this regard, it is assumed that a field manager is compensated on the basis of a weighted average of the profitability of the holding company and the field company under his or her control. As a result, it is not in the interests of a field manager to support large amounts of the holding company's uneconomic generation costs because of depressed profitability.

The last assumption is that the distribution market is regulated either according to rate-of-return or performance-based principles.[49] These forms of regulation are assumed for modeling purposes because they represent the best regulatory defense against anticompetitive behavior by a monopolist that sells bottleneck and essential services to their competitors in unregulated markets.[50]

Economics of the Utilities' Support of Social Goals

Let *p* be the regulated price for a distribution service that is supplied under monopoly conditions. Let *p* be sufficiently large to include: (1) an allowed rate of return for the facilities directly assigned to the distribution service, (2) the recovery of the fixed and variable costs directly assigned to the service, (3) contributions towards the recovery of nonassignable fixed costs, stranded costs, and stranded benefits, and (4) a

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just as easily as utilities with functionally separated distribution companies.

[49] The allowed rate of return on rate base is clearly delineated in rate-of-return or performance-based regulation. It is nonobservable under price-cap regulation, which uses the more subjective target rate of return as a benchmark. Generally, the target rate of return exceeds the allowed rate of return because the utility's higher earnings under price-cap regulation is supposed to be the *quid pro quo* for lower production costs and lower wholesale and retail prices.

[50] R. J. Graniere, *Implementation of Open Network Architecture: Development, Tensions, and Strategies* (Columbus, OH: The National Regulatory Research Institute, 1989). R. J. Graniere, *Interstate Basic Service Elements: Potential Effects on Interstate Message Toll Service and Plain Old Telephone Service* (Columbus, OH: The National Regulatory Research Institute, 1991).

contribution towards the support of social goals.[51] Let q be the quantity demanded of the distribution service. Denote p^* as the price that has been proposed by a utility and approved by its regulators, and denote q^* as the quantity that has been selected at p^* by the consumers of the distribution service. Then p^*q^* is the gross revenue that a utility receives from the sale of the distribution service. Suppose that p^*q^* is sufficiently large to just recover the items identified above as (1) through (4).

p^* is *not* the profit-maximizing price because the rate of return allowed by regulators is assumed to be less than the monopoly rate of return that the utility could earn in an unregulated distribution market. Clearly then, there exists a p', different from p^*, that does not provide any contribution toward the support of social goals, but does everything else that p^* does. If the demand for the distribution service is nonzero and inelastic, then it follows that $p' < p^*$ is such a price.[52] As compared to p^*, revenues are lower under p' because the demand for the distribution service is inelastic. Meanwhile, the production costs under p' are larger as compared to those under p^* because the price decline has induced $q' > q^*$. In other words, under the assumed conditions, the utility has substituted the costs of production for the costs of supporting social goals. This substitution is the reason why a utility produces more of the distribution service when it is not required to support social goals. It also is the reason why the users of the distribution service obtain more consumer surplus when social goals are not supported by a utility.

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[51] It seldom is the case that a regulated firm is permitted to earn an allowed rate of return that is as high as the competitive rate of return on investment because regulators generally believe that a regulated market is less risky than a competitive unregulated market. The presumption of lower risks faced by a regulated firm warrants in their view an allowed rate of return that is lower than the competitive rate of return.

[52] The utility's stockholders continue to earn the allowed rate of return on distribution investments because a utility does not substitute a dollar of production costs for a dollar of the costs of supporting social goals. Instead, a utility exchanges fewer production costs for any given level of the costs of supporting social goals. For example, a utility may find it necessary to exchange $2 of social-goal costs for each additional dollar of production costs in order to continue to earn the allowed rate of return after a price decline from p^* to p'.

The next step is to extend the analysis to determine the maximum support for social goals that can be provided by the sale of a distribution service. Because distribution is assumed to be a monopoly, there exists a p^m that represents the unregulated monopoly price. p^m is the maximum economically rational price for a distribution service; therefore, define p^m as $p^m \equiv \max(p)$. This definition implies that $p^m - p'$ represents the maximum support for social goals *per unit* of sale that can be forthcoming from a distribution service, if $p' \leq p^m$. Clearly then, the mere existence of p^m indicates that the distribution market is not a bottomless well for the support of social goals.

A conclusion drawn from the preceding analysis is that the monopoly status of the distribution market is an important influence on a utility's capability to support social goals. If the utility's distribution company is a natural monopolist, then it can legitimately drive any competitor out of the market.[53] Consequently, it does not have to worry about charging p^m on a sustained basis. As a result, each unit sale of this company's distribution service is expected to provide as much as $p^m - p'$ towards the support of social goals. Since an actual price of p^m implies that the utility will sell q^m units of the distribution service, it follows that the *total* maximum contribution *per distribution company* from the sale of the distribution service is $p^m q^m - p' q^m$.

Let j be the index for the number of distribution companies that the utility has in a particular state. If the utility has **N** distribution companies in a state, then j = 1, ... , n. It is indeed possible that a different p^m and p' are applicable for each of the utility's distribution companies. Then the full contribution from the utility's distribution companies towards the support of social goals is represented by $\sum_{j \in N} [\, p_j^m q_j^m - p_j' q_j^m \,]$ for all $p_j' \leq p_j^m$.

