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NRRI 97-10

SUPPORT FOR SOCIAL GOALS IN A MORE COMPETITIVE ELECTRICITY INDUSTRY

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June 1997

This report was prepared by The National Regulatory Research Institute (NRRI) with funding provided by participating member commissions of the National Association of Regulatory Utility Commissioners (NARUC). The views and opinions expressed herein do not necessarily state or reflect the views, opinions, or policies the NRRI, the National Association of Regulatory Utility Commissioners (NARUC), or NARUC member commissions.

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

[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.

position. 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

[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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June 1997

ACKNOWLEDGMENTS

We wish to express our thanks to Douglas Jones, Kenneth Costello, and Susan Stratton for reviewing this report. Their insightful comments helped us focus our efforts and clarify our exposition. However, we alone are responsible for any errors.

We also would like to thank Francine Sevel for editing this report and Marilyn Reiss and Lee Ann Rabe for typing the report.

CHAPTER 1

INTRODUCTION

As more and more contracts to serve electric load are won by non-utility generators (NUGs), the dominance of the regulated utility over the wholesale and retail electricity markets 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 NUGs' competitive success is due in part to the attractive total and average costs of production of combined-cycle gas turbines. Essentially, this new technology has mitigated the importance of the economies of scale that characterized power generation by large nuclear and coal-fired plants.[1] Through changing the cost structure of the market, combined-cycle gas turbines are contributing to the fading prominence of the regulated electric power utility.

As long as unregulated generation firms and energy service providers are required to contribute to this effort, a prior report by the National Regulatory Research Institute dealing with utility-supplied support for social goals concluded that such support is feasible.[2] With the prior report serving as a foundation, the purposes of this report are to: (1) discuss the realities of utility-supplied support for social goals; (2) analyze a model of utility-supplied support for social goals; (3) describe the pass-

[1] Herbert G. Thompson, David Alan Hovde, Louis Irwin, Mufakharul Islam, and Kenneth Rose, *Economies of Scale and Vertical Integration in the Investor-Owned Electric Utility Industry* (Columbus, OH: The National Regulatory Research Institute, 1996).

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

through and incidence of utility-supplied support for social goals; and (4) present a plan for utility-supplied support of social goals.

Some words of caution are in order concerning the use of the conclusions of this report. They should not be used to infer that all of the support for social goals should come solely from a utility. Also they should not be used to infer that the existing levels of utility-supplied support for social goals should be continued nor as evidence that the existing levels of utility-supplied support for social goals are optimal. Instead, these conclusion refer back solely to two questions: Does a more competitive electricity industry cause a utility to reduce its support of social goals? How can legislators and regulators continue to use a utility to support social goals, while the simultaneously allow competition to flourish in the industry?

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 in the area of retail competition. Notable events lying in-between these two end points 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, and the latter required among other things the full recovery of mitigated and verifiable stranded costs that have been created by wholesale competition.[3]

First Signs of Competition

Crude oil prices were low and supplies were secure prior to the 1970s and, consequently, substantial amounts of oil were used to generate electric power during

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

peak periods of demand. Moreover, despite the highly publicized "(automobile gas crisis" in the early 1970s, the demand for electricity continued to grow substantially throughout the decade. However during the 1970s, politically and economically motivated reductions in the supply of Middle Eastern oil caused rapid increases in the price of crude oil. The rising oil price contributed to significant increases in a utility's total cost of production, which, in turn, put downward pressure on a utility's profits. Profits were depressed because a utility was not allowed to automatically readjust its rates to reflect the higher fuel costs. The fuel adjustment clause (FAC) was the regulatory response to this problem. Simultaneously, many utilities were submitting rate cases to state regulatory commissions whose cause could be traced back to the rapid growth in the demand for electricity during the 1960s. The utilities, in response to these substantial growth rates, had undertaken ambitious plant construction programs in the 1970s. These programs were drawing to a close by the end of the 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 impacts of the FAC and these rate cases on consumers were immediate. Electricity prices soared, and their volatility increased.

Political realities required a reduction in the United States' dependence on Middle Eastern oil, but it was politically infeasible to use rising electricity, heating oil, and gasoline prices to p UT the brakes on the quantity demanded of oil. Instead, PURPA represented the response of the United States Congress and the President to this dilemma. Important for our purposes are PURPA's features concerning co-generation, qualifying small power facilities, and conservation. The utilities were asked to conserve oil, which meant reductions in the utilities' peak periods of demand. Time-of-day pricing, load management, energy efficient appliances, co-generator, and qualifying facilities were the tools that were recommended to achieve this result. The

[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.

first three recommendations involve the management of the demand side of the electricity market. Thus, demand-side management (DSM) became a public policy. The promotion of co-generators and qualifying facilities are related to the production and supply of electric power by a NUG. Thus, the legitimacy of NUGs became public policy.

On the one hand, PURPA's promotion of co-generators and qualifying facilities opened the generation market to competition. On the other hand, it was clear that the utilities did not have a lock on the development and deployment of DSM technologies. Non-utilities installed insulation, and non-utilities could perform energy audits. There is a long economic history of non-utilities producing household appliances and light bulbs. Because PURPA had elevated DSM to the status of a national policy, these non-utilities were given greater access to the utilities' customers. Hence, competition was introduced to the energy service market.

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 the utilities subject to their jurisdiction to meet energy conservation goals. Each of these actions reaffirmed again and again that consumers had access to non-utilities 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 80s. Co-generators were provided with a seemingly secure market for their excess power. A utility was forced to accept the co-generator's power and to pay a price that was equal to the utility's avoided cost. 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 construction. These regulatory actions strongly suggested that a utility would not be allowed to earn the full expected return on its 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 utility.

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 a utility. Fuel prices fell steadily during the latter half of the decade, and tax credits for renewable resources and home insulation were not renewed by Congress. Furthermore, completed plant construction programs made it harder and harder to economically justify further expenditures on DSM on an avoided-cost basis. Simultaneously, fewer competitive bid opportunities were surfacing since the initial investments in DSM and other factors had slowed the growth in the demand for electricity. In addition, excess capacity had lowered avoided costs, which, in turn, lowered the profit potential of co-

generators, independent power producers, and qualifying facilities. Thus, it appeared that competition in the electricity would settle down to a moderately active level during the 1990s.

However, advances in combined-cycle gas turbine technology in early 90s increased the competitive pressure in this industry despite the aforementioned events. Falling avoided costs do not mean that a utility would or could lower its prices. In fact, just the opposite effect occurred. The cause of falling avoided costs -- a completed plant construction program -- increased a utility's rates. Meanwhile, the improvements to the combined-cycle technology lowered the costs of the utility's competitors in the generation market. In point of fact, the per-unit costs of many of the competitors were lower than the utility's electricity prices.

The early 1990s also were witness to a concerted effort in Congress to allow competition to flourish in the electricity industry. EPAct made it clear that competition was the overarching public policy for the industry. The FERC was instructed to create regulatory institutions that were compatible with competition in the industry in general and in the wholesale market in particular. The open transmission access and comparable transmission service mandates found in Order 888 was FERC's response to the Congressional directive.

But even prior to this FERC order, this federal regulatory authority had decided not to regulate the utility's competitors in the generation market. Hence, the "competitive" policy for the wholesale market was partial deregulation. A utility's competitors were now firmly established in the wholesale market. If in its economic interests, a wholesale customer could leave a utility for a lower priced generation alternative. Meanwhile, the utility's wholesale prices were still regulated.

Obviously, partial regulation runs counter to the utility's economic interests. From the utility's perspective, the pricing and marketing constraints imposed on its by regulation are nothing more than competitive advantages for its competitors. Thus, each utility subject to FERC jurisdiction pleaded for more pricing freedom in the wholesale market. These pleas did not go unheeded. In the course of passing EPAct, the United States Congress created the exempt wholesale generator - which provides the utility with the means to enter the generation market on an unregulated basis.[5]

Although it is conceivable that someday exempt wholesale generators (EWGs) and NUGs will dominate the generation market[6], the stranded-cost effect could be restricted by limiting the scope of wholesale and retail competition. Unregulated power could be sold only to meet the *growth in demand* for electric power. Then the power supplied by NUGs and EWGs would represent power that had never been produced and supplied by the utility. If all of the growth in the demand for electric power was served by NUGs and EWGs, then the utility would not have to deploy new *regulated* generation facilities.

Of course, the utility's *obligation to serve* is not necessarily affected by the presence of NUGs and EWGs. If the NUGs and EWGs cannot meet the new demands for electric power, then the utility would have to have the facilities on hand to meet the consumers' needs, as long as state and federal law is not changed to relieve the utility

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[5] An exempt wholesale generator is exempt from the ownership restrictions of the *Public Utilities Holding Companies Act* and, consequently, it can be owned and operated by holding companies that also own and operate a regulated utility.

