FINAL REPORT

PUBLIC UTILITY RATES STUDY COMMITTEE

1977

The Public Utility Rates Study Committee was created by the Iowa Legislative Council to conduct a study of electric and natural gas rate structures and consumption levels as provided in Senate Concurrent Resolution 118 (1976 Session). The membership of the Committee is as follows: Representative Arthur A. Small, Jr., Chairperson; Senator Lowell L. Junkins, Vice Chairperson; Senator James E. Briles; Senator James V. Gallagher; Senator Calvin O. Hultman; Senator Berl E. Priebe; Representative Glenn F. Brockett; Representative Rollin K. Howell; Representative Thomas J. Jochum; and Representative Thomas J. Tauke.

SCOPE OF STUDY

Pursuant to S.C.R. 118 the Committee was directed as follows:

> "(T)o study electric power and natural gas rate structures and consumption levels in Iowa with respect to differences in electric power and natural gas consumption levels and costs resulting from seasonal demand fluctuations, time of day fluctuations, evidence or estimates of changes in consumption patterns due to changes in price, and income levels of users. The study shall include consideration of the relative advantages and disadvantages to consumers of the prevailing declining block rate systems, other block rate systems, lifeline service, peak hour schedules, metering devices, marginal cost pricing, long-range incremental cost pricing, and other methods which may be used to structure rate schedules..."

SUMMARY

The Committee held a hearing at which representatives of various interests were invited to address the Committee. Statements and commentary were presented by representatives of the Iowa Commerce Commission, the City of Des Moines, consumer and environmental associations, and associations of investor-owned, mutual, and municipal utilities. The commentary thus received indicates the existence of a wide range of opinion about public electric utility service rates and the processes of regulation of those rates. The presentations did not discuss service rates for natural gas, even though referred to in S.C.R. 118, and thus the discussion in this Report will not include any reference to natural gas rates or rate structures.

There appears to be nearly universal agreement that today's electric energy costs, whether viewed as producer or as user costs, are a cause for concern. Given that concern, however, there does not appear to be any general agreement between the

various interests about what can be done to alleviate the energy cost problem. Numerous alternatives to existing rating structures were cited in the Resolution, and several of those have been initiated in other states. The Iowa Commerce Commission has been criticized, unjustly it believes, for not having undertaken similar projects.

There are in existence several voluntary experimental projects in other states, some of which are being financed by the Federal Energy Administration. In Iowa, and in other states, actions have been taken by the regulatory agencies which are directed at some of the deficiencies which are perceived to exist in the methods used to determine and distribute electric service costs. The commentary received by the Committee indicates that conclusive results have not been generated as a result of any experimental project or other action. Substantial alterations are viewed by some as absolutely necessary, by others as unnecessary, and yet by others as unwarranted at this time because results cannot be predicted with any certainty.

The Committee recommends that additional action be taken in Iowa. The formal recommendation of the Committee is contained later in this Report.

TYPES OF CRITICISM OF EXISTING RATES

The information obtained by the Committee indicates that electricity pricing has been the subject of increasing criticism and concern since approximately the early 1970's. The information also suggests that the criticism involves two types of complaints: Those which relate to the cost of electric service, and those which relate to conservation. Viewed in perspective, all criticism involves the cost of electric service; i.e., the total economic cost to the entire system, including environmental costs. Also, the costs of electric service include the costs which exist today and those which are projected for the future. Nevertheless, price and conservation are distinct although related subjects of concern.

Price complaints

Public utilities in the past few years, not only in Iowa but nationwide as well, have sought frequent rate increases which have resulted in higher electric bills for users. Since everyone in Iowa, either directly or indirectly, pays utility bills, a change in price in electric service has an immediate, and perhaps disagreeable, effect on everyone. Rising utility rates, like the prices of other goods and services in an inflationary economy, are stated to have the most significant impact on those persons with fixed incomes or those who have the most strict budgets. Whether the impact of a price increase be severe, moderate, or small, there likely are very few individuals who do not have some concern for the costs of electric power.

The producers also appear to have complaints about the prices of electric power. A representative of the Commerce Commission stated that the Iowa utilities have referred to the efforts of the Commission in rate regulation as attempted "confiscation", and that the Commission staff has been charged with using "every device known to utility regulation" for the purpose of keeping rates down.