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[53] If the distribution market is a natural monopoly, then the incumbent utility is the lowest cost producer of the entire market demand for the distribution service. See W. W. Sharkey, *The Theory of Natural Monopoly* (Cambridge, England: Cambridge University Press, 1982).

Recapture of the Lost Contribution for Social Goals

In effect, by raising the profitability of the utility's distribution companies, state regulators can recapture some of the lost contribution towards social goals that is due to a more competitive generation market. To prove this claim, first note that $p_j' + \varepsilon$, with $\varepsilon > 0$, induces a reduction in the production of the j^{th} company's distribution service, as compared to the production that would have occurred if the j^{th} distribution company had set its price at p_j'. Let $q_j(p_j' + \varepsilon)$ denote the quantity produced by the j^{th} distribution company when the price is $p_j' + \varepsilon$. Let $q_j(p_j')$ denote the quantity produced by the j^{th} distribution company when the price is p_j'. Then $q_j(p_j') > q_j(p_j' + \varepsilon)$.

Now note that the decline in production due the price increase from p_j' to $p_j' + \varepsilon$ causes a reduction in the variable costs of producing the distribution service. If the j^{th} company's short-run marginal variable costs are assumed to be a constant, $\mathbf{k}_j$, then the reduction in these costs equals $\mathbf{k}_j\, q_j(p_j' + \varepsilon) - \mathbf{k}_j\, q_j(p_j') < 0$. Hence, the utility's full state-induced reduction in variable distribution costs due to the price increase is $\sum_{j \in N} [\mathbf{k}_j\, q_j(p_j' + \varepsilon) - \mathbf{k}_j\, q_j(p_j')]$.

Next let $p_j'q_j(p_j')$ denote the j^{th} distribution company's gross revenue from the sale of the distribution service at the price p_j', which does not include a contribution towards the support of social goals. Then consistent with this notation $(p_j' + \varepsilon)q_j(p_j' + \varepsilon)$ denotes the j^{th} distribution company's gross revenue after the price increase. Because the market demand for the distribution service has been assumed to be inelastic, ε induces an increase in the gross revenue from the sale of the distribution service; that is, $p_j'q_j(p_j') < (p_j' + \varepsilon)q_j(p_j' + \varepsilon)$, which implies that $(p_j' + \varepsilon)q_j(p_j' + \varepsilon) - p_j'q_j(p_j') > 0$ represents the rise in gross revenues induced by ε. Thus, the utility's full state-induced increase in gross revenue is $\sum_{j \in N} [(p_j' + \varepsilon)q_j(p_j' + \varepsilon) - p_j'\, q_j(p_j')]$.

Finally, the rise in gross revenue minus the reduction is short-run variable distribution costs represents the increase in the utility's net revenue from the sale of the distribution service. Denote this profit increase by $\sum_{j \in N} [(p_j' + \varepsilon)q_j(p_j' + \varepsilon) - p_j'\, q_j(p_j')] -$

$\sum_{j \in N} [\mathbf{k}_j\, q_j(p_j' + \varepsilon) - \mathbf{k}_j\, q_j(p_j')]$ for the entire state. This variable represents the recapture of the lost contribution towards the support of social goals due to a more competitive generation market because p_j' is the price at which there is no contribution by the utility's distribution companies towards the support of social goals.

The conclusion drawn from the preceding analysis is that the regulator's ability to influence a utility's contributions towards the support of social goals rests partly on sustainable price increases for distribution services. The analysis also indicates that increasing the price of the distribution service does not represent a threat to the distribution company's market share, if the utility's distribution companies are natural monopolies and the prices chosen by the distribution companies are not larger than p_j^m. These conclusions are important because they establish the market-share stability that supports all of the utility's contributions towards the support of social goals. In effect then, the utility's support of social goals through its dominance of the distribution market rests on the fact that its distribution companies are in the position to earn supranormal profits.

CHAPTER 5

INCIDENCE OF SURCHARGES ON DISTRIBUTION SERVICES

Introduction

Energy service companies and other retailers use a distribution service to produce a retail service that is sold to customers that do not own distribution facilities. There is nothing special about an unbundled distribution service when it is viewed as an intermediate service. It is simply a component of every retailer's total cost of producing its final retail service. This fact stands unchallenged even when the regulated company producing the unbundled distribution service is owned by a holding company that also produces retail electricity services. Typically, any retail company purchasing a distribution service attempts to pass its costs through to its customers.

Pass Through of Support for Social Goals

The price for a distribution service is the retailer's per-unit out-of-pocket distribution cost. When this price contains a contribution towards social goals, the retailer's per-unit distribution costs contain a contribution toward social goals. When the retailer's per-unit distribution costs are passed through to its customers, it occurs through a retail price that contains a contribution toward social goals. This chain of events raises the issue of what happens to the growth rates of different retail services when the support of social goals is unevenly distributed among different classes of retail customers.

