Research Department
Federal Reserve
Bank of
San Francisco

June 20, 1975

Peak Load

In response to a recent rate-increase application by Pacific Gas and Electric Co., the Federal Energy Administration suggested several major changes in the utility industry's rate-setting methods. "The existing industry capacity factor of 49 percent suggests that much more attention must be devoted to load-management programs that will better utilize existing generation equipment." According to the FEA's estimates, by 1985 the nation could save 500,000 barrels of oil per day and $120 billion in capacity expansion if such programs were adopted.

Peak-load pricing is a key element in the FEA's plan for national energy self-sufficiency. Peak-load pricing describes a system by which the cost to electricity users is higher at times when generating plants are operating at the limits of capacity. Under the present system, with one price for electricity no matter when it is used, businesses and households tend to concentrate their electricity usage into particular times of day (3:00-10:30 PM) and particular seasons of the year (summer). This substantially increases electricity production costs, because much of the capacity needed to handle peak loads stands around idle the rest of the time, gathering dust and wasting money.

For this reason, the same amount of electricity could be produced at a lower total cost if consumers could be induced to shift some of their electricity usage to off-peak times. This tendency for usage to bunch at particular times could be largely offset by adopting a variable price; higher at times when electricity usage is high, and lower when usage is low.

FEA studies

The FEA is now sponsoring an experiment, in conjunction with a New Jersey utility, to determine whether residential electricity consumption can be influenced significantly by peak-load pricing. In this four-year study, special meters will be installed in 1,000 dwelling units to record hourly consumption data. Half the households will be given special rates, with higher charges for peak-time consumption and lower rates for off-peak usage, while the rest of the households will serve as a control group, with no variation in hourly rates.

The FEA has already found supporting data for its advocacy of peak-load pricing in an analysis of European consumption patterns for the 1961-73 period. For example, a price which embodied a 6-1 to 10-1 differential between peak and off-peak usage was credited with reducing French demand by 2,000 megawatts on a national system whose total capacity is only 30,000 megawatts. French, British and German utilities showed rapid improvement in their daily load factors, attributable to pricing policies and time-dependent rate structures.

Some observers are not so certain that peak-load pricing is the cure-all that the FEA seems to suggest.

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The key issue in their view is not how to produce the lowest cost electricity, but rather how to provide consumers with the best service within the context of achieving energy self-sufficiency for the nation.

The primary difficulty in determining the cost of electricity has always been the lack of competition between utility firms. Within a given geographical region, a natural monopoly develops, because it is so much cheaper to provide customers with electricity from a single source than from many sources. Hence, in practically every region, there is only one major utility company. Also, political pressures over time ensure that the price of electricity is established with the help of a public regulator, the public-utility commissions in the various states.

Competition vs. monopoly

Regulatory authorities are created to bring utility prices closer to what they would be if the utility were competing with others, because competitive pricing gives the consumer the most for his money. But this raises the question—Would peak-load pricing be used if the utility were competing with other utilities? Consideration of pricing in a competitive industry may help throw some light on this question.

Consider the case of the financial-district restaurants that cater to businessmen at lunchtime. This business unquestionably is beset with a peak-load problem, but it still does not lower prices in order to encourage off-peak business. It is not hard to see why. To the consumer, there are factors other than the cost of his meal that motivate him to eat lunch at peak periods. For the restaurant-owner, there are other considerations. If he were to charge lower prices at off-peak periods, he would have to raise prices at peak periods in order to meet his costs—but he wouldn't stay in business very long if he did that, because the extra sales picked up during off-peak hours wouldn't compare with the lost sales at peak hours.

On the other hand, if there were only one restaurant in town—as is the case with the regulated utility—then lower prices off the peak would work much better. The restaurant would not go out of business because everyone would have to eat there, and customers would be forced to shift their lunch hours to take advantage of off-peak prices. But this consideration suggests that peak-load pricing is much more likely to develop under monopolistic than under competitive conditions, and that consumers would not necessarily be better off under such a system.

