ELECTRICITY
CONSUMERS
RESOURCE
COUNCIL

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NUMBER 1 MARCH 1986

PROFILES IN ELECTRICITY ISSUES:

Cost-of-Service Survey

This survey shows that industrial electricity consumers pay more than $2.5 billion annually in subsidies to other ratepayers.

This subsidy is very substantial. $2.5 billion is roughly equal to the negative balance of trade with England or Italy. It is enough to pay the annual electric bills of more than 4 million homes or nearly twice the number of residential customers in New York City.

Artificially high U.S. industrial rates negatively impact the ability of U.S. industry to compete in both foreign and domestic markets, particularly when industrial rates in other countries are subsidized. They also encourage U.S. industry to relocate electricity-intensive operations offshore and explore other options such as self-generation and cogeneration.

This survey compares the after-tax rate of return on investment for industrial and residential customers with the system average rate of return. All customer classes should be equally profitable to the utility when costs are allocated properly. However, this survey shows that:

- The rate of return provided by industrials exceeds that of residentials in 79 of the 84 cost-of-service studies (or in 94% of the studies).
- Nine times out of ten the industrial rate of return exceeds both the residential and the system average rate of return (in 76 of the 84 studies).

PROFILES IN ELECTRICITY ISSUES are published in the interest of better understanding of the economic and social impact of proposals related to electricity. ELCON seeks an efficient and adequate supply of electric energy at prices based on costs, not only for the benefit of industrial consumers and their labor force, but also for all consumers of industrial products and thus the national economy. For a copy of other PROFILES, write or call ELCON at the address above.

BACKGROUND

Cost-of-service studies determine the total costs incurred by a utility in providing service to its customers and the allocation of those costs to customer classes. Revenue collected from each customer class then may be compared with that class' cost responsibility to determine the extent to which each class is reimbursing the utility for the costs it incurred in providing service.

Many of the costs incurred by a utility are "joint" costs, incurred on behalf of all customers rather than for a specific customer class. As a result, the allocation of a utility's costs requires engineering, economic and accounting expertise, as well as a significant amount of informed judgment. Several appropriate cost-of-service methodologies have been developed for this process.

The particular method selected depends upon such factors as the diversity of the system load, the types and sizes of customers and customer classes and the type, time and rate of usage. A proper cost-of-service method will allocate each category of costs to the responsible customer class. Appropriately designed electric rates then will recover these costs (including a fair return on investment) from each class. A proper cost-of-service based rate design will produce approximately equal rates of return on investment from each of the utility's customer classes. That is, the cost burden will be equitably shared among all of the utility's customers.

There are three general categories of cost-of-service study methodologies: demand methods, consumption methods and load curve methods. These methods differ mainly in their allocation of fixed costs among the various customer classes.

Fixed costs generally are demand-related. A utility builds generating units and transmission lines based upon the maximum requirement expected to be imposed on its system at any point in time. Thus, the fixed costs of this equipment are incurred to meet the peak load(s) of the system. A proper cost-of-service methodology allocates these costs to each customer class in proportion to that class' contribution to the system peak(s) (or maximum demands).

Other costs are "customer-related" costs -- mainly meter reading and billing costs. These are related to the number of customers on the system. Still other costs are "energy related" -- mainly fuel costs -- which are related to electricity (KWH) consumption.

Some equipment is used only to serve particular customer classes. For example, the distribution network provides service to residential and small commercial customers at low voltage levels. The costs of this equipment should be borne only by those who use it.

The revenue burden is being equitably shared when each customer class produces roughly the same rate of return to the utility. On the other hand, there is a strong indication that the customers of a class are being overcharged (or undercharged) if a cost-of-service study shows that a particular customer class is producing a rate of return significantly above (or below) the utility's average system rate of return.

PREVIOUS RESEARCH

ELCON commissioned surveys of cost-of-service studies in 1977, 1978, and 1982. The results of these surveys indicate that industrial electricity users pay more than their fair share of utilities' costs of service.