The answer to the preceding question begins with the observation that the advancement of retail competition is not based on a government mandate that *every* retail customer has to purchase its unbundled electric power directly from a NUG, EWG, or regulated generator; unbundled transmission service from an ISO; and unbundled distribution service from its regulated distribution company. Some percentage of the utility's retail customers is apt to elect to buy bundled electricity service from the utility's energy merchant or its competitors in the energy service market.[54] Table 5-1 shows a pattern for contributions towards the support of social goals and growth rates for bundled and unbundled services when the class of customers purchasing the bundled retail service is asked to make a higher contribution towards the support of social goals than the class of customers that purchases the unbundled services.

When a disproportionate percentage of the support for social goals is extracted from the retail customers who purchase the bundled service, the result is that the price of the bundled service rises relative to the sum of the prices of the unbundled services.

TABLE 5-1
TYPOLOGY OF GROWTH RATES
FOR BUNDLED AND UNBUNDLED SERVICES

Type of Service	Contributions towards Support of Social Goals	Growth Opportunities	Pace of Growth
Bundled	Higher	Fewer	Slower
Unbundled	Lower	More	Faster

Source: Authors' construct.

[54] If β is the percentage of retail customers that purchased bundled services, then 1 - β is the percentage of retail customers that buy unbundled generation, transmission, and distribution services.

Because bundled and unbundled services are substitutes, the increase in the price of the bundled service relative to the sum of the prices of unbundled services causes a reduction in the number of customers that want to buy the bundled service. Meanwhile, more customers want to buy unbundled services. Consequently, there are fewer growth opportunities in the market for the bundled service and more opportunities for growth in the markets for unbundled services. Therefore, the rate of growth will be slower for the bundled service and faster for unbundled services.

Incidence of Support for Social Goals

Under a more competitive generation market, the delivery of electricity to homes or places of business begins with the unregulated sale of electric power to rural cooperatives, municipalities, electric power wholesalers, energy merchants, and retail customers. Next, a federally regulated transmission company sells its service to them and perhaps generators. Lastly, a state-regulated distribution company sells its service to electric power purchasers that do not own distribution facilities and perhaps generators.

Several assumptions govern the exchanges of generation, transmission, distribution, and energy services in our model. First, the markets for the generation and merchant functions are assumed to be sufficiently competitive to stop any efforts by federal or state regulators to directly influence the pricing of electric power and wholesale and retail services. Thus, it has been assumed that these services and products cannot be used to provide any direct contributions towards the support of social goals. Second, federal regulators are assumed to place the entire obligation to find support for social goals in the hands of state regulators. Third, federal regulators are assumed to have exclusive jurisdiction over transmission markets. Fourth, federal regulators are assumed to exercise their jurisdiction by choosing not to provide any support for social goals via the sale of transmission service. Together, these four assumptions ensure that wholesalers with distribution facilities, rural cooperatives, and municipalities will not make any involuntary contributions towards the support of social goals because they are not state regulated and do not purchase any state-regulated services in order to deliver their electric power to the proper locations.

An unbundled distribution service is sold to wholesalers without distribution facilities, energy merchants without distribution facilities, and direct-access retail customers.[55] Hence, the incidence group in our model, which provides support for social goals, is comprised of these three customer types. Only those companies owning their own distribution facilities, which includes the regulated utilities, are excluded from this group. As a result, every retail customer served by members of our incidence group also are served directly or indirectly by the distribution companies of state-regulated utilities. Therefore, the elasticity of demand for the services sold by our incidence group in the retail market should be taken into account by state regulators as they consider their options to obtain contributions for the support of social goals.[56] Obviously, the demand elasticities characterizing the customers of our incidence group determine the percentage of the surcharge on the unbundled distribution service that can be passed through to the retail sector. If this "pass-through" percentage, as expected, is less than 100 percent, then the utility's stockholders will bear some of the burden for the support of social goals indirectly.[57]

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[55]A bundled distribution service is sold to the utility's energy merchants and to energy aggregators since both of these business organizations resell bundled services to retail customers.

[56] Although it has been assumed that state regulators cannot unilaterally increase or decrease the price for a retail service, it has been implied that they can unilaterally affect the cost of a retail service through their authority over the pricing of a bundled or unbundled distribution service. Consequently, a way for state regulators to move toward price comparability for a bundled and unbundled distribution service is to ensure that the price for either distribution service contains the same contribution towards the support of social goals. In this way, each retail customer contributes directly or indirectly to the support of social goals when purchasing a retail service that contains either class of distribution service in its chain of production.