Conservation complaints

Criticism of the price of electricity is accompanied by criticism of the continuing increase in demand for service. Producers are criticized for promoting the use of more power when the commodity is becoming increasingly more costly to produce. Some representatives suggested that the present pricing mechanism fails to provide any incentives either to reduce individual consumption or to discourage the construction of new generating capacity. One speaker stated that although there was a measurable effort on the part of consumers during the years 1973 and 1974 to reduce consumption, the effect was not to reduce the historical growth in required generating capacity, but rather to reduce the efficiency of use of that capacity.

Criticism of pricing techniques

The criticisms of price and conservation ultimately are criticisms of the techniques used to determine the price at which electric energy is sold in the marketplace. It is suggested that the economic theories underlying the pricing practices of the industry have ceased to have any validity, and that therefore the true costs of production are not being recovered, either by the utility to meet its total revenue needs, or from those specific customers whose demand for power necessitates extraordinary costs.

ELECTRIC POWER PRICING

The Committee requested information about existing pricing techniques in order to better understand the criticisms and the alternatives. A spokesman for the Iowa investor-owned utilities stated that the obligation of each utility is to provide adequate and reliable electric service in a nondiscriminatory manner. In return for that service the courts have held that the investor-owned utilities are entitled to an adequate return on investment. A spokesman for the cooperative utilities stated that their obligations are similar, and that instead of a return on investment, a margin is collected above costs which is retained as "equity capital" and is used for the payment of patronage dividends to customers. As supplements to the general legal principles which govern the process of public utility regulation, the regulatory agencies, courts, legislatures, utilities and energy users rely on a series of economic principles to determine what price is paid for each unit of electricity purchased by each customer.

The starting point for a utility is its revenue requirement: The total amount received by a utility in exchange for sales. The revenue requirement is equal to the costs of providing service, including capital costs and taxes. (Appendix A to this Report contains the mathematical formula which describes this relationship.) The total costs of producing electric power can be categorized as follows:

1. Customer costs - this category includes the cost of such services as customer billing, meter reading and some office management expense. These costs are dependent on the number of customers.

2. Energy costs - this category contains the expenses directly related to the production of energy, and includes fuel costs and the costs of maintaining generating equipment. These costs vary with the amount of output.

3. Demand or Capacity costs - these costs are incurred in establishing a power generation and distribution network, and include generating plants, substations, transmission lines, transformers and user consumption meters. These costs are independent of output. In addition to facility costs, expenses are incurred in the form of interest on borrowed funds (debt) and return on investment (equity). One speaker noted that the capital requirement for a utility is four to six times the annual revenue requirement, compared to a capital requirement of one year's revenue or less for most other industries.

These costs are what the user of electricity pays, and the manner in which these costs are assessed to each user determines the price of electricity.

The principle which is stated to govern the pricing process is that costs are allocated to customers on the basis of actual cost to serve. One of the objectives of the Iowa Commerce Commission is to assure that the cost components are reasonably distributed among the customers of the utility. (See Appendix B.) A utility allocates costs to serve to each of its customers on the basis of calculations of the actual costs incurred in serving classes of customers. Thus, most utilities have separate rate schedules for residential, commercial, and industrial customers, and in addition may have more than one schedule for each class of customer. Economists observe that the difference in rate schedules for the different classes of customers are primarily due to the method in which demand (capacity) costs are attributed to the different classes; and also that the process of allocating costs is based upon the exercise of judgment rather than a precise mathematical formula. (See, e.g., WILCOX, PUBLIC POLICIES TOWARD BUSINESS, pp. 336-345, 3d ed., 1966.)

The entire ratemaking process is rather complex and cannot be discussed here. Three concepts are important, however, in order to understand the specific criticisms and alternative methods which

are discussed in the next section of this Report. The first concept is that most utility customers are billed on the basis of aggregate consumption and without regard to the amount being consumed at any given time. Thus, the price paid is determined by the amount which the customer consumes during a given period of time, typically one month, and that price represents an average of the costs allocated to the production of energy for that class of customers.