These surveys show that in the vast majority of instances, the industrial rate of return exceeds both the residential and the total system rate of return. Specifically, this earlier research demonstrated that the industrial rate of return exceeded the residential rate of return in 588 -- or 84 percent of the 701 studies included in the 1982 survey.[1] The industrial rate of return exceeded the system average rate of return in 526 of the studies. Alternatively, the residential rate of return was less than the system average rate of return in 610 -- or 87 percent -- of the studies.

CURRENT RESEARCH

The current survey encompasses 84 cost-of-service studies for 73 electric utilities operating in 32 states (several utilities operate in more than one state). The studies include actual and forecasted test periods for 1979 through 1986 and reflect a variety of cost allocation methodologies. The results of the survey are provided in Appendix Table A-1 at the end of this Profile. This table is essentially the same as those contained in previous ELCON cost-of-service profiles.

Three independent utility rate consultants provided cost-of-service information for this survey: Drazen-Brubaker & Associates, Inc., St. Louis, Missouri; Kennedy and Associates, Inc., Atlanta, Georgia; and Cook, Eisdorfer, Willer & Associates, Inc., St. Louis, Missouri.

Data are from electric utility cost-of-service studies on file with each of the consultants. In each case, the cost-of-service

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[1] Cost of Service Survey, Profiles in Electricity Issues, No. 6, Electricity Consumers Resource Council, Washington, D.C., May 1982.

study provided is the most recent available for the utility included in the survey. Thus, unlike earlier ELCON surveys, only one cost-of-service study is provided for each utility.

The data compare after-tax rates of return for residential and industrial service with the system average rate of return. Various cost-of-service methodologies are represented in the data provided.

For each utility, that methodology determined by the particular consultant to be most appropriate is included, considering the electric load, usage and other customer characteristics of that utility. The consultant calculates the rate of return (in percent) for the industrial and residential customer classes and the system average rate of return for each utility.

In 1984 (the latest year for which sales figures are availble), the utilities included in the survey had total kilowatt-hour (KWH) sales of 1,320 billion KWH, or approximately 57.9 percent of total energy sales for the U.S. electric utility industry. Total industrial sales for these utilities was 448.9 billion KWH or about 53.6 percent of total U.S. industrial electricity sales in 1984.

Survey results show that the industrial rate of return exceeds the residential rate of return in 79 -- or 94 percent -- of the 84 cost-of-service studies contained in the survey. In 76 cost-of-service studies -- or 90 percent of the total -- the industrial rate of return exceeds both the residential and the system average rates of return.

This survey clearly shows that industrial customers usually are required to pay more for electricity, relative to the cost of producing service, than do residential customers.

Contrary to popular misconception, industrials generally are required to subsidize other electricity consumers; industrial users are <u>not</u> being subsidized by residential customers.

MAGNITUDE OF THE SUBSIDY

How significant is the subsidy that industrial electricity users pay to other electricity customers? This survey determines the dollar subsidy paid by industrial consumers in each cost-of-service study by determining the revenue that must be deducted from the industrial class' revenue requirement to equilibrate the rate of return on investment from that class with the system average rate of return. This information is contained in Table 1.

For the 73 utilities included in the survey, Table 1 shows that the industrial subsidy totals $1.37 billion in 1984 dollars. For industrial users, this represents approximately 3.1 mills (or more than 3 tenths of a cent) for each KWH of electricity purchased in 1984. Based on total industrial sales for the U.S. electric utility