[57] Because the utility's stockholders may find themselves involuntarily contributing to the support of social goals, state regulators have to be careful that their burden is not onerous. When the profitability

Broadening the Incidence Group Supporting Social Goals

Even if the United States Congress fails to order the FERC to support social goals through transmission pricing, state legislatures may be able to impose mandates that require nonelectricity energy suppliers, rural cooperatives, municipalities, and other wholesalers with distribution facilities to provide support for social goals. However, this approach does raise some thorny issues that are created by the differences between investor-owned utilities, rural cooperatives, and municipalities. The first issue is that rural cooperatives and municipalities tend to be smaller in all measures of output when they are compared to the more urbanized investor-owned utilities. Because rural cooperatives and municipal electricity companies have access to fewer retail customers, they make fewer retail sales. In general, their peak demands also are lower than the peak demands of the investor-owned utilities. As a result, it is more difficult for rural cooperatives and municipal electricity companies to raise money through kilowatt charges. All things considered, the municipalities and rural cooperatives would be at a disadvantage if a state mandates (somewhat unbelievably) that they and the investor-owned utilities have to expend the same number of dollars in support of social goals. The reason is that equal cost shares in support of the state's social goals are larger fractions of the municipalities' and rural cooperatives' operating budgets as compared to the investor-owned utilities' operating budgets. Therefore, it is not reasonable to expect that rural cooperatives and municipalities can or will be ordered to provide the same level of support for social goals that can be provided by the investor-owned utilities.

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of the electricity industry falters, investors simply will look elsewhere for financial growth opportunities. Those investors that do buy into the electricity industry will do so only at lower stock prices. Thus, existing investors in electricity stocks suffer equity losses. Hence, it is not in the broad public interest to support social goals through the pricing of distribution services when the associated surcharges place an onerous burden on the utility's investors.

The second issue is that competitive alternatives are neither uniformly nor universally available to all retail customers at any point in time. This unevenness is particularly striking during the initial efforts to advance competition in a regulated market. Typically, the large-volume customers have competitive alternatives. Meanwhile, the small-volume customers are not being pursued by any competitive suppliers. Consequently, the retail competition induced by a more competitive generation market can financially devastate rural cooperatives, municipalities, and other similar companies that have a few large retail customers who represent a disproportionate share of their total electricity load, sales, and retained earnings.

Reduced retained earnings represent a deterioration of the rural cooperatives' and municipalities' capabilities to support social goals. In order to restore their capabilities in this area, they would have to find ways to replace their lost retained earnings. Ideally, the mechanism or mechanisms that they choose would discourage their large-volume customers from leaving in the first place and then recapture some of the lost retained earnings if they still choose to leave. A surcharge on a distribution service is a practical means to achieve these objectives. It could be either usage sensitive or nonusage sensitive. Obviously, a usage-sensitive surcharge would continue the tradition that the largest retail customers would contribute the most funds in support of social goals regardless of whether these customers did or did not stay with the rural cooperatives or municipalities.

A third issue is the relatively small number of customers and sales that the municipalities and rural cooperatives can turn to for the recovery of generation costs that are stranded by retail competition. It is indeed possible that the rate increases necessary for the recovery of stranded costs will not be acceptable to their remaining customers. When this occurs, the rural cooperatives and municipalities are in the same difficult position as the investor-owned utilities. Their options are to reduce or eliminate their support of social goals. However, such action is not costless. Reduced support of social goals creates stranded benefits. As discussed earlier, stranded benefits are the fixed costs that are associated with the eliminated social-goals-related programs. Surely, the recovery of these fixed costs, along with the recovery of stranded costs, puts additional upward pressure on the prices for retail services. The higher retail prices, in turn, induce more customers to leave the rural cooperatives and municipalities, and the cycle begins all over again.

When this cycle of recovery and defection is explosive, the pressure created by stranded costs, stranded benefits, and the support of social goals could mark the end of rural cooperatives and municipal electricity companies. In this regard, it is worthwhile to note that the process of recovering stranded costs, stranded benefits, and supporting social goals is more likely to be nonexplosive (dampened) when the majority of the social-goal-related program costs are variable. To show this, note that the elimination of social-goals-related programs characterized by a disproportionate share of variable costs creates a minimal amount of stranded benefits because variable costs vanish with the loss of customers and profits to unregulated competitors. It is the resulting minimal amount of stranded benefits that enables the rural cooperatives and municipalities to continue to support at least some social goals, while they simultaneously recover their stranded costs.

CHAPTER 6

PLAN FOR THE SUPPORT OF SOCIAL GOALS

Introduction

It is risky business to devise a plan for the support of social goals without considering the fact that advances in combined-cycle generation technologies and low relative prices for natural gas have provided an apparently sustainable foundation for competition in the retail market. It is chancy to ignore the facts that retail competition induced by a more competitive generation market creates stranded costs and that the utilities' response to this competition creates stranded benefits. Lastly, it is dangerous to ignore the existing signals indicating that the recovery of stranded costs and stranded benefits supersedes support for social goals in the policy arena.

The plan for the support of social goals presented herein is based on the belief that competition-induced stranded costs diminish the utilities' capability to support social goals. It acknowledges in the interests of fairness that the utilities create stranded benefits when they eliminate their programs that support social goals. It recognizes that the recovery of stranded costs and benefits is presently a higher priority for the utilities and their regulators than the continuation of support for social goals that induces *higher* retail prices. It admits that the direct sources of support for social goals are the distribution market and captive retail customers with inelastic demands for electricity service. Finally, it rests on another belief that it is worth some loss of market efficiency to support social goals that would not otherwise be supported by the normal operations of the retail market.