[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 the power that is 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.

of its obligation to serve. Hence, a utility may be forced to build new generation facilities, even when NUGs and EWGs are restricted to serving the growth in the demand for electric power.

However, the elimination of stranded costs by making it impossible for the utility to incur them is inconsistent with the rapid spread of competition throughout the electricity industry. Restricting NUGs and EWGs to compete only for the growth in the demand for electric power implies that the utility will indefinitely be the sole supplier of the existing load. This outcome is incompatible with the expectation that eventually NUGs and EWGs will serve all or significant portions of the wholesale and retail markets.

In any event, EPAct does not mandate competition for retail electricity markets. The jurisdictional split of regulatory authority over the electricity industry leaves the regulation of the retail markets to the states. However, the Congress and FERC as its agent left no doubt with the passage of EPAct that they would like to see competition spread to the retail markets. The State of California took up the challenge for a variety of reasons not the least of which was the expectation of lower prices. It did not take the utility's competitors to make marketing pitches to the large-volume retail customers in California and elsewhere. Many of these customers liked what they heard, and they began to evaluate if it was in their best interests to switch to a competitor whenever the existing state laws permitted them to do so.

The utility faced another dilemma. In addition to the threatened loss of wholesale customers with the attendant stranded costs, it also had to deal with the potential loss of retail customers and another perhaps larger wave of stranded costs. This situation created a Hobson's choice for the utility and its regulators. They could run the risk of incurring the full amount of stranded costs by doing nothing to stop the threatened loss of a large-volume retail customer to a competitor, or they could respond by offering a discount in order to keep the customer and stave off some of the stranded costs. This is a Hobson's choice because what the utility and its regulators

do not know is which action minimizes the actual level of stranded costs.[7] In any event, it typically was the case that the utility was allowed to lower the prices on a case-by-case basis wherever state law permitted a retail customer to defect from a utility.

Having demonstrated why wholesale and retail competition do not represent a financial threat to the utility as long as the utility continues to serve existing wholesale and retail loads, we can conclude that the utility can continue to cover its existing costs. Thus, a utility is in the position to continue to meet its existing obligation to support social goals. This position is threatened only when competition is extended to existing loads.

The threat to extend competition to existing loads grows in statute when a utility's customers begin to complain that the regulated prices are too high. Such complaints cause build-up of political pressures that often lead to price reductions for regulated services. These price reductions, in turn, threaten the utility's ability to meet its existing social-goal obligations. An alternative to price increases for regulated services involves eliminating or cutting back on the effort that is expended to support social goals. Arguably then, there is a real threat that a utility might not be able to continue to support social goals as the electric power industry becomes more competitive.

Of course, it always is possible that a competitive generation market will provide cost savings that are sufficient to compensate the utility for the stranded costs that are created by wholesale and retail competition. In this case, the utility's current prices for wholesale and retail services would be sufficient to continue its support of social goals. However, the general feeling among legislators, regulators, and industry executives is that these cost savings will not represent full compensation for the utility's stranded costs. Therefore, the conventional wisdom is that the partial deregulation of the generation market conjoined with wholesale and retail competition and the recovery of

[7] Graniere, ***note is incomplete***

stranded costs will cause the current regulated prices to be insufficient for the continued support of social goals at their existing levels.

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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.[1] Government becomes involved because investor-owned utilities, similar to any other privately owned firms, generally put forth only minimal voluntary effort in support of social goals. Such behavior is induced by the readily observable fact that social interests associated with social goals often are inconsistent with the private interests of the utilities' stockholders and managers. Left unrepaired, this disconnection of interests leads to the insufficient voluntary support of social goals by the utilities.

The public interest often is the reason for supporting social goals. Financial assistance to low-income customers is in the public interest because utilities are "businesses affected with the public interest."[2] This is because the ready availability of

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

[2] For a review of the judicial history of the notion of a "business affected with the public interest," see Felix Frankfurter and Henry M. Hart Jr., *Encyclopedia of the Social Sciences*, Vol. III (New York: ***publisher needed,*** 1934).

electricity at a reasonable price is essential and vital to the well-being of all individuals.[3] DSM is in the public interest for two reasons. It enhances national security when fuel, construction and licensing costs are relatively low or declining, and it restrains the growth in the demand for electricity when these costs are skyrocketing. Pollution control is in the public interest because many individuals are adversely affected by the actions of a few. 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.[4] Thus, pollution control promotes the public interest because it raises the firm's private costs toward the pertinent social costs.[5]

Support for Low-Income Subscribers

The electric industry supports low-income subscribers in a variety of ways. Assistance programs include partial payment of the low-income customer's electricity bills, income-based billing, budget billing, deferred billing, arrearage forgiveness, conservation loans, weatherization assistance, energy audits, budget counseling,

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[3] James C. Bonbright, Albert L. Danielsen, and David R. Kamerschen, *Principles of Public Utility Rates* (Arlington: VA: Public Utilities Reports, ***19XX)***: 8. For a discussion of low-income assistance programs, see Robert Burns, Janice Beecher, Youssef Hegazy, and Mark Eifert, *Alternatives to Utility Service Disconnection* (Columbus, OH: The National Regulatory Research Institute, 1995).

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

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

referral services to social support agencies, targeted conservation, and targeted financial assistance. Table 1 describes the billing arrangements that are intended either to help low-income subscribers meet their payment obligations, mitigate financial distress, or avoid the social distress caused by service disconnection.

Each of the billing options alleviates the stress levels of low-income customers. Budget billing helps the low-income subscriber 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 a job loss or severe injury. Income-based billing helps the low-income subscriber to avoid the stress of sub-standard living conditions. Finally, partial payment eliminates the stress that is caused by collection agencies and "dunning" notices.

Table 2 depicts the types of "forgiveness" programs that are made available to low-income subscribers. They retire all or a portion of a low-income subscriber's debt in a systematic fashion over a specified period of time. The purpose achieved by the general practice is to provide low-income subscribers with less onerous ways to pay their electricity bills.

The descriptions of forgiveness programs indicates that they are most suitable for subscribers with transitory income problems. They have to have access to financial resources that enable them to honor the *quid pro quo* for the clean slate, which is full and timely payment of future electricity bills. Additionally, they have to have access to financial resources in amounts that enable them to simultaneously pay off their current electricity bills and the unforgiven portions of their debts.

Table 3 describes the targeted programs that help low-income subscribers find ways to pay their electricity bills in full. They focus either on altering the low-income subscribers' behavior or on helping these subscribers find alternative sources of funds to pay their electricity bills. Obviously, they exist solely for the purpose of avoiding more drastic actions by the utilities against the low-income subscribers at a later date.

TABLE 1

BILLING ARRANGEMENTS IN SUPPORT OF LOW-INCOME SUBSCRIBERS

Billing Arrangement	Description
Partial Payment	The utility continues to serve the subscribers as long as the subscriber makes a pre-determined partial payment against its 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 subscriber.
Budget Billing	The utility receives the same monthly payment each month, which allows a low-income subscriber to avoid seasonal increases and decreases in its electricity bill.
Deferred Billing	The utility provides a subscriber with temporary payment problems with the option to pay the total electricity bill at a later date.

Source: Authors' construct.

TABLE 2
FORGIVENESS PROGRAMS IN SUPPORT OF LOW-INCOME SUBSCRIBERS

Programs	Description
Full Forgiveness	The utility writes off the entire arrearage as a bad debt. The low-income subscriber 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 arrearage as bad debt and waives any late payment charges on the remaining debt. The low-income subscriber pays off the debt over a pre-determined period of time.

Source: Authors' construct.

TABLE 3
TARGETED PROGRAMS IN SUPPORT OF LOW-INCOME SUBSCRIBERS

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

Source: Authors' construct.

Budget counseling contributes to the low-income subscribers' 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. Non-payment often is one of the first signs that households are in financial distress.

Table 4 characterizes the proactive programs that the utilities can use to assist their low-income subscribers in avoiding service disconnections. They are designed to reduce the amounts of electricity that are used by low-income subscribers. As a result, they tend to promote conservation in one form or another.

TABLE 4
CONSERVATION PROGRAMS IN SUPPORT OF LOW-INCOME SUBSCRIBERS

Program	Description
Conservation Loans	The utility provides a low-income subscriber 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 subscriber's electricity bill.
Conservation	The utility assists the low-income subscriber in the purchase of conservation devices.

Source: Authors' construct.

These 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 landlords because low-income subscribers 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 property owners.