TABLE 1

INDUSTRIAL SUBSIDY TO OTHER RATE PAYERS

STATE	KWH (000) RESIDENTIAL	KWH (000) INDUSTRIAL	KWH (000) SYSTEM	TOTAL SUBSIDY 1984 $ (000)	INDUSTRIAL SUBSIDY (cents/kwh)
ALABAMA	9,174,780	14,651,012	32,000,704	$65,442	0.45
ARKANSAS	5,682,151	6,803,579	18,741,268	$17,881	0.26
CALIFORNIA	37,850,821	35,882,149	116,653,298	$248,268	0.69
CONNECTICUT	6,232,209	7,168,737	15,365,884	$46,262	0.65
DELAWARE	1,460,922	2,104,925	5,127,948	$3,722	0.18
FLORIDA	41,674,215	11,416,160	85,621,265	$27,851	0.24
GEORGIA	12,004,092	19,970,447	43,458,560	$55,900	0.28
ILLINOIS	27,218,115	22,290,253	93,472,067	$138,844	0.62
INDIANA	16,090,650	20,990,692	52,751,276	$34,238	0.16
KANSAS	4,134,241	4,297,350	12,604,433	$10,750	0.25
KENTUCKY	2,513,602	2,234,226	7,900,847	$13,258	0.59
LOUISIANA	12,551,836	21,854,533	43,687,789	$60,757	0.28
MAINE	2,358,416	1,892,432	5,896,465	$4,545	0.24
MARYLAND	6,564,194	6,248,537	18,290,683	$2,951	0.05
MASSACHUSETTS	1,124,206	1,030,982	3,265,866	$2,085	0.20
MICHIGAN	21,192,753	30,743,001	68,110,463	$142,219	0.46
MINNESOTA	5,917,702	16,969,311	25,392,683	$54,702	0.32
MISSOURI	10,836,757	8,164,226	29,778,512	$23,121	0.28
NEW JERSEY	13,349,873	10,259,035	46,599,606	$37,105	0.36
NEW MEXICO	1,517,939	1,054,474	4,719,063	$9,926	0.94
NEW YORK	13,750,831	16,603,651	46,315,469	$28,277	0.17
NORTH CAROLINA	19,026,862	20,501,980	55,795,684	$48,572	0.24
OHIO	26,756,003	33,651,166	82,854,890	$39,272	0.12
OKLAHOMA	5,927,792	8,319,885	16,627,887	$18,952	0.23
PENNSYLVANIA	27,802,962	30,170,276	88,541,407	$89,747	0.30
SOUTH CAROLINA	9,488,599	15,929,841	32,458,812	$29,079	0.18
TEXAS	47,544,960	36,644,078	163,072,149	$38,968	0.11
UTAH	2,716,432	3,853,949	9,375,216	$12,474	0.32
VIRGINIA	19,314,868	16,079,866	43,189,440	$44,209	0.27
WEST VIRGINIA	6,161,538	7,782,854	19,570,354	$11,383	0.15
WISCONSIN	8,304,584	9,843,686	27,317,694	$8,779	0.09
WYOMING	760,779	3,557,828	5,710,591	$3,790	0.11
TOTAL	427,005,684	448,965,121	1,320,268,273	$1,373,329	0.31
ELECTRIC ENERGY SALES-1984	777,421,000	837,661,000	2,279,923,000		
RATIO UTILITY/ TOTAL SALES	0.549	0.536	0.579		

industry in 1984 -- 837.7 billion KWH -- this amounts to a total industrial subsidy of $2.6 billion. Alternatively, industrial KWH sales for the utilities included in this survey account for 53.6 percent of total industrial KWH sales for 1984. If extrapolated to represent 100 percent of 1984 sales, the industrial subsidy to other customer classes would total approximately $2.56 billion.

SUMMARY AND CONCLUSIONS

This survey of cost-of-service studies updates earlier studies commissioned by ELCON and quantifies the extent to which industrials subsidize other electricity users.

Survey results show that in 79 -- or 94 percent -- of the 84 cost-of-service studies, the industrial class rate of return on investment exceeds that of the residential class. In 76 cost-of-service studies, the industrial rate of return also exceeds the system average rate of return. Industrials, thus, generally are required to subsidize other electric utility customers.