The plan suggests that state regulators use various means to support social goals. As usual, tradeoffs and compromises are involved because each of the suggested means has a distinguishable effect on the operation of various markets. One of the suggested means is associated with allowing the utilities to exercise their monopoly power in the market for distribution service. Another means is access fees for generators. An exit fee for direct-access customers is the last means that is contained in the plan.[58]

Exercise of Market Power in the Distribution Markets

The core of this plan contains usage-sensitive surcharges on the unbundled distribution services purchased by the incidence group. Unbundled distribution is an essential service in the context of competitively supplied generation. Simply put, the delivery of electric power to wholesalers and energy merchants without distribution facilities and direct-access customers cannot occur without it. Furthermore, unbundled distribution is presently produced using bottleneck facilities because there are not any alternative nonutility distribution companies. Consequently, wholesalers and energy merchants without distribution facilities and direct-access retail customers must pass through monopolistic distribution markets controlled by investor-owned utilities, if they want to complete the delivery of competitively supplied generation.

The support for social goals by way of a usage-sensitive surcharge on unbundled distribution service is achieved by permitting the utilities' distribution companies to exercise monopoly power against their customers. When exercised, this market power results in the sale of fewer units of the unbundled distribution services,

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[58] Ramsey pricing of conventional retail services is considered to be a nonviable means for continuing the support of social goals. For the detailed explanation of Ramsey pricing, see F. Ramsey, "A contribution to the theory of taxation." *Economic Journal* Vol 17, 1927, 47-67. For a simplified version of Ramsey pricing, see W.J. Baumol and D. Bradford, "Optimal departures from marginal cost pricing." *American Economic Review* Vol 60, 1970, 265-283.

higher prices for the services, and supranormal profits for the utility-owned distribution companies. Essentially, the support of social goals is realized in the *spirit* but not the *reality* of a market-based vertical control effort.[59] Similar to an efficient vertical control effort, an upstream entity is expropriating a downstream entity's monopoly profits. In this instance, state regulators are the upstream entity. They are expropriating the monopoly profits of the utilities' distribution companies, which are the downstream entities.[60] Therefore, the first tradeoff associated with the plan is a decline in the attractiveness of the distribution market to the utilities as a source of profit.

The monopoly profits so expropriated can be put to at least three uses by state regulators. First, they can be used to finance the recovery of stranded costs. Second, they might finance the recovery of stranded benefits, if anything is left over after the recovery of stranded costs. Third, they can be used to support social goals after the recovery of stranded costs and stranded benefits. As mentioned, the legislative and regulatory communities have so far signaled that the recovery of stranded generation costs is a higher priority than supporting social programs that *increase* the price of a retail service. A logical extension of this signal is that the recovery of stranded benefits also is a higher priority than continued support of price-increasing social goals. Thus, it would be reasonable to presume that the first and second surcharges on a distribution service would be for the purpose of recovering stranded costs and benefits. It is the

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[59] An actual vertical control effort would involve an upstream monopolist, in this instance the utility-owned distribution company, and a downstream monopolist that in this instance would be a utility-owned company that serves the utility's captive retail customers. What would happen under an efficient vertical control is that the utility-owned distribution company would earn a total profit that is greater than the sum of the monopoly profits earned by the utility's distribution and captive-customer companies when they act separately. Consequently, the utility-owned distribution has expropriated all of the profits that can be earned by the utility-owned company serving the utility's captive customers. See, J. Tirole, *The Theory of Industrial Organization* (Cambridge, MA: The MIT Press, 1988).

[60] An approximately equivalent interpretation is that the average cost of an unbundled distribution service contains a component that is related to the costs of social programs. Therefore, a contribution in support of social goals is obtained by setting the prices for unbundled distribution services equal to their average costs.

third surcharge that provides the contribution towards the support of social goals. Therefore, the second tradeoff induced by this plan is that even a monopoly price for a distribution service does not necessarily provide for the full continuation of the full set of existing social goals after the retail market reacts to a more competitive generation market.

Access Fees for Generators

It was previously noted that wholesalers and energy merchants without distribution facilities and direct-access retail customers bear the burden of supporting social goals when surcharges on unbundled distribution services are the means that has been chosen for this purpose. But, what if, the monopoly pricing of unbundled distribution services does not provide for the full support of existing social goals? Wouldn't it seem unfair to call upon another means for supporting social goals that also places a burden on these companies and consumers. Thus in this spirit of fairness, the second element of the plan is monthly fixed charges that the utilities' distribution companies assess against the competitive generation companies. These recurring fees are for access to the utilities' distribution facilities. It is proposed that these monthly charges should be deposited into a fund that is earmarked exclusively for the support of social goals. However, lump-sum monthly access fees have the potential to adversely affect the entry of firms into the competitive generation markets. As a result, the plan's third tradeoff is the possibility of fewer competitive generators.

Exit Fees for Direct-Access Retail Customers

Currently, the FERC is using exit fees on wholesalers as the means to recover the stranded costs that are created by a more competitive generation market.