Support of DSM Programs

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

Energy efficiency technologies make it possible to use less electricity to produce a specific amount of energy services such as lighting, heating, or cooling. However, these technologies do not alter the utilities' load shapes.[6] Direct load control is an energy-saving option for residential subscribers who are comfortable with allowing utilities to affect their water heating and air conditioning activities. Meanwhile, interruptible load is an option for industrial and commercial subscribers who are willing to be disconnected from the utilities at a price for the purpose of avoiding large-scale brownouts or blackouts. Lastly, load-shifting technologies such as storage and energy

[6] 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.

TABLE 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 utility's subscribers.
Direct Load Control	These technologies are designed to periodically interrupt the electricity to individual subscribers during peak hours of demand without actually disconnecting the subscribers from the utility.
Interruptible Loads	These technologies are designed to disconnect subscribers from the utility when the utility is at risk of a wide-spread service outage or when electricity prices reach a pre-determined level.
Load Shifting	These technologies are designed to allow the utility's subscribers to respond to changes in the utility's cost of producing power.

Source: Authors' construct.

management systems have to be teamed with time-of-use or real-time rates to be effective.

Through their effects on the subscribers' energy consumption and the utilities' 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.[7] Coal-fired generation facilities emit sulfur dioxide that in turn lowers air quality and has been connected with acid rain.[8] Lowered air quality and acid rain are negative externalities because they adversely affect the well-being of non-polluters.[9] Nuclear generation creates nuclear waste, which is comprised of long-lived radioactive isotopes. These isotopes pose a long-term health 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.[10] Table 6 delineates the approaches that the United States government has selected to retard the degradation of the nation's air quality.

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[7] 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).

[8] 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.

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

[10] 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.

TABLE 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 of acceptable levels of pollution. Obviously, an emission cap implies that pollution is divisible.[11] However, it is not a particularly flexible form of environmental protection. A utility is not free to transfer its 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 a utility to transfer its property right for a fee to other utilities or to those who suffer the effects of pollution.

Industry Support of Social Goals

Under current circumstances, the utilities support social goals regardless of whether these activities are voluntary or involuntary. They make expenditures on personnel, rebates, subsidies, incentives, monitoring, record-keeping, equipment and

[11] Pollution is a non-exclusive commodity because it harms whomever it contacts. It is non-rivalrous commodity because other services do not compete with it.

other facilities, and program development and implementation. These expenditures represent a measurable link to the utilities' financial commitment to social goals. We have collected expenditure-related data for 1993 that pertain to the investor-owned utilities' efforts in support of DSM and pollution abatement.[12] Data for 1993 on federal and state expenditures to avert heating and cooling crises for low-income subscribers also have been collected for comparisons. The financial assistance data do not distinguish between investor-owned and other utilities. These data have been aggregated and summary statistics have been calculated on a state-by-state basis in an effort to sharpen the presentation.[13]

Table 7 shows combined federal and state expenditures on assistance for low-income subscribers. These data have been classified as assistance for heating, cooling, weatherization, and crisis.[14] Data on administrative costs are included for the purpose of suggesting the percentage of federal and state tax dollars that do not go to low-income subscribers. While the vast majority of these expenditures are made by the federal government, some states have allocated some of their funds to the support of low-income subscribers. Eleven states contributed approximately $14.5 million for the

[12] 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 sources of these data are U.S. Department of Energy/Energy Information Administration and the U.S. Department of Health and Human Services. The official publications used for the extraction of data are the *Financial Statistics of Major Investor-Owned Utilities, 1993*, *Four Spreadsheets on Demand-side Management*, *Low Income Home Energy Assistance Program-Report to Congress for Fiscal Year 1993*.

[13] Because the federal assistance data are available only a state-by-state basis, it was useful to recast the investor-owned utility's' 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.

[14] Appendix D contains the state-by-state detail for the expenditures by area shown in Table 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 7
1993 PUBLIC EXPENDITURES ON ASSISTANCE
TO LOW-INCOME SUBSCRIBERS
(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.

purposes of supplementing benefits or covering administrative costs. The data received from the U.S., Department of Health and Human Services 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 subscribers were increased by donations from private enterprises.

In 1993, state and federal government 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 subscribers with their heating bills. Crisis assistance amounted to slightly less than 15 percent of the total expenditure in the four areas. Together, crisis 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 subscribers.

Table 8 provides the 1993 breakdown of utility expenditures. These data

collected by the U.S. Department of Energy indicate that utilities of all types spent in the neighborhood of $2.75 billion on DSM programs.[15] Expenditures by the investor-owned utilities were approximately $2.25 billion in 1993, and DSM expenditures by the cooperatives amounted to about $88 million.[16] Meanwhile, the federal government spent approximately one and one-half times the expenditures of the publicly-owned utilities.

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 subscribers. DSM expenditures by investor-owned utilities account for 82 percent of total recorded DSM expenditures by utilities. A more graphic statistic is that

TABLE 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: U.S. Electric Utility Demand-side Management of 1994. Energy Information. 1995.

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

[16] Utility 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 and evaluation, and other costs.

investor-owned utilities spent slightly more than $25.00 for every $1.00 that the cooperatives spent on DSM.[17] However, we must be careful not to overstate its importance. The investor-owned utilities most certainly have larger revenues and expense 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 to DSM than the cooperatives do. Tables 9 and 10 show that our set of 142 investor-owned utilities incurred approximately $144 million of operating expenses in 1993, and they devoted approximately $2.4 million or in the neighborhood of 1.7 percent of their annual 1993 operating expenses on DSM activities. Because data pertaining to the cooperatives' 1993 operating expenses are not readily available, we could not compute the percentage of their expense 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. In any event, the investor-owned utilities got more bang for their bucks. 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.[18] 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 can be complementary social goals. Pollution is reduced when DSM programs cause a reduction in the prior year's consumption of energy. In this instance, a pre-determined amount of pollution per kilowatthour is foregone as the utilities' subscribers consume fewer kilowatthours of electricity. However, DSM programs can result in an increase in pollution when the saved energy

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

[18] See footnote 19

causes the deferral of the construction of less polluting generation facilities. Therefore, state and federal government cannot always rely on DSM to solve a pollution problem. Table 10 shows the 1993 expenditures of 142 large investor-owned utilities on pollution control.[19]

These investor-owned utilities spent nearly 1.7 times more on pollution control than on DSM programs in 1993. However, this expenditure was not evenly distributed across 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 utility expenditure on pollution abatement is 2.6 times the average expenditure on pollution control by these utilities. Tables 9 and 10 also are useful for putting this ratio into perspective. These utilities, on average, directed approximately 2 percent to 3 percent of their operating expense budgets to the prevention of pollution. Thus, 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 cost of a kilowatthour produced by the "average" utility than DSM. However, the utility-by-utility distribution of these expenditure is very skewed, which implies that actual increase in the cost of a kilowatthour due to pollution abatement for many of these utilities exceeds the cost increase for the "average" investor-owned utility. This phenomenon is not as prevalent when DSM expenditures are considered. As indicated by the data in Table 9, the standard deviation for DSM expenses is nearly 2 times the DSM expenses incurred by the "average" utility.

As discussed below, the uneven distribution of expenditures on pollution abatement could create problems for the continued support of this social goal as the generation market becomes more competitive. Utilities with large pollution

[19] If comparisons of DSM and pollution control expenditures are made, it is most appropriate to compare the pollution control expenditures to the DSM expenditure by investor-owned utilities that is shown in Table 8. However, any such comparisons should recognize in some fashion that the DSM data are associated with a larger set of utilities that includes the major investor-owned utilities as a subset.. 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 on DSM programs.

TABLE 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

Source: U.S. Department of Energy.

control programs per kilowatthour may find themselves at a relative price disadvantage in the generation market as they attempt to recover the associated costs from their customers that purchase electric power independently of transmission and distribution services.

Overall, the electricity industry spent approximately $6.5 billion on pollution control and DSM programs in 1993. The investor-owned utilities followed by the U.S. Department of Energy 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. 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 plants, which frees resources for research and development and many other things.[20] Although the utilities' expenditures on pollution abatement and DSM are substantially greater than the federal and state government's expenditures on financial

[20] 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 services markets. The research and development expenses for the 142 major investor-owned utilities in 1993 were a relatively sparse $35 million, which is considerably less than their DSM and pollution abatement expenses.

assistance for low-income subscribers, the expenditures on pollution control and DSM pale in comparison to the utilities' total 1993 operating expenses. Table 11 presents this comparison.

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, they could significantly affect a utility's profits. Table 12 summarizes the analysis of relative relationship between social goal expenditures and total operating expenses.

TABLE 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: U.S. Department of Energy.

TABLE 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: $1/n \sum_{i=1}^{n} E$, where E denotes the social goals-related expense.

Source: U.S. Department of Energy.