This profile also quantifies the subsidy paid by industrials to other electricity users. For each of the 84 cost-of-service studies, electric rate consultants estimated the change in revenue requirement necessary to cause the industrial rate of return to equal the system average rate of return. In 1984 dollars, this annual subsidy amounts to $1.37 billion or more than 3 mills (3 tenths of a cent) for each KWH of industrial sales represented by those utilities included in the survey.

When extrapolated to represent 100 percent of 1984 industrial KWH sales, this subsidy totals approximately $2.5 billion. This subsidy is very substantial. It suggests that industrial rates are approximately 6 percent higher on average than they should be. $2.5 billion is roughly equal to the negative balance of trade with England or Italy. It is enough to pay the annual electric bills of more than 4 million homes -- nearly twice the number of residential customers in New York City.

Despite these facts, proposals continue to be advanced which would further undermine established cost-of-service ratemaking principles. These proposals threaten to produce additional distortions in electricity rates and to increase the burden borne by industrial users in subsidizing other classes of electricity users.

These proposals also undermine the competitiveness of U.S. firms in both domestic and foreign markets. Industrials cannot simply pass on increased electricity costs to their customers. This is particularly true when industrial electricity rates in other countries are subsidized or when, as is sometimes the case, industry is offered special long-term electricity discounts in exchange for building new facilities in foreign countries. This process leads to erosion of the U.S. industrial base, contributes to domestic unemployment and causes U.S. industry to reduce electricity purchases through such means as self-generation and cogeneration.

APPENDIX A

SUMMARY OF COST-OF-SERVICE STUDIES

APPENDIX TABLE A-1

SUMMARY OF COST-OF-SERVICE STUDIES

STATE	UTILITY	YEAR OF STUDY	COST-OF-SERVICE METHOD	RATE OF RETURN--% RESIDENTIAL	INDUSTRIAL	SYSTEM
ALABAMA	ALABAMA PWR CO.	1981	FOUR CP	4.95	8.60	7.12
ARKANSAS	ARKANSAS PWR & LT	1984	SINGLE CP	8.71	10.92	9.64
	OKLAHOMA G & E	1983	A&E	7.77	6.63	7.31
	SOUTHWESTERN ELEC PWR	1983	SINGLE CP	6.52	9.56	7.61
CALIFORNIA	PACIFIC G & E	1984	TWELVE CP	0.24	12.04	5.34
	SAN DIEGO G & E	1986	TWELVE CP	5.29	23.86	11.57
	S. CALIFORNIA EDISON	1983	TWELVE CP	-0.06	4.34	2.23
CONNECTICUT	CONNECTICUT PWR & LT	1984	A&E	6.73	13.88	10.19
DELAWARE	DELMARVA PWR & LT	1983	FIVE CP	9.88	12.18	11.70
FLORIDA	FLORIDA PWR CORP	1984	WINTER/SUMMER CP	6.01	9.06	7.12
	FLORIDA PWR & LT	1984	WINTER/SUMMER CP	6.52	10.24	8.55
	GULF PWR CO	1984	THREE CP	6.53	9.25	7.70
	TAMPA ELEC CO	1984	WINTER/SUMMER CP	5.25	7.14	6.16
GEORGIA	GEORGIA PWR CO	1984	NEAR PEAK	3.16	10.91	8.40
ILLINOIS	CENTRAL ILLINOIS LT	1982	SINGLE CP	4.14	13.36	8.38
	CENTRAL ILL PUB SERV	1981	THREE CP	4.00	8.82	6.57
	COMMONWEALTH EDISON	1982	SINGLE CP	7.59	15.03	11.27
	ILLINOIS PWR CO	1983	SINGLE CP	4.43	16.58	9.18
	UNION ELEC CO	1983	THREE CP	-0.78	8.59	6.81
INDIANA	IND & MICH ELEC CO	1984	TWELVE CP	7.94	6.69	7.86
	INDIANAPOLIS PWR & LT	1981	TWELVE CP	6.98	9.57	8.38
	NORTH INDIANA PUB SERV	1982	TWO CP	2.80	6.24	4.45
	PUB SERV CO OF INDIANA	1984	TWELVE CP	10.69	11.44	11.25
	SOUTH INDIANA G & E	1979	FOUR CP	4.31	7.28	5.88
KANSAS	KANSAS G & E	1982	FOUR CP	7.21	15.16	9.69
	KANSAS PWR & LT	1980	THREE CP	4.50	6.12	5.73
KENTUCKY	LOUISVILLE G & E	1982	SINGLE CP	4.34	11.11	7.65
LOUISIANA	GULF STATES UTIL	1982	4 CP/ A&E	7.24	10.72	9.23
	LOUISIANA PWR & LT	1984	FOUR CP	2.33	6.95	4.51
	NEW ORLEANS PUB SERV	1983	FOUR CP	-4.99	13.87	3.69
MAINE	CENTRAL MAINE PWR CO	1979	NEAR PEAK	8.36	12.36	11.00
MARYLAND	BALTIMORE G & E	1983	SINGLE CP	7.53	9.59	9.37
MASSACHUSETTS	WESTERN MASS ELEC	1983	A&E	10.02	11.31	9.71
MICHIGAN	CONSUMERS PWR CO	1985	TWELVE CP	7.70	10.92	9.82
	DETROIT EDISON	1985	SINGLE CP	1.87	5.50	3.97
	IND & MICH ELEC CO	1985	TWELVE CP	5.79	6.50	6.76
MINNESOTA	MINNESOTA PWR & LT	1981	A&E	1.31	7.67	5.50
	NORTHERN STATES PWR	1981	SINGLE CP	6.14	9.08	7.89
MISSOURI	ARKANSAS PWR & LT	1984	SINGLE CP	9.78	11.77	10.58
	EMPIRE DISTRICT ELEC	1981	SINGLE CP	6.04	23.22	10.25
	KANSAS CITY PWR & LT	1984	NEAR PEAK	1.69	5.81	4.71
	UNION ELEC CO	1984	TWO CP	2.00	4.66	3.44