Presumably, some state public utility commissions will employ exit fees on direct-access customers to recover the stranded costs created by the retail competition induced by a more competitive generation market. Consequently, an exit fee for the support of social goals constitutes another "hit" against the class of retail customers that is trying to benefit the most from the availability of competitive supplied electric power. The exit fee's obvious effects on industry restructuring are to restrict the growth rate of direct-access customers and to reduce the profit-making opportunities for competitive suppliers of electric power. Therefore, the fourth tradeoff associated with the plan is a smaller and less competitive generation market.

Not Included in the Plan

The plan treats price increases for the utilities' captive retail customers as a politically nonviable means for supporting social goals. Although social goals are important to state regulators, the protection of captive customers from price increases, when noncaptive customers are experiencing declining prices, is even more important to them. Consequently, it is far from likely that state regulators will order utilities to raise funds for the support of social goals by increasing the price of the retail service used by captive customers.

Tax increases are not suggested because they also are not acceptable politically. Practically speaking, utilities are responsible for the support of particular social goals because legislative bodies have decided not to use their taxing authority for this purpose. Only one influential factor has changed since this legislative decision was made: the generation and energy service markets have become more competitive. Many legislative bodies have encouraged this transition because of their belief that competition induces lower prices for consumers who also are their constituents. Therefore, it is impractical to think that legislative bodies seeking lower prices through competition will raise taxes because competition in certain markets of the electricity industry has diminished the utilities' capabilities to support social goals.

A call for price-cap regulation of relevant markets is not made because regulated utilities are unlikely to work hard voluntarily to achieve cost savings that immediately will be expropriated for the support of social goals. The only reason that price-cap regulation induces cost savings is because there is an opportunity for some of these savings to flow through to the utilities' accounting systems and end up as profits. Some reflection suggests that utilities are apt to bargain more aggressively under price-cap regulation for lower fuel or purchased-power prices when there are private payoffs to them for doing so. Conversely, it is not unreasonable to suppose that they do not bargain as aggressively for the very same cost savings under the very same regulatory format when their private payoffs are expropriated by consumers or policy makers. Thus, the expropriation of additional profits realized under price-cap regulation, for the purpose of supporting social goals, does not appear to bring the utilities' private interests into congruity with the public interest. Hence, a change of regulatory format to price-cap regulation for the distribution market does appear to be ill-advised, if anyone is interested in continuing support for social goals.

In contrast, performance-based incentive regulation can be reasonably structured to contribute towards the support of social goals. Regulators could set predetermined and mandated expenditures on social goals. Obviously, the utilities' profitability is exposed if they are unable to generate cost savings that are greater than or equal to the mandated expenditures on social goals. In addition, the utilities are not rewarded at all under this regulatory format when their entire cost savings are required to offset their expenditures on social goals. Hence, the utilities have good reasons to work hard to achieve sufficient cost savings under this particular "command and control" variant of incentive regulation.

Lastly, outright reductions in the profitability of regulated utilities are not used to support social goals because the plan expropriates supranormal profits (and cost savings) for this purpose. As the utilities' distribution companies earn supranormal profits from the sale of distribution services, state regulators expropriate all of them for the purposes of supporting social goals, recovering stranded benefits, and recovering stranded costs. Consequently, this plan acknowledges, other things being equal, that the utilities' economic responsibility to their stockholders will discourage them from supporting social goals at the cost of declining profitability.

CHAPTER 7

CONCLUSIONS

The report has analyzed the capability of regulated utilities to support social goals as the generation market becomes more competitive. It has examined whether utilities can be the sole source of support for these goals. Lastly, it has reviewed the role that unregulated electric power and energy service suppliers can play in providing support for social goals. The following conclusions have been reached.

Cost-reducing opportunities for large-volume customers caused by the transition to a more competitive generation market have diminished the utilities' capabilities to support social goals. The reason is that a more competitive generation market, if allowed to do so, tends to drive retail (and wholesale) prices downward, while the support of social goals tends to create higher prices for electricity services. Because the competition in generation is expected to become more intense as time passes, the utilities' capacity to support social goals also is expected to be more diminished in the future. Although not a near-term threat to the regulated utilities and also not a widely-held notion, a more competitive distribution market may emerge as support for social goals pushes the price for distribution service above its sustainable level.

It has been found that policy decisions with respect to the support of social goals have to be based on a broad view of how a more competitive generation market affects the utilities' profitability and pricing. The analysis has indicated that the induced competition characterizing the retail market does not necessarily prevent the utilities from collecting the funds that are required for the support of social goals. The analysis also has indicated that this capability will exist well into the future — albeit in a diminished amount. In particular, the utilities can turn to the monopolistic distribution market for the funds for the support of social goals. Moreover, the utilities still will have the wherewithal to support social goals as long as any competition in the distribution market is sufficiently imperfect. An imperfectly competitive distribution market would allow the utilities to continue to earn supranormal profits, and state regulators would continue to have the authority to expropriate these profits in the name of supporting social goals.

Sources and Means of Support for Social Goals

There are widespread sources of support for social goals. The analysis has demonstrated how unregulated energy service companies, direct-access retail customers, wholesalers without distribution facilities, unregulated generators, utility stockholders, and regulated retail customers can be sources of support for social goals. Therefore, problems with the continued support of these goals in a more competitive generation market are not created by a precipitous reduction in the number of sources of support. Instead, these problems are created by reductions in the amount of profits and cost savings that can be extracted from these sources through market and nonmarket means.