On average, a major 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 DSM expenses, on average, accounted for 1.69 percent of the utility's total operating expenses, and the pollution control expenses, on average, amounted to 2.63 percent of total operating expenses. However, the major investor-owned utilities varied widely in the resources that they devoted to support these two social goals. The largest amount of resources that were devoted to DSM programs was slightly above $238 million, while the largest expenditure on pollution control was slightly above $500 million. The $238

million DSM expenditure represents 9.58 percent of the utility's operating expenses, while the $500 million pollution control expenditure represents 14.42 percent of a utility's operating expenses. Although the overall expenditures on pollution control and DSM programs by major investor-owned utilities were relatively low in 1993, the data in Table 11 indicate that some of these utilities have made significant commitments to support these two social goals.

The standard deviations presented in Table 11 suggest an interesting possibility. Namely, the major investor-owned utilities expend approximately the same proportional amount of their resources in the support of social goals regardless of their rate of returns or interest coverage ratios. Although the standard deviation of slightly more than $32 million is almost twice as large as the average expenditure on DSM by a major investor-owned utility, the standard deviation for DSM expenses as a percent of total operating expenses of 1.97 percent is only slightly larger than the average percentage of total operating expenses that a major investor-owned utility devotes to the support of this social goal. Similarly, the standard deviation for pollution control expenses as a percent of operating expenses of 2.65 percent is slightly larger than the average percentage that a utility dedicates to the support of a cleaner environment; this is true even though the $73 million standard deviation for pollution control expenditure is two and one-half times as large as the utility's average pollution control expenses. The rather small standard deviations associated with the relative amounts of resources that the utilities dedicate to the support of these two social goals are consistent with a conjecture that no discernible pattern exists between measures of the utility's financial health and its relative expenditures in support of social goals.

We performed additional analysis to attempt to uncover a pattern that is created by the interplay of the utility's financial health and its commitment to social goals. In particular, a plot was made of the data pertaining to an investor-owned utility's relative expenditure on these two social goals and its interest coverage ratio. The outcome of this effort is Figure 1, which indicates the absence of any observable pattern between

these summary statistics. Consequently, there is some support for the hypothesis that a major investor-owned utility's support of the environment and DSM is independent of its financial health under the current regulatory regimes. Put another way, there is no indication that a major investor-owned utility's support of these two social goals, *per se*, has either a favorable or unfavorable effect on the utility's financial health.

TABLE 9

OPERATING EXPENSES AND SOCIAL GOALS-RELATED EXPENSES
(in thousand 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 $1/n(\sum_{i=1}^{n} E)$, where E denotes the social goals-related expense.

** Standard deviation

Source: U.S. Department of Energy. ***Is this another authors' construct from DOE info???***

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Source: Authors' construct from U.S. Department of Energy Data (1993).

Fig. 1. Social goals-related costs as a percent of operating costs (142 investor-owned utilities).

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CHAPTER 3

REALITIES OF INDUSTRY SUPPORT OF SOCIAL GOALS

Introduction

Particularly among utilities, a widely held belief is that their continued support of social goals will have adverse effects on their financial well-being as the electricity industry becomes more competitive. Interestingly, this belief has little to do with whether the existing DSM or pollution control programs have passed cost-benefit tests.[1] The fact that benefits exceed costs is immaterial when the utilities do not believe that they can recover their expenditures on these two social goals. This belief also has little to do with whether the utilities are using their resources efficiently and in a cost-effective manner.[2] The utilities' motivation to efficiently allocate their resources to get the highest return is secondary to the utilities' desire to recover their costs. In fact, these utilities may be more concerned about their cost-shifting opportunities than the efficient and cost-effective use of their resources. Therefore, it is useful at this time to summarize the market process that the utilities perceive as producing a diminished capacity to support social goals.

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

[2] If the utilities' programs in support of social goals are efficient and 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 the utility.

Utilities' Diminished Tendencies to Support Social Goals

What if the United States Congress wrote EPAct in such a way that meaningful competition could only emerge in the markets for *new wholesale* or *new retail electric* loads? Then the markets for existing wholesale and retail loads are 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, utility-owned EWGs and NUGs do not provide one penny towards the support of social goals. However, this particular outcome does not represent a real problem for the utilities when they currently are recovering the costs that they incur to support social goals. Therefore, competition for new electric loads does not necessarily diminish the utilities' existing capacity to support social goals.

The situation is much different when NUGs and utility-owned EWGs are able to capture the regulated utilities' existing electric loads. If these utilities cannot replace their lost existing loads because all electric load growth is served by unregulated firms, then these utilities continue to incur the fixed costs of production that are associated with the lost existing loads without earning any corresponding revenue. At this point, these utilities are faced with the possibility of having to divert revenues that previously were used to support 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 can immediately obtain some of the revenues that they need to cover their stranded costs by simply eliminating their expenditures in support of these goals.[3] Simply put, the theory is that support of social goals disappears as existing electric load disappears. Not surprisingly, pressure quickly rises within the regulated utilities to discontinue their support of social goals when many of the program costs are variable

[3] When the utilities incur fixed cost 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.

costs.[4] Therefore, the expansion of competition into the market for existing wholesale and retail electric loads is apt to diminish the utilities' tendencies to support social goals when the program costs associated with achieving these goals are predominantly variable.

The speed of the transition to full competition also is a factor that diminishes the utilities' tendencies to support social goals. A rapid expansion in the markets for existing wholesale and retail electric loads is likely to be uneven and destabilizing. On the one hand, it provides huge benefits to subscribers with credible options to switch to lower-cost NUGs and utility-owned EWGs. On the other hand, a rapid transition to competition creates enormous pressures for price increases for subscribers without these options.[5] 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. Therefore, the utilities are less likely to continue their current level of support for social goals when there is a rapid expansion of competition into the markets for existing wholesale and retail electric loads.

Lastly, the lumpiness of the transition to competition 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.[6] Surely, different effects on the

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[4] 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 subscribers. If they decide to discontinue their programs, then they would want to recover their newly created stranded costs from their subscribers. 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 costs.

[5] 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.

[6] One natural break is the wholesale market with possible extension of competition to the retail market. Another is new wholesale and retail electric loads with possible extension to existing wholesale and retail loads. Still, another natural break is a particular class of customers with possible extension to

utilities' abilities to support social goals are associated with different transitions to full competition. A small number of discrete steps to competition with short interim periods between them put more strain on the utilities' abilities to support social goals than a large series of discrete steps with long interim periods between them.

Factors Currently Affecting Tendencies to Support Social Goals

The advancement of competition on a nationwide basis exists only for the wholesale electric power market.[7] Only a small number of states permit retail competition although many states are considering the "pros and cons" of competitive retail markets.[8] Another bit of reality is that the electric industry did not reach this point in the transition to competition overnight. In fact, a dominant feature of the industry's competitive metamorphosis thus far is that it has been slow change. [9] Perhaps, the pace of change has been slow because competition is not a forgiving process. Therefore, the parties to this change need some time to adjust to the new competitive realities. For example, regulators can use a respite from the advancement of competition to control and mitigate prices increases to captive customers. Simultaneously, a gradualist approach to restructuring the electricity industry gives the utilities some time to adjust their market strategies. Meanwhile, other stakeholders are happy to be afforded the protection that is supplied by a slow transition to competition. Finally, the slow transition to competition gives valuable time to all the stakeholders,

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other customer classes.

[7] FERC Order 888 ***need correct full reference.***

[8] Joseph E. Schuler Jr., "Residential Pilot Programs: Who's Doing, Who's Dealing," *Public Utilities Fortnightly* Vol. 135, 1 (1997): 16-21.

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

which they can use to figure out how to continue the support for social goals.

The current slow transition has been uneventful.[10] Many discrete steps have been taken to remove administrative barriers that prevent the advancement of competition in the 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 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 for more or less competition in legislative and regulatory forums. These arguments carry different weights in different political and regulatory jurisdictions. These different weights affect how competition is perceived among the different states.

The different roles for competition across states have significant implications for the continued support of social goals by the utilities. Consider the following possible set of competitive parameters. Suppose one set of states has chosen to speedily remove institutions that restrict the growth of competition, and suppose another set of states has chosen to the slow removal of these institutions. When confronted by this environment, the low-cost competitors will gravitate toward the set of states that is quickly eliminating these institutions because this activity is in their best interests. However, the rapid influx of this type of competitor into these states will make it more difficult for the utilities in these states to continue their support of social goals. Meanwhile, the high-cost competitors will seek the protection that is afforded by the slow removal of existing regulatory institutions. As a result, the utilities in these states will find it less difficult to continue their support of social goals.

The different expectations of regulators also have implications for the utilities' continued support of social goals. Consider, for example, two competitively minded

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[10] Daniel 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. Ruth K. Kretschmer and Robert Garcia, "Recovering Stranded Costs: Not "If", But "How"," *Public Utilities Fortnightly* Vol. 135, 2 (1997): 34-38.