The second concept is that of load factor. Each customer uses varying amounts of energy depending upon the time of day, the season of the year, weather conditions, etc. The ratio between the average amount used over a period of time to the maximum amount consumed at any point during that period of time is the load factor. A graphic illustration of this consumption pattern would show periods of high usage referred to as peak load and periods of lesser usage referred to as off-peak load. The utility likewise has periods of peak and off-peak load which are a function of the composite instantaneous demands of all of its customers.

The third concept is that the average price of a unit of electricity to a given customer generally decreases as consumption increases above a certain minimum amount. Theoretically, and within certain limits, the costs incurred by a utility per unit of output at a given moment in time decrease as more output is produced, and this principle is reflected in what is referred to as the declining block rate price structure. Thus, e.g., a residential customer might pay 6.5 cents for each of the first 50 kWh consumed during the month, 4.2 cents for each of the next 150 kWh, 3.6 cents for each of the next 200 kWh, and 3.1 cents for each kWh in excess of 400. As a result, the average price per kWh to the customer always decreases with each additional kWh purchased in excess of the basic block (the first 50 kWh in the example).

SPECIFIC CRITICISM AND CONCERN-- EXISTING RATE STRUCTURES AND ALTERNATIVES

The following discussion attempts to summarize the principal concerns expressed to the Committee about the existing electric power pricing structure, and includes references to those alternatives which were suggested to the Committee. The reader should make note that the concerns and alternatives are extracted from the presentations to the Committee, and thus cannot be interpreted as expressing the entire range of opinion respecting any issue, nor can the discussion be interpretted as expressing all of the concerns which may exist.

Peak load pricing

One of the areas of concern reported to the Committee is the absence of peak load pricing in existing pricing techniques. It was noted in the previous section that prices are established on the basis of average costs of production over a period of time. Information received by the Committee suggests that this average

cost method, and the accompanying declining block rate structure, do not reflect the realities of production costs. One representative suggested that peak production costs may be as much as fifty times those of off-peak periods, and observed that the present pricing techniques fail to recongize this differential. Also, it was suggested that the declining block rate structure encourages additional consumption, much if not most of which occurs during peak hours of consumption for the system, thus adding to the deficiencies of the average cost method.

This failure to establish peak load prices equal to peak load production costs is asserted to produce two undesirable results: First, those persons who cause the additional peak load costs do not pay for those costs, and thus costs of service are not allocated fairly as between customers; and second, the additional consumption which occurs during peak hours increases the maximum demand upon the utility and necessitates construction of costly additional capacity which remains out of use much of the time.

An alternative to the present structure is suggested, that of time-differentiated pricing. Under one type of time-differentiated pricing users pay a price which varies with the time of day, thus assuring that those who consume the relatively more expensive peak load production pay the added costs. Also, it is suggested that a higher price during peak periods would cause a shift in consumption by some customers to other periods of the day, thereby reducing peak demand and reducing the need for new capacity.

Some commentators, while agreeing with the concept of time-of-day pricing, state that to install the sophisticated metering devices required would result in substantial expenditures. A representative of the Association of Electric Cooperatives, for example, estimated that it would cost approximately $15 million to install those meters for all customers of Iowa cooperatives. Also, it is stated that the time-of-day pricing technique has not been proven to be cost-effective. Representatives of the Iowa Commerce Commission noted that another form of time-differentiated pricing is used by Iowa-based utilities who establish seasonal rates which reflect higher costs to serve.

Marginal cost assumptions

Another area of concern relates to the assumption that the marginal costs of a utility decrease as production increases. Earlier in this Report it was noted that utilities price electric service on a declining block rate basis. This practice is predicated on the theory that average production costs decrease as output increases. Some commentators suggested that while this may have been true in earlier years, recent experience has shown that marginal cost (the cost of producing an additional unit of output) is greater than average cost.

The results of this "erroneous" assumption are asserted to be reduced load factors or decreased efficiency, and misallocation of resources. The customer is charged on a declining block basis, and thus is encouraged to consume more energy. This results in the construction of even more costly new capacity, but in order to pay for the new capacity, rates must be increased. However, the increased rates tend to diminish consumption, thus reducing load factor and causing excess capacity and misallocation of economic system resources.