The FERC could use the pricing of transmission services as a means to support social goals. However, it is highly unlikely that it will use its pricing authority for this purpose. Therefore, state regulators have to consider the costs and benefits of using surcharges for unbundled distribution services, access fees for competitive generators, and exit fees for direct-access retail customers as the set of means to support social goals. But unfortunately, none of these means can be viewed as a "win-win" event. Surcharges have been shown to be associated with a reduction in the consumption of unbundled distribution service, even though the demands for these services are very inelastic. Access fees create higher entry barriers for nonaffiliated and affiliated generation companies because they raise the cost of entering the generation market. Lastly, exit fees make it more difficult for retail customers to become direct-access customers. In the end, it is undeniable that efficiency losses are associated with the support of social goals.

The analysis has shown that the feasibility of supporting social goals is primarily an economic issue. However, it also has indicated that the continued support of social goals is not governed entirely by the practical realities of economics. The practical realities of politics always play a role in any decisions to support social goals. In this regard, slowly increasing retail competition induced by the transition to a more competitive generation market improves the political/economic feasibility of supporting social goals. High-cost and regulated generation facilities are protected by a slow transition to competition. Interestingly, high-cost and unregulated generation facilities also are beneficiaries of slowly evolving retail competition. The pricing inflexibility that characterizes the regulated utilities in these circumstances serves to protect the investments made by high-cost and unregulated generation companies. Meanwhile, it has been demonstrated that only low-cost generators can profitably enter states that have removed the regulatory institutions that restrict the growth of retail competition and the pricing of the regulated utilities. Thus, a state that has decided to move quickly toward retail competition also has decided to make it more difficult for its regulated utilities to continue their support of social goals.

Lastly, it has been shown that reductions in the support of social goals occur at a cost to the utilities. This business decision creates stranded benefits, which are the uncovered fixed costs of the now defunct programs originally designed to implement social goals. Obviously then, fewer stranded benefits are created when the utilities' social-goals-related programs are dominated by variable costs. Unfortunately, the continued support of any social goals by the utilities is at great risk when their social-goals-related programs are characterized by large percentages of variable costs.

Utilities as the Sole Source of Support for Social Goals

The restructuring of the electricity industry is characterized by the piece-meal competition that describes markets in transition. Some customers have the opportunity to choose an electricity supplier from a fairly large set of generators, but other customers have few or no choices. Even though the utilities can expect to continue to extract the same level of support for social goals from their customers without the ability to choose an alternative supplier, it has been explained how the utilities will find it difficult to extract the same level of support from their wholesale and retail customers with choices. Whatever the utilities do, some of their customers with choices will defect to competitors. As a result, the utilities will lose the support for social goals that the defecting customers had provided previously. To regain the lost support, it has been shown that the utilities, among other things, will have to place access fees and usage surcharges on unbundled distribution service. However, these price increases may not be sufficient to fully cover the costs of supporting existing social goals. Thus, it is possible that the utilities' support for social goals will diminish as the generation market becomes more competitive and regulatory institutions are removed that prevent competition in the retail market.

APPENDIX A

EXTERNALITIES PRODUCED BY PRODUCTION, DELIVERY, AND CONSUMPTION OF ELECTRICITY

1.	Impacts on *agricultural crops, timber, and livestock.*
2.	Impacts on the real and perceived risks of *catastrophic accidents* associated with some, especially nuclear, technologies.
3.	Impacts on *ecosystems and biodiversity,* including impacts on rare, threatened, or endangered species.
4.	Impacts on *environmental-cultural icons,* such as wild anadromous fish.
5.	Impacts on *global climate change.*
6.	Impacts on *human morbidity and mortality.*
7.	Impacts on *land use.*
8.	Impacts on *materials.*
9.	Impacts on *recreational opportunities.*
10.	Impacts on *regional economic structure.*
11.	Impacts on *visibility.*
12.	Impacts on *visual and audio aesthetics.*

Source: ECO Northwest, *Environmental Externalities and Electric Utility Regulation*, prepared for the U.S. Department of Energy under a subcontract with Oak Ridge National Laboratory (Washington, D.C.: National Association of Regulatory Utility Commissioners, September 1993).

APPENDIX B
1993 DSM EXPENDITURES
BY STATE

State	DSM Expenditures
Alabama	35152
Alaska	84
Arizona	29573
Arkansas	123
California	46854
Colorado	434
Connecticut	1068
Delaware	4096
District of Columbia	8763
Florida	105658
Georgia	2507
Hawaii	10472
Idaho	595
Illinois	3924
Indiana	24243
Iowa	27394
Kansas	2634
Kentucky	23998
Louisiana	0
Maine	64106
Maryland	73171
Massachusetts	221344