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 existing 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 anti-competitive institutions and to require the utilities' competitors to assist in the support of existing 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 the support of existing social goals. However, the subscribers of these utilities will not benefit from any of the pro-competitive policies that have been instituted by commission B.

Even the discrete-step nature of the advancement of competition creates problems for the support of social goals. The implementation of competitive practices makes whole classes of subscribers 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 classes of customers 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 profitability. Either of these outcomes is detrimental to the utilities' capacity to support existing social goals. As a result, the retention of some of the existing social programs is threatened by each discrete step that advances competition in the electricity industry. Furthermore, the slowness and discreteness of the current advancement of competition in different electricity markets does not guarantee that existing social goals will continue to be supported at their existing levels. The mere

fact that a transition is taking place exerts an influence on the retention of existing social programs through the interplay between the anticipated length of the transition and the anticipated length of the payback period for these programs. The basic idea is that it will be difficult to find support for social programs whose planning horizons are longer than the anticipated length of the transition to competition. 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 particular DSM program before the generation market becomes competitive, then they are unlikely to implement it. If the utilities' regulators hold similar beliefs about the transition to competition and payback periods, then they can be persuaded to withhold their sanction of this program because the program's costs may exceed its benefits. Scenarios like these hold the potential to cause some DSM programs to fall out of sight as the electricity industry becomes more competitive.

The slowness and discreteness of the advancement of competition are not the only realities that have to be faced as the stakeholders attempt to determine whether it is appropriate to continue or discontinue the utilities' support of social goals. The costs of existing social 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 electricity industry. Although the shedding of the variable costs of social programs helps the utilities to withstand the mounting competitive pressure, the retention of unrecoverable, non-used, and non-useful fixed costs makes it difficult for the utilities to find profitable responses to the rising competitive pressures.

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CHAPTER 4

MODEL OF THE UTILITIES' SUPPORT OF SOCIAL GOALS: A TECHNICAL ANALYSIS

Introduction

The modeling of the utilities's support of social goals starts with an assumption relating to the motivation for the utilities' activities in support of these goals. Either these activities are perceived as part of the utilities' normal business operations, or they are viewed as being beyond the utilities' fiduciary responsibilities to their owners. When activities in support of social goals are viewed as normal profit-making opportunities, the utilities do not have to be prodded to support social goals. In this instance, the utilities create lists of business opportunities that treat social goals in the same manner as their other goals. Very profitable social programs would be at the tops of the lists, and minimally profitable social programs would be at the bottoms of these lists, and so on.[1]

However, the utilities in general are not given the option of voluntarily supporting social goals. Typically, they are forced to expend their resources in support of these goals. As a result, the utilities must have higher privately valued uses for the resources. When the utilities are not putting their resources to their highest privately valued uses, the modeling assumption is that the utilities perceive their support of social goals as

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

being comprised of activities that are beyond their fiduciary responsibilities to their owners. This is the starting point for this model of the utilities' support of social goals.

Subsidiary Assumption of the Model

Because the overriding assumption is that the utilities are forced to support social goals, the model needs an assumption of how social goals are established. In this regard, it is assumed that the specifics of all social goals are established through mandates passed by state legislatures or initiatives begun by state public utility commissions.[2]

Actions taken by state legislatures or state regulatory commissions to create social goals do not obligate the state legislature to support these goals by providing funding from general tax revenues. Similarly, the United States Congress is not obligated to support states' social goals or for that matter its own social goals through its taxing authority. Also similarly, federal regulators are not obligated to use their rate making authority to set prices for the services under their jurisdiction in a manner that provides support for either type of social goal.[3] Therefore, it is assumed that the federal regulators and law makers do not make any effort to assist the utilities in their support of social goals through the exercise of rate making or taxing authority during the electricity industry's transition to competition.

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[2] Federal law makers have not rushed to raise taxes in order to provide the funds that would be used to support social goals that are associated with utilities. Furthermore, state law makers have similar tendencies. The implication of this behavior is that shifting the burden for the support of social programs to general tax revenues will result in too little support for these goals.

[3] 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.

The fact is that the advancement of competition is occurring simultaneously in the wholesale and retail electricity markets. The actual competition in these markets can be cut throat, gentlemanly, or anywhere in between. It can be sufficiently intense to drive the prices for wholesale and retail services down to their production costs, or it can be sufficiently subdued to allow the utilities to set prices for their services that exceed their production costs. It is assumed in this model that competition in these markets is intense enough to prevent the utilities from setting prices for their wholesale and retail services that include any contributions towards the support of social goals. However, it also is assumed that the competition in these markets permits the utilities to set prices for wholesale and retail electricity services that contribute toward the recovery of the utilities' stranded generation costs.

The closing off of the wholesale and retail electricity markets as sources for the utilities' support of social goals means that the utilities have to look elsewhere for the required funds. "Elsewhere" is the markets for transmission and distribution services. Therefore, the model needs an assumption that addresses the competitiveness of these markets. It is assumed that they are monopolies. Consequently, the utilities can extract some contribution for the support of social goals from the prices that they set for transmission and distribution services.

The advancement of competition in the wholesale and retail electricity markets is causing the industry's institutions to undergo important transformations. Open access and service comparability rules restrain the utilities' monopoly power in the transmission and distribution markets. The separation of the utilities' merchant function from their transmission and distribution functions is necessitated by their direct control or ownership of bottleneck and essential transmission and distribution facilities. Advances in generation technology have eliminated many of the economies of scale that previously characterized the generation sector of the electricity industry. These changes encourage the disappearance of functionally integrated utilities as the means to ensure the competitiveness of the wholesale and retail electricity markets.

Therefore, it is assumed that the utilities and their regulators have agreed to functionally separate the utilities' generation, transmission, distribution, and merchant activities.[4]

Functional separation in this model means that cost accounting procedures are used to assign and allocate the utilities' costs.[5] It also means that non-structural safeguards as opposed to fully separate subsidiaries are used to protect the interests of the utilities' customers and competitors. Clearly, non-structural safeguards are needed because the potential for the utilities to engage in anti-competitive practices such as cross subsidization is greatest under functional separation. For example, functionally separate utilities can find it profitable to use their market power in the transmission and distribution markets in a manner that favors their generation companies.[6] However, these problems with functional separation do not appear to be sufficiently strong to force the creation of an independent system operator (ISO).[7]

It is readily apparent to an observer that the regulatory jurisdiction over transmission and distribution markets is unsettled. A case can be made for sharing jurisdiction over both markets. Another case can be made for sharing the jurisdiction over either market. Yet, another case can be made for exclusive jurisdiction. To reduce complexity and without loss of generality, it is assumed that federal regulators

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[4] 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 anti-trust remedy that typically is reserved for the courts.

[5] 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.

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

[7] The absence of ISOs is not a defining characteristic of the model. A regulated ISO can set "above cost" prices for the purpose of supporting social goals just as easily as utilities with functionally separated transmission companies.

have exclusive jurisdiction over the transmission markets and state regulators have exclusive jurisdiction over distribution markets.

Exclusive jurisdiction over the transmission markets provides the federal regulators with exclusive jurisdiction over transmission pricing. Previously, it was assumed that transmission markets are monopolies. As a result, the prices for transmission services could contain contributions towards the support of social goals.[8] However, it also was assumed previously that the federal regulators do not make any effort to support social goals during the electricity industry's transition to competition. 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.

The compensation schedules for the managers of the utilities' functionally separated distribution companies generally are designed to provide them with incentives to balance the financial interests of the holding company against the financial interests of their companies. In this regard, it is assumed that managers are compensated on the basis of a weighted average of the profitability of the holding company and the companies under their direct control. As a result, it is not in the interests of distribution companies' managers to carry large amounts of uneconomic generation costs on their books because they depress their profitability.

Finally, price-cap, performance-based, or rate-of-return regulation can be applied to the distribution markets by the state public utility commissions.[9] It is assumed that the distribution markets will be subject to either rate-of-return or

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[8] Previously, it was assumed that competition in the wholesale market is intense enough to prevent the utilities from setting prices for their wholesale services that include any contributions towards the support of social goals.

[9] The allowed rates of return on rate base is an observable number under rate-of-return regulation and performance-based regulation. It is non-observable under price-cap regulation, which uses the more subjective preferred rate of return as a benchmark. Generally, the preferred rate of return exceeds the allowed rate of return because higher earnings by the utility under price-cap regulation is supposed to be the *quid pro quo* for lower production costs and lower wholesale and retail prices.

performance-based regulation during the advancement of competition in the wholesale and retail electricity markets. These more traditional forms of regulation have been assumed because of the excessive potential for anti-competitive behavior that accompanies price-cap regulation when vertically integrated utilities sell bottleneck and essential distribution services to their competitors in the unregulated retail markets.[10]

Economics of the Utilities' Support of Social Goals

Let p be the regulated price for the distribution service, which is supplied under monopoly conditions. Let p be sufficiently large to include: (1) an allowed rate of return, (2) the recovery of the fixed and variable costs directly assigned to the service, (3) contributions towards the recovery of non-assignable fixed costs, stranded costs, and stranded benefits, and (4) a contribution towards the support of social goals.[11] 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 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) - (4).

p^* is *not* the profit-maximizing price because the rate of return allowed by regulators is 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

[10] Robert J. Graniere, *Implementation of Open Network Architecture: Development, Tensions, and Strategies* (Columbus, OH: The National Regulatory Research Institute, 1989). Robert 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).