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STATE	UTILITY	YEAR OF STUDY	COST-OF-SERVICE METHOD	RATE OF RETURN--% RESIDENTIAL	INDUSTRIAL	SYSTEM
NEW JERSEY	JERSEY CENTRAL PWR & LT	1984	FOUR CP	7.99	14.14	10.06
	PUB SERV ELEC & GAS	1981	SINGLE CP	8.45	12.03	10.77
NEW MEXICO	PUB SERV CO OF N MEXICO	1984	TWELVE CP	6.27	15.29	10.66
	TEXAS-N MEXICO PWR CO	1982	THREE CP	7.89	14.59	9.48
NEW YORK	CENTRAL HUDSON G & E	1982	WINTER/SUMMER CP	6.90	14.89	10.98
	CONSOLIDATED EDISON	1981	SINGLE CP	11.43	12.05	11.56
	N Y STATE E & G CORP	1986	NEAR PEAK	9.24	10.07	10.06
	ORANGE & ROCKLAND	1983	SINGLE CP	9.28	12.16	11.01
NORTH CAROLINA	CAROLINA PWR & LT	1983	SINGLE CP	7.86	11.70	9.70
	DUKE PWR CO	1984	SINGLE CP	5.31	8.51	7.10
OHIO	CINCINNATI G & E	1984	TWO CP	6.16	14.36	10.55
	CLEVELAND ELEC ILLUM	1983	FOUR CP	14.05	15.13	14.55
	COLUMBUS & S OHIO ELEC	1983	SINGLE CP	7.49	9.97	9.83
	OHIO EDISON CO	1985	TWELVE CP	9.51	10.04	11.08
	OHIO PWR CO	1983	TWELVE CP	8.97	11.07	10.30
	TOLEDO EDISON CO	1983	TWELVE CP	9.36	8.52	9.29
OKLAHOMA	OKLAHOMA G & E	1984	SINGLE CP	5.59	9.69	7.87
PENNSYLVANIA	DUQUESNE LT CO	1984	SINGLE CP	12.22	13.79	11.19
	PENN ELEC CO	1985	TWO CP	6.29	9.12	7.80
	PENN PWR & LT	1985	TWO CP	7.33	10.97	8.92
	PHILADELPHIA ELEC	1984	FOUR CP	5.87	11.67	9.70
	WEST PENN PWR CO	1984	SINGLE CP	8.02	8.72	8.87
SOUTH CAROLINA	CAROLINA PWR & LT	1983	SINGLE CP	7.19	12.45	10.09
	DUKE PWR CO	1984	SINGLE CP	4.41	9.33	6.88
	S CAROLINA E & G	1983	SINGLE CP	8.70	8.14	8.71
TEXAS	CENTRAL PWR & LT CO	1981	FOUR CP	5.57	11.20	8.59
	EL PASO ELEC CO	1983	FOUR CP	8.64	10.30	9.58
	GULF STATES UTIL	1983	FOUR CP	7.31	8.35	8.03
	HOUSTON LTG & PWR	1984	NEAR PEAK	9.51	11.55	10.46
	SOUTHWESTERN ELEC PWR	1983	FOUR CP	8.47	11.00	10.22
	TEXAS-N MEXICO PWR CO	1983	FOUR CP	8.18	25.82	10.16
	TEXAS UTILITIES ELEC	1983	A&E	12.50	13.52	12.46
UTAH	UTAH PWR & LT	1982	FIVE CP	9.55	13.56	11.93
VIRGINIA	APPALACHIAN PWR CO	1982	TWELVE CP	8.65	9.77	9.41
	VIRGINIA PWR CO	1984	A&E	9.02	12.78	10.76
WEST VIRGINIA	APPALACHAIN PWR CO	1983	TWELVE CP	5.85	8.48	7.41
	MONONGAHELA PWR CO	1984	SINGLE CP	8.13	11.58	10.11
WISCONSIN	WISCONSIN ELEC PWR CO	1986	TWELVE CP	9.23	11.30	10.53
	WISCONSIN PWR & LT CO	1986	TWELVE CP	9.37	6.56	8.55
	WISCONSIN PUB SERV CORP	1986	TWELVE CP	5.76	13.97	9.69
WYOMING	PACIFIC PWR & LT	1983	SINGLE CP	7.45	10.20	9.43
	UTAH PWR & LT	1983	EIGHT CP	5.33	9.47	8.49