APPENDIX B
1993 DSM EXPENDITURES
BY STATE

State	DSM Expenditures
Michigan	0
Minnesota	237555
Missouri	614
Montana	15631
New Hampshire	156
New Jersey	136930
New York	79107
N. Carolina	52029
N. Dakota	16282
Ohio	49158
Oklahoma	55424
Oregon	4896
Pennsylvania	48317
Texas	9565
Vermont	51038
Virginia	35198
Washington	35198
W. Virginia	103
Wisconsin	99586

APPENDIX C
1993 POLLUTION ABATEMENT EXPENDITURES

State	Abatement Expenditures
Alabama	1048963
Alaska	0
Arizona	1336225
Arkansas	284316
California	2881479
Colorado	4149
Connecticut	0
Delaware	305493
District of Columbia	1289861
Florida	2451391
Georgia	1672525
Hawaii	0
Idaho	181622
Illinois	2997899
Indiana	1638263
Iowa	150968
Kansas	0
Kentucky	779649
Louisiana	168075
Maine	285245
Maryland	3120225
Massachusetts	423856

APPENDIX C
1993 POLLUTION ABATEMENT EXPENDITURES

State	Abatement Expenditures
Michigan	547972
Minnesota	323763
Missouri	1004788
Montana	231939
New Hampshire	421311
New Jersey	1704595
New York	4584483
N. Carolina	2698899
N. Dakota	0
Ohio	4616845
Oklahoma	602598
Oregon	4909193
Pennsylvania	3695888
Texas	3351540
Vermont	0
Virginia	915694
Washington	75833
W. Virginia	287
Wisconsin	844767

APPENDIX D
1993 USES OF FUNDS FOR LOW-INCOME ASSISTANCE BY STATE
(in dollars)

State	Heating Assistance Benefits	Cooling Assistance Benefits	Crisis Assistance Benefits	Weatherization Assistance Benefits	Administrative Costs
Alabama	$ 4447613	$ 0	$ 4623329	$ 1342750	$ 764656
Alaska	4652492	0	200983	3596950	622312
Arizona	3906462	0	252000	841055	559613
Arkansas	5265738	0	905258	1168526	830352
California	29248524	0	14222195	11266772	5743219
Colorado	22360044	0	163704	3487568	2082050
Connecticut	29104137	0	2080468	0	2765174
Delaware	3280712	0	125791	0	342938
Dist. of Columbia	3270059	0	520727	781092	472736
Florida	10403596	0	2273382	2690329	1588364
Georgia	9637845	0	3657995	2128722	1142403
Hawaii	1002040	0	285867	0	142916
Idaho	5227737	0	577666	1223118	763467
Illinois	29592410	50000	881957	4475000	3381195
Indiana	14984155	0	4622362	3687640	2081978
Iowa	14984155	0	4622362	3687640	2061978
Kansas	5184191	2596696	1579041	1522179	1163502
Kentucky	14283642	0	5801377	2436997	2448448
Louisiana	4529551	3450091	-	1408172	1043090
Maine	15353332	0	154335	2504737	1932717
Maryland	21804369	0	-	0	2774442
Massachusetts	51720990	0	-	3200000	5719560
Michigan	69100000	0	5288483	1300000	5300000
Minnesota	39183847	0	6482405	2130963	5261460
Mississippi	5886190	1555651	753000	1311508	971487
Missouri	26138874	0	3690000	0	3179726
Montana	4754242	0	659601	1235721	823240
Nebraska	6483000	560000	2079726	1166424	1215786
Nevada	1780217	607733	141100	330499	314599
New Hampshire.	9751590	0	-	500000	970333
New Jersey	49929278	1700000	2500000	3600000	6400000
New Mexico	5445385	0	451547	0	625022

APPENDIX D
1993 USES OF FUNDS FOR LOW-INCOME ASSISTANCE BY STATE
(in dollars)

State	Heating Assistance Benefits	Cooling Assistance Benefits	Crisis Assistance Benefits	Weatherization Assistance Benefits	Administrative Costs
New York	103270642	0	33000000	32980000	17847384
N. Carolina	20972180	0	2503617	0	2715971
N. Dakota	7909298	0	2503617	0	2715971
Ohio	35173467	0	20601706	9895878	4473578
Oklahoma	7215404	0	721890	707591	750042
Oregon	12529063	0	35000	1998086	1142550
Pennsylvania	51561008	0	36635151	8360000	8231761
Rhode Island	9770578	0	307744	453801	1178946
S. Carolina	7428422	0	902417	1357691	963870
S. Dakota	6410304	0	214000	504083	589642
Tennessee	13708485	0	2463247	1445400	347168
Texas	9495430	10988423	2911030	4478976	2985983
Utah	7948771	0	100404	368000	696844
Vermont	6379014	0	318800	1105136	785536
Virginia	24317772	766381	2644825	0	2785396
Washington	15660894	0	2094763	3623265	2494991
W. Virginia	6215253	0	3267783	1075164	1104910
Wisconsin	37198815	0	4651499	6475547	4264472
Wyoming	2830784	0	132136	592173	397268
Total	$ 908692001	$ 22274975	$ 185606290	$ 135245153	$ 121961046

Source: The U.S. Department of Health and Human Services, *Low Income Home Energy Assistance Program-Report to Congress for Fiscal Year 1993* (Washington, DC 1994).