[11] It seldom is the case that a regulated firm is permitted to earn a 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.

does not provide any contribution toward the support of social goals, but does everything else that p^* does.[12] If the demand for the distribution service is non-zero and inelastic, then it follows that $p' < p^*$ is such a price. 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 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.

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

[12] 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 cost 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 cost for each additional dollar of production costs in order to continue to earn the allowed rate of return after the price decline from p^* to p'.

It is undeniable that the assumed natural monopoly status of the distribution market has an important influence on a utility's capability to support social goals.[13] A natural monopoly in distribution implies that a utility can legitimately drive any competitor out the market. Consequently, a utility does not have to worry about charging p^m on a sustained basis. As a result, each unit sale of the distribution service is expected to provide $p^m - p'$ towards the support of social goals. Since a 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 the 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. As a result, let a subscripted j denote a specific distribution company. Then the full contribution from the utility's distribution companies towards the support of social goals is represented by $\sum_{j \in \mathbf{N}} [\, p_j^m q_j^m - p_j' q_j^m \,]$ for all $p_j' \leq p_j^m$.

Recapture of the Lost Contribution for Social Goals

In effect, by raising the profitability of the utility's distribution companies, the regulators can recapture some of the lost contribution towards social goals that may be due to more competitive wholesale and retail electricity markets. To prove this claim, first note that $p_j' + \varepsilon$ induces a reduction in the production of the 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}

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

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 reduction in variable distribution costs due to the price increase is $\sum_{j \in \mathbf{N}} [\mathbf{k_j}\, q_j(p_j^{'} + \varepsilon) - \mathbf{k_j}\, q_j(p_j^{'})]$.

Next let $p_j^{'} q_j(p_j^{'})$ denote the j^{th} distribution companies 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 increase in gross revenue from the sale of the distribution service is represented by $\sum_{j \in \mathbf{N}} [(p_j^{'} + \varepsilon) q_j(p_j^{'} + \varepsilon) - p_j^{'} q_j(p_j^{'})]$.

Finally, the rise in gross revenue minus the reduction is short-run variable distribution costs represent the increase n the utility's net revenue from the sale of the distribution service. Denote this profit increase by $\sum_{j \in \mathbf{N}} [(p_j^{'} + \varepsilon) q_j(p_j^{'} + \varepsilon) - p_j^{'} q_j(p_j^{'})] - \sum_{j \in \mathbf{N}} [\mathbf{k_j}\, q_j(p_j^{'} + \varepsilon) - \mathbf{k_j}\, q_j(p_j^{'})]$. This variable represents the recapture of the lost contribution towards the support of social goals due to competitive wholesale and retail markets because $p_j^{'}$ is the price at which there is no contribution by the utility towards the support of social goals.

The state regulator's ability to influence a utility's contributions towards the support of social goals rests partly on price increases for distribution services. Because it has been assumed that each of the utility's distribution companies are

natural monopolies, increasing the price of the distribution service does not represent a threat to the distribution company's market share, as long as the price chosen by the distribution companies is not larger than p_j^m. This facet of the model is important because it is the stability of the market shares 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 supra normal profits.

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CHAPTER 5

DISTRIBUTIONAL EFFECTS OF SUPPORT FOR SOCIAL GOALS

Introduction

Production occurs in stages. Raw materials are mined and sold to refiners. Refined materials are produced and sold to machine shops and equipment makers. Investment goods of various types and functions are made at the machine shops and elsewhere. These goods are sold to companies that produce all types of non-investment goods and services. In general, non-investment goods and services are classified into intermediate and final goods and services categories. Intermediate goods and services are used to produce final goods and services. For example, unbundled transmission services are intermediate services that are associated with competitive wholesale or retail electricity sales.

Energy service companies and other retailers use distribution services to produce retail electricity services that will be sold to customers that do not own distribution facilities. There is nothing special about unbundled distribution services when they are viewed as intermediate services. They are components of every retailer's total cost of producing its final services. This fact stands unchallenged even when the companies producing the unbundled distribution services also produce retail electricity services. Typically, companies purchasing these intermediate services attempt to pass their costs through to their customers. Therefore, energy service retailers should attempt to pass their distribution costs through to their customers.

Pass Through of Support for Social Goals

The prices for distribution services are the retailers' per-unit out-of-pocket distribution costs. When these prices contain a contribution towards social goals, the retailers' per-unit distribution costs contain a contribution toward social goals. When the retailers' per-unit distribution costs are passed through to the customers, it occurs through retail prices that contain contributions 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 services from an ISO, and unbundled distribution services from its regulated utility. Some percentage of the utility's retail customers are apt to elect to buy bundled electricity services from the regulated utilities or their competitors in the energy services markets.[1] 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 services 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 services, the result is that the prices of the bundled services rise relative to the prices of the unbundled services.

[1] 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.

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.

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

Incidence of Support for Social Goals

Under either wholesale or retail competition, the delivery of electricity to homes or places of businesses begins with the unregulated sale of electric power to rural cooperatives, municipalities, electric power wholesalers, merchants, and retail customers. Next, regulated transmission companies sell their services to rural cooperatives, municipalities, electric power wholesalers, merchants, retail customers,

and perhaps generators. Lastly, regulated distribution companies sell their services to electric power wholesalers without distribution facilities, merchants, and retail customers.

Several assumptions govern the exchanges of generation, transmission, distribution, and energy services that comprise the electricity industry. First, the markets for 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 these functions. Thus, these markets are not equipped to provide any contributions towards the support of social goals. An alternative assumption is that these markets are deregulated. Second, it is assumed that federal regulators have chosen to place the entire obligation to find support social goals in the hands of the state regulators and third that federal regulators have exclusive jurisdiction over the transmission markets. Thus, no support for social goals will be forthcoming from the unbundled transmission services markets. Together, these three 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. Fourth, state regulators who have the obligation to find support for social goals are assumed to have exclusive jurisdiction over the distribution markets. Thus, any support for social goals will be extracted from the state-regulated distribution markets.

Distribution services are either unbundled or bundled with generation, transmission, and marketing services. Unbundled distribution services are sold to a variety of customers. There are wholesalers, rural cooperatives, and municipalities that do not own distribution facilities. There are retail customers and energy service merchants who buy generation services directly from unregulated generators. Distribution services also are “sold” implicitly to the regulated utilities themselves and to energy service aggregators who resell the regulated utilities’ bundled services. Hence, the incidence group that can provide support for social goals in this model is

comprised of five different kinds of electricity suppliers. Only rural cooperatives, municipalities, and wholesalers with distribution facilities are excluded from this group, and as a result, this incidence group includes every retail customer that is served directly by regulated utilities that are subject to the jurisdiction of the state regulators. Therefore, the competitiveness of the energy services markets should not be of any great consequence to state regulators as they consider their options to obtain contributions for the support of social goals.

Nevertheless, state regulators cannot completely dismiss the overall structure of the energy service markets as they devise means for the support of social goals. Although it has been assumed that they cannot unilaterally increase or decrease the prices for retail electricity services, it has been assumed that they can unilaterally affect the costs of these services through their authority over the prices for bundled and unbundled distribution services. It is obvious that regulated utilities sell distribution services to themselves and to their competitors. The distribution services that they sell to themselves find their way to market in the form of bundled retail electricity services that are sold, more times than not, to retail customers without competitive alternatives. However, bundled electricity services are part of the choice set for other retail customers as well. It should not be surprising that some retail customers with competitive alternatives prefer the convenience of one-stop shopping that is obtained through the purchase of a bundled electricity service. Hence, state regulators have to consider how the prices of the distribution services that the utilities sell to themselves compare to the prices of the distribution facilities that the utilities sell to their competitors.

A way for state regulators to create comparability between these prices is to ensure that the price for every distribution service sold contains the same contribution towards the support of social goals. In this way, every retail customer contributes directly or indirectly to the support of social goals when it purchases a retail service that contains a regulated distribution service in its chain of production. The reasoning

behind this conclusion is that the regulated utilities and their competitors will attempt to pass their distribution costs through to the retail customers. The degree of competition characterizing the retail electricity markets will determine the percentage of the support for social goals that can be passed through to retail customers. If this "pass-through" percentage is less than 100 percent, then the stockholders of the firms competing in the energy service market will bear some of the burden for the support of social goals.