Similar in principle to the short term marginal cost concern is a concern about the long term costs of added capacity. Comments were presented which suggest that the declining block method of pricing also creates a false impression of prices for the long term. It was stated that while technological advances during the early stages of industry development resulted in reductions in the average cost of a kWh of electricity, the industry now faces increasing long-range incremental costs. One speaker stated that the cost of new capacity is increasing at a rate greater than the overall inflation rate of the economy, and that the newer facilities are less efficient than the old. Commentators also point to the impact of increased electric power capacity costs on the entire economic system. It was noted that the increasing size of power plants causes environmental and land use problems, and that by 1985 it is estimated that three-fourths of net private domestic investment in the United States will be in the energy industries, and that 75 percent of that energy investment will be in the electric power industry.

It was stated that the failure to recover actual production costs also inhibits the ability of utilities to obtain necessary capital for expansion. One speaker noted that utilities recently have had substantial problems in attacting capital, and concluded that the cause is the inability of utilities to generate authorized earnings because of defective pricing mechanisms. Another noted that there is a time lag between the perception of earnings "loss" and the institution of a rate increase, and stated that this further compounds investment problems.

Availability of information

The proponents of new rate design techniques, those who oppose change or who urge caution, and the Iowa Commerce Commission, all point to the absence of statistical data which would indicate the feasibility of adopting any new technique. Some noted that changes in rate design could result in even more severe problems, and that predictability must be achieved before action is taken. Proponents of change suggest that the necessary information already exists, that action has been taken in other states without the benefit of conclusive information, and that any delay which is imposed for the purpose of performing experimental studies will add to the existing problem. Some observers criticized the utilities and the Commerce Commission for their respective failures to take action to make the information available. It was variously

suggested in reply that the funds necessary to perform the information gathering function would make further rate increases necessary; that studies already are in process in other states and that costly duplication is unwise; and that the smaller utilities cannot afford the extensive cost studies required. Appendix C contains a listing of F.E.A. funded experimental studies in progress.

Representatives of the Iowa Commerce Commission noted that the Commission had submitted an application to the Federal Energy Administration for a grant of funds for the purpose of undertaking an experimental cost-effectiveness study of seasonal and time-of-day pricing techniques, but that the study had not been approved. Commission staff also noted that recommendations had been made by the staff to the Commission that the following actions be taken in Iowa:

1. At least one utility should be required to produce detailed current cost to serve studies.

2. All utilities should be required to file flat rate schedules for all residential customers having a demand of less than 1,000 kW, and that indicating demand meters be installed for all customers consuming in excess of 1,000 kWh per month and for all customers consuming in excess of 1,000 kWh for nine months out of the year. A customer in the latter group would be entitled to a block rate price schedule only if the load factor of the customer exceeded the load factor of the utility.

3. The Commission should encourage that the minimum bill for every customer be increased to recover a greater portion of fixed (capacity and customer) costs in the minimum charge.

4. All utilities failing to file cost studies justifying that block rate schedule should be required to price service on flat rate schedules.

5. Fuel adjustment costs and kW demand should be printed on the customer's bill to increase customer awareness and to encourage conservation.

6. New plant capacity costs should be borne by the new loads to be served, and the cost should not be allocated to previously existing loads.

7. All industrial price schedules should be justified by detailed cost to serve studies, and in the absence of such, flat rate schedules should be required.

8. The Commission should institute a program to require the use of peak load pricing techniques.

9. Energy conservation programs should be developed which discourage the installation of electric ranges, electric water

heaters, and electric appliances which convert electric power to heat.

10. Encourage the reforestation of cities with large shade trees which offer relief against summer peak loads.

11. Create disincentives for the use of excessive ornamental lighting.

12. Require proper insulation as a condition precedent to the right to have electric service connected to new construction.

13. Obtain and disseminate current cost information respecting electric heating.

14. Encourage apartment builders and owners to install individual meters for each apartment.

COMMITTEE RECOMMENDATION

The Committee recommends that the Standing Committees on Commerce in the Senate and House of Representatives continue to study the subject of public utility rates with the aim of proposing legislation to require the Commerce Commission to take the necessary actions to determine the extent to which the principles of incremental cost and peak responsibility pricing should be applied to sales of electric service in order to assure that individual rates be designed to recover the respective costs associated with providing that service, and to determine the methods, including but not limited to time-of-day metering, seasonal rate differentials, and interruptable service, by which those principles may be applied.