NOTES TO TABLES

1. Information included in tables 1 and A-1 was provided from cost-of- service studies on file with utility rate consultants.

2. Cost- of- service methods presented are those recommended by the rate consultants as most appropriate for the particular utility and test year being considered. These include:

   Four CP -- four coincident peaks
   Single CP -- maximum annual coincident peak
   A&E -- average and excess
   Twelve CP -- twelve coincident peaks
   Five CP -- five coincident peaks
   Winter/Summer CP -- winter and summer seasonal coincident peaks
   Near Peak -- system peak demands within a certain % of the annual system peak (e.g., 90% of peak) are used to allocate costs.
   Three CP -- three coincident peaks
   Two CP -- two coincident peaks
   4 CP/ A&E -- combination of four coincident peaks and average and excess methods
   Eight CP -- eight coincident peaks

3. Killowatt-hour sales for each state are those provided by the cost- of- service studies for those utilities included in the survey.

4. Electric Energy Sales--1984 are totel KWH sales for the U.S. electric utility industry for 1984 as determined by the Edison Electric Institute.

5. Industrial Subsidy is that amount of revenue necessary to be deducted from the industrial class revenue requirement to cause the rate of return for that cless -- as determined by the cost-of- service study for the test year under consideration -- to equal the system average rate of return. Figures are in 1984 dollars.

6. Industrial Subsidy per KWH is derived by dividing the industrial subsidy in 1984 dollars by each state's industrial KWH sales for those utilities included in the survey.