Because stockholders of regulated utilities and competing energy service companies 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 of the electricity industry falters, some investors with discretionary money will simply look elsewhere for financial growth opportunities. The investors that buy into the electricity industry will do so only at lower stock prices. Thus, existing investors in electricity stocks suffer equity losses as stock prices fall. Hence, it is not in the broad public interest to support social goals through the pricing of distribution services when such prices place an onerous burden on investors who are risking their funds in competitive or partially competitive energy services' markets.

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 rural cooperatives, municipalities, and other wholesalers with distribution facilities and even non-electricity energy suppliers to provide support for social goals. However, this approach does raise some issues that are created by the differences between investor-owned utilities, rural cooperatives and municipalities. The first is that rural cooperatives and municipalities tend to be smaller in all measures of output when they are compared to the more urbanized regulated utilities. They have access to fewer retail customers, and consequently, they make fewer retail sales. Their peak

demands are lower, and as a result, it is more difficult for them to raise money through kilowatt charges. All things considered, the municipalities and rural companies would be at a disadvantage if the state mandated that they and the regulated utilities had to expend the same number of dollars in support of social goals. The reason is that equal cost shares are larger fractions of the municipalities' and rural cooperatives' operating budgets than they are with respect to the utilities' operating budgets. Therefore, it is not reasonable to expect that rural cooperatives and municipalities can provide a level of support for social goals as that which can be provided by the investor-owned utilities.

The second issue is that competitive alternatives generally are neither uniformly nor universally available to all retail electricity 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, while the small-volume customers are not being pursued by any competitive suppliers. Consequently, retail competition can financially devastate rural cooperatives and municipalities and other similar companies that have a few large customers who represent a disproportionate share of their total electricity load and sales.

As always, reduced profitability represents a deterioration of the rural cooperatives' and municipalities' capabilities to support of social goals. In order to restore their capabilities in this area, they would have to find a way to replace the lost profits that they use to support social goals. Ideally, the mechanism or mechanisms that they choose would discourage their large-volume customers from leaving in the first place and recapture the lost profits if they choose to leave. An exit fee is not particularly appealing in this instance. Because the support of social goals is an ongoing activity, it would be very difficult to determine the appropriate fee. Surcharges on distribution services are more practical alternatives. They could be either usage-sensitive or non-usage sensitive additions to the prices for distribution services. Obviously, usage-sensitive surcharges would continue the tradition that the largest 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 their 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 the remaining customers. When this occurs, the rural cooperatives and municipalities are in the same difficult position as the investor-owned utilities. They have no option other than reducing or eliminating 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. Surely, the recovery of these fixed costs puts additional upward pressure on the prices for electricity services. The higher electricity prices, in turn, induce more customers to leave the rural cooperatives and municipalities. 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 and stranded benefits is more likely to be non-explosive or dampened when the majority of the program costs are variable. The elimination of social programs with 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, the municipalities and rural cooperatives are able to soften the blow that the recovery of stranded costs and benefits lays on their sagging bottom lines. Consequently, municipalities and rural cooperatives can put themselves in a better position with respect to continuing their support of social goals after retail competition by restructuring their social programs to include more variable costs and less fixed costs.

The competitiveness of the retail market is an important determinant of which customers are targeted as the means for the support of social goals. If widespread competition across the retail market eliminates the retail customers as a direct source for the support of social goals, then the support of social goals is achieved through the prices for distribution services: as a result, the responsibility for supporting social goals falls entirely on electricity merchants, direct access retail customers, wholesalers without distribution, and regulated utilities. These companies must purchase distribution services because they are essential to the production of retail electricity services. If pockets of competition among the large-volume retail customers depict the present stage in the transition to retail competition, then the small- volume retail customers may be added to the list of sources of the direct support for social goals.

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CHAPTER 6

PLAN FOR THE SUPPORT OF SOCIAL GOALS

Introduction

It is an ill-conceived idea to formulate a plan for the support of social goals without taking into consideration the effects of changes to the electricity industry. It is risky business to devise a plan for the support of social goals without considering the fact that advances in generation technologies and low relative prices for natural gas have provided a sustainable foundation for competition in the wholesale and retail sectors of the energy industry. It is chancy to ignore the facts that competition in these sectors creates stranded costs and that the 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 supercedes support for social goals in the policy arena.

This plan for the support of social goals takes note of each of the three facts just mentioned. It is based on the belief that competition-induced stranded costs diminish the utilities' capability to support social goals. It acknowledges that regulated utilities create stranded benefits when they eliminate their social programs in an effort to recover their stranded generation costs. 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 electricity prices. It admits that the direct sources of support for social goals are distribution markets and captive retail customers with inelastic demands for electricity services. Finally, it rests

on the 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 various sectors of the electricity industry.

State regulators can use various means to support social goals. As usual, tradeoffs and compromises are involved. Those required by this plan are associated with the exercise of monopoly power in the markets for distribution services, the competitive effects of an access fee for generators and exit fees for wholesale and direct-access retail customers, and the welfare-preserving effects of Ramsey prices for non-direct access retail services.

Exercise of Market Power in the Distribution Markets

The core of this plan is that distribution services are viable sources of direct support for social goals even when widespread competition exists in the generation markets. Distribution is an essential service in the context of competitively supplied generation. Simply put, the delivery of electric power to merchants and direct-access customers cannot occur without it. Furthermore, distribution is presently a bottleneck facility because there are not any alternative distribution companies. Consequently, the energy merchants 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 the pricing of distribution services is achieved by permitting the utilities' distribution companies to exercise monopoly power against their customers. When exercised this market power results in fewer distribution services, higher prices for these services, and supranormal profits for the distribution companies. Essentially, the support of social goals is realized in the spirit of a market-

based vertical control effort.[1] State regulators expropriate the distribution companies' monopoly profits.[2] Therefore, the first tradeoff involves a decline in the attractiveness of competitive retail markets as perceived by entrepreneurs and retail customers that directly purchase distribution services.

The monopoly profits so expropriated can be put to at least three uses by state regulators. They can recover stranded costs and stranded benefits and support social goals. As mentioned, the legislative and regulatory communities have so far signaled that the recovery of stranded generation costs is a higher priority than the continuation of support for social programs that increase the prices for retail electricity services. A logical extension of this signal is that the recovery of the stranded benefits that are created by the elimination of social programs also is a higher priority than the continued support of social goals. As a result, the prices of distribution services would first have to account for the state's portion of the recovery of stranded generation and then the state's portion of the recovery of stranded benefits with the residual left over for the contribution towards the support of social goals. Therefore, the second tradeoff is that even monopoly prices for distribution services do not necessarily provide for the full continuation of existing social programs after the advancement of competition.

Access Fees for Generators

It was previously noted that electricity merchants, direct-access retail customers, wholesalers without distribution facilities and regulated utilities bear the burden of supporting social goals when distribution service is the source of direct support for social programs. When the monopoly pricing of distribution services does not provide

[1] Jean Tirole, *The Theory of Industrial Organization* (Cambridge, MA: The MIT Press, 1988).

[2] 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.

for the full support of existing social goals, it would be unfair to call upon another means to support social goals that also places a burden on these companies and consumers. In this spirit of fairness, the second element of this plan for the support of social goals calls for a monthly fixed charge that the utilities' distribution companies would assess against the competitive generation companies for access to distribution facilities. It is proposed that these monthly charges should be deposited into a fund that is earmarked for the support of social goals. However, this access fee has the potential to adversely affect the entry of firms into the competitive generation markets. As a result, the third tradeoff is the possibility of fewer competitive generators.

Price Increases for Inelastically Demanded Retail Services

Thus far, the support for social goals comes from the production side of the electricity industry. Access fees are paid directly to the utilities by unregulated generators, and they are imputed to the utilities when there still is regulated generation. The utilities' distribution companies earn monopoly profits by selling distribution services to energy merchants and direct-access customers. However, access fees and monopoly profits may not be sufficient to support social goals at the levels currently desired by state regulatory and legislative communities. Or, alternatively, these governing bodies may not be willing to approve access fees and distribution prices at the levels that are necessary to provide the desired support for social goals. Whatever the reason for the support shortfall, the policy makers are forced to look elsewhere for funds if they want to continue their support for social goals at current levels. They could order the regulated utilities to raise additional funds by raising the prices for their inelastically demanded retail electricity services.[3] However, price increases are

[3] The economic underpinning of this means of supporting social goals is the welfare-preserving aspects of implementable forms of Ramsey prices (Baumol and Bradford; Ramsey -- ***need complete references***). In particular, price increases with this characteristic provide the net revenue that is required by the utility, while at the same time minimizing the reduction in the production of the utility bundled retail

workable only if the affected customers either have few competitive alternatives or the price increases were insufficiently large to induce them to switch suppliers. Essentially then, price increases for retail electricity services can support social goals if two conditions are met. First, the targeted customers are captive. Second, the price increases are not large enough to induce them to defect to the utilities' competitors when they are not captive. When either condition is met, the utilities are in the position to earn supranormal profits from the sale of retail services — the fourth tradeoff (***Bob I think something is missing here???)***.