APPENDIX A

(1) REVENUE REQUIREMENT = COST OF SERVICE

(2) $RR = E + d + T + (V-D)R$

(3) DEFINITIONS:

RR = REVENUE REQUIREMENT

E = OPERATING EXPENSES

d = DEPRECIATION EXPENSE

T = TAXES

V = GROSS VALUATION OF THE PROPERTY SERVING THE PUBLIC

D = ACCRUED DEPRECIATION

R = RATE OF RETURN (A PERCENTAGE)

(V-D) = RATE BASE (NET VALUATION)

(V-D)R = RETURN AMOUNT, OR EARNINGS ALLOWED ON THE RATE BASE

Source: Iowa Commerce Commission

APPENDIX B

Source: Iowa Commerce Commission

ALLOCATION OF REVENUE REQUIREMENTS

EQUITABLE ALLOCATION CONSIDERATIONS

COST OF SERVICE

FULLY ALLOCATED STUDIES - FIXED & VARIABLE COSTS

INCREMENTAL COSTS - FINAL BLOCK DETERMINATIONS

DEMAND FOR SERVICE

RECOGNITION OF FACTORS

DISCRIMINATION - RATE SCHEDULES

RATE FORMS

OBJECTIVES OF UTILITY PRICING POLICY

PRODUCE REVENUES EQUIVALENT TO THE COST OF SERVICE

REVENUE REQUIREMENT FORMULA

MAXIMIZE THE UTILIZATION OF FIXED PLANT

LOAD FACTOR CONSIDERATIONS

ASSURE MAXIMUM STABILITY OF REVENUES

FIXED COST, VARIABLE COST CONSIDERATIONS

DISTRIBUTE THE TOTAL COST OF SERVICE REASONABLE

AMONG THE DIFFERENT CLASSES OF CUSTOMERS

Meanwhile, In Washington

"The EPRI study? We're way ahead of *that*," snorts an FEA staffer.

The Federal Energy Administration has been high on rate design ever since its first electric utility conference (EL&P July '74, T/D edition, p.1). Rate work is now a very formal part of FEA activity, as administered by the utilities programs group in the office of energy conservation and environment.

The FEAer in charge, Douglas Bauer, outlined the bureaucratic activity in recent testimony before the North Carolina Utilities Commission. (FEA has intervened on behalf of peak-load pricing in Wisconsin, California, Colorado, New York and Minnesota.)

According to Bauer, the FEA economic rationale for peak-load pricing is as follows:

- It promotes the efficient allocation of all resources.
- It improves the fairness in the allocation of costs.
- It promotes end-use conservation.

FEA's love for the concept is such that, as mentioned in the text, the agency is spending a few million on demonstration projects. EL&P has covered these in earlier issues; a summary is shown in the accompanying chart.

Preliminary results are in from the Green Mountain Power study (EL&P Jan '75, p.1) and Bauer summarized the early findings for the North Carolina commission:

"There has been a general acceptance among customers, and a positive load control impact, associated with two of the six nontraditional rates, viz. the off-peak rate and the interruptible rate. It is too early to establish the cost-effectiveness of the rates.

"Concurrently, those rates which include a demand charge (i.e. contract, three part, inverted demand and peak kilowatt demand) with the exception of the peak kilowatt demand rate have created rate design problems and would appear to require some form of load limiting device or time-of-day relaxation of penalty charges if they are to be made acceptable generally to the public.

"Some customers have benefitted; others have lost financially. Customer volunteers remain generally enthusiastic and supportive of the experiment. The data being obtained are supportive of system-wide implementation of innovative tariff designs."

FEA RATE DEMONSTRATION PROGRAM EXPERIMENTAL RATE STRUCTURES AND LOAD MANAGEMENT TECHNOLOGIES

	Rates/Load Management Technology	Customer Class
WISCONSIN	Time-of-Day LRIC Future embedded costs 7 cost groups	Residential
VERMONT	[illegible]	[illegible]
CITY OF LOS ANGELES	"3 types exp. tariffs" Flat rates Time-of-Day, Peakload Pricing	Residential Large Customers Large Customers
ARKANSAS	[illegible] Time-of-Day	[illegible]
OHIO	[illegible]	[illegible]
NEW JERSEY	[illegible]	[illegible]
MICHIGAN	Energy Management Program	[illegible]
CALIFORNIA	[illegible]	[illegible]

Source: FEA