Exit Fees for Direct Access Retail Customers

This plan treats exit fees on direct-access retail customers as a last resort for the support of social goals. Currently, the FERC is using exit fees on wholesalers as the means to recover the stranded generation costs that are created by wholesale competition. Presumably, some state public utility commissions will employ exit fees on direct-access customers for the related purpose of recovering stranded costs created by retail competition. Consequently, exit fees and surcharges on distribution services constitute a "hit and re-hit" mechanism working against the class of retail customers that is trying to benefit the most from the availability of competitive supplied electric power. Both of these means for the support of social goals restrict the growth rate of direct-access customers and reduce the profit-making opportunities for competitive

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services (Baumol and Sidak, 19xxa, 19xxb — ***reference??***).

suppliers of electric power. Therefore, the fifth tradeoff involves a smaller and less competitive generation market.

Not Included in the Plan

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

A call for rice cap regulation is not made because utilities are unlikely to work hard voluntarily to achieve cost savings that immediately will be expropriated for the support of social goals. Incentive regulation induces voluntary cost savings because they flow through to the utilities' bottom lines as additional profits. For example, utilities do bargain more aggressively for lower fuel or purchased power prices because there is a private payoff. They do not bargain as aggressively for the very same cost savings when their private payoffs are expropriated by consumers or policy makers. Thus, the expropriation of hard-won additional profits for the purpose of supporting social goals does not bring the private interests of the utilities into congruity with the public interest.

Hence, the sixth tradeoff is less incentive regulation because the additional profits required to support social goals will not e generated by voluntary cost savings.[4]

In contrast to price-cap regulation, performance-based incentive regulation can be reasonably structured to contribute towards the support of social goals. Regulators could set pre-determined social the mandated expenditures on social goals. Obviously, the utilities' profits suffer 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 if all of their cost savings are required to offset their expenditures on social goals. Hence, the utilities have good reasons to take performance-based regulation seriously under this particular "command and control" variant.

Lastly, outright reductions in the profitability of regulated utilities are not used to support social goals because our model expropriates supranormal profits for this purpose. Although the distribution companies earn supranormal profits from the sale of distribution services, state regulators expropriate all of them for the purposes of supporting social goals and recovering stranded benefits. While the utilities also can earn supranormal profits from the sale of retail electricity services, state regulators once again expropriate them in the name of supporting social goals and recovering stranded benefits.

This plan does not include tax increases, price-cap regulation or profit reductions as means for the support of social goals. They are excluded for a variety of economic

[4] There is a managed approach for the support of social goals that uses price-cap regulation as the only means available to the utilities to protect their profitability. It begins with the regulators setting the utilities' expenditure levels for social goals. Next, the regulators cap the utilities' prices. Finally, the utilities' markets are opened to competition. Because the utilities must spend the specified amount on social goals, their profits will decline if competition forces a general reduction in retail prices and the utilities do not cut their other costs. Hence to maintain their profits in the face of a general decline in retail prices, the utilities must cut costs that are not incurred to support social goals. This approach may be classified as "command and control" under a price-cap mechanism.

reasons. Consequently, this plan acknowledges, other things being equal, that the utilities' economic responsibility to their stockholders will discourage them from supporting the current complement of social programs.

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CHAPTER 7

CONCLUSIONS

The report analyzes the capability of regulated utilities to support social goals when electric power is produced competitively allowing wholesale and retail competition to exist. It examines whether utilities can be the sole source of support for these goals. It further examines the role that unregulated electric power or energy service suppliers can play in the support of social goals. The following conclusions are reached in this regard.

Existing competition in the large-volume-customer segment of the electricity industry and the industry's generation sector have diminished the utilities' capabilities to support social goals. The reason is that competition tends to drive wholesale and retail prices downward, while the support of social goals tends to create electricity services. Because the competition in these two sectors is expected to become more intense in the future, the utilities' capacity to support social goals will be more diminished in the future. Although not a near-term threat to the regulated utilities and also not a widely-held notion, competition can potentially spread to the industry's distribution sector as the necessity to support of social goals pushes the prices for distribution services above their sustainable levels.

Policy decisions with respect to the support of social goals have to be based on a broad view of how competition affects the profitability and pricing of the utilities. The analysis indicates that competitive wholesale and retail markets do not prevent the utilities from collecting the funds that are required to support of social goals. The analysis also indicates that this capability will exist well into the future — albeit in a diminished amount. Even if competition exists in all sectors of the electricity industry

and all segments of these sectors, the utilities still have the wherewithal to support social goals as long as the competition in some markets is imperfect. Imperfect competition allows the utilities to earn supranormal profits while state regulators have the authority to expropriate some or all of 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, utilities, and regulated retail customers can be direct sources of support for social goals. Therefore, problems with the continued support of these goals in a more competitive environment are not created by a precipitous reduction in the number of direct sources of support. Instead, these problems are created by reductions in the amount of profits that can be extracted from these sources through market and non-market means.

The FERC can use the pricing of transmission services as a means to support social goals. However, it is highly unlikely that the FERC will use its pricing authority for this purpose. State regulators can use surcharges for distribution services, access fees for competitive generators, price increases for certain retail electricity services, and exit fees for direct-access retail customers as means for the support of social goals. But, none of these means can be viewed as a “win-win” event. Surcharges and price increases are associated with some reduction in the consumption of distribution and bundled retail electricity services even though the demands for these services are very inelastic. Access fees create higher entry barriers for non-affiliated companies because they raise the cost of entering the generation market. 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 means available to state regulators for the support of social goals is affected by the dispersion of competition over the electricity industry. The prices of distribution services are the chief means of support when there is widespread retail competition. Inelastically demanded retail electricity services are a principal means of support when competition is restricted to the wholesale market. The prices of distribution services and specific inelastically demanded retail services are the main means of support when pockets of competition exist in the retail markets. Lastly, a combination of access fees, exit fees, and retail service prices are the means of support if distribution markets ever become competitive.

The analysis shows that the feasibility of supporting social goals is primarily an economic issue. However, it also indicates 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 this decision which often are more important than economics in day-to-day regulation. For example, regulators often have to implement statutory mandates that require a particular action or set of actions.

The slow advancement of competition improves the political/economic feasibility of supporting social goals. High-cost generation is protected by a slow transition to competition. Therefore, the levels of stranded generation costs are held in check. Consequently, there is one less thing that can adversely affect the continued support of social goals. Obviously, support for social goals becomes much less feasible as competition becomes more widespread across the electricity industry. However, many analysts do not expect competition to spread to the transmission and distribution markets.

On the one hand, low-cost generators prefer to enter regulatory jurisdictions that have removed institutions that restrict the growth of wholesale and retail competition and do not require them to contribute to the support of social goals. On the other hand, they prefer to stay out of regulatory jurisdictions that require them to directly support social goals or restrict the growth of wholesale and retail competition. This set of

actions makes it very difficult for the utilities in the affected regulatory jurisdictions to continue their support of social goals.

Reductions in the support of social goals by regulated utilities create stranded benefits. Stranded benefits are the uncovered fixed costs of the social-goal programs that have been eliminated. Obviously then, fewer stranded benefits are created when the utilities's social-goal programs are dominated by variable costs. Just as obviously, the continued support of any social goals by the utilities is at great risk when their social-goal programs are characterized by larger percentages of non-recoupable fixed costs. The reason for this is the snowballing effects on stranded benefits that are fueled by the piece-by-piece withdrawal of the utilities' support of social goals.

Utilities as the Sole Source of Support for Social Goals

The restructuring of the electricity industry has created the piece-meal competition that describes markets in transition. Some customers have many opportunities to choose from a set of electricity suppliers. Other customers have a few choices. Still other customers have no choices at all. While the utilities can extract the same level of support for social goals from their customers without choices, they will find it difficult to extract the same level of support from their wholesale and retail customers with choices. Some of the customers with choices will defect to the utilities' competitors. As a result, the utilities will lose the support for social goals that was provided by defecting customers. To regain the lost support, the utilities have to increase their productive efficiency and raise the prices for some of their remaining customers. The price increases set another round of defections in motion. Thus, the utilities cannot continue to be the sole support for social goals as competition advances in the electricity industry.

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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).

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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

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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

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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
New York	103270642	0	33000000	32980000	17847384
N. Carolina	20972180	0	2503617	0	2715971

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
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).