One of the oldest rules of thumb among economists is that resources are utilized most efficiently when the price of each item is equal to the cost of producing the last unit of output. It would seem,

then, that since the cost of generating electricity at peak is greater than the off-peak cost, electricity at peak should bear a higher price. But this is only true if the utility is unable to choose its capacity.

Since over the long haul the utility may change the size of its plant, and since larger plants mean lower production costs in any given area, it is difficult to make any clear-cut conclusion about an industry with a peak-load problem. All that we can say is that peak-period prices should be higher than they would be if electricity use were sustained indefinitely at peak levels—and conversely, off-peak prices should be lower than they would be if electricity use were kept indefinitely at its off-peak lows. This conclusion is not strong enough to lead to a position either for or against peak-load pricing.

Peak-load problems

The FEA argues that peak-load pricing for electricity usage can be implemented "without significantly affecting lifestyles or reducing industrial output." But some observers dispute this conclusion. In their view, business firms and households have good reason for consuming electricity at peak periods. Consumers turn on lights and run airconditioners between 3:00 and 10:30 PM because that's when they need them. Businesses operate more heavily during the day because labor costs are lower then than at night. Farmers use more energy during particular seasons because the growing season dictates such scheduling. Accordingly, the cost of electricity production is only one of the many costs that would be affected by peak-load pricing. Focussing on this cost alone would not necessarily bring about lower total cost, and in addition, would serve to disguise the cost of energy to the consumer.

Would peak-load pricing help achieve energy self-sufficiency for the nation? It should help, because generators that operate only part-time are wasteful of energy. With peak-load pricing, more generators could be operated full-time, using relatively less energy to produce electricity more cheaply.

But again, critics contend that this approach leaves some important factors out of consideration. The simplest way to achieve Project Independence is to raise the price of U.S.-produced fuel to the level where domestic production meets domestic demand. This approach would make clear to the American people exactly what they are sacrificing for self-sufficiency. With other production adjustments, such as peak-load pricing, the cost of Project Independence would be hidden in the many necessary adjustments in life-styles, including the higher costs of off-peak production. The total cost of Project Independence would remain the same, but it would be harder for the American public to measure.

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BANKING DATA—TWELFTH FEDERAL RESERVE DISTRICT

(Dollar amounts in millions)

Selected Assets and Liabilities Large Commercial Banks	Amount Outstanding 6/04/75	Change from 5/28/75	Change from year ago Dollar	Change from year ago Percent
Loans (gross, adjusted) and investments*	84,885	– 182	+ 2,042	+ 2.46
Loans (gross, adjusted)—total	64,401	– 223	– 254	– 0.39
Security loans	1,371	– 254	+ 30	+ 2.24
Commercial and industrial	23,501	– 39	+ 315	+ 1.36
Real estate	19,539	– 3	+ 296	+ 1.54
Consumer instalment	9,802	– 10	+ 489	+ 5.25
U.S. Treasury securities	8,091	+ 20	+ 2,905	+ 56.02
Other securities	12,393	+ 21	– 609	– 4.68
Deposits (less cash items)—total*	85,286	+ 1,590	+ 6,460	+ 8.20
Demand deposits (adjusted)	23,220	+ 1,251	+ 1,338	+ 6.11
U.S. Government deposits	468	+ 143	+ 25	+ 5.64
Time deposits—total*	59,861	– 56	+ 4,900	+ 8.92
States and political subdivisions	7,284	– 264	+ 180	+ 2.53
Savings deposits	20,070	+ 139	+ 2,166	+ 12.10
Other time deposits‡	29,049	+ 107	+ 1,768	+ 6.48
Large negotiable CD's	15,575	+ 25	+ 1,611	+ 11.54

Weekly Averages of Daily Figures	Week ended 6/04/75	Week ended 5/28/75	Comparable year-ago period
Member Bank Reserve Position			
Excess Reserves	125	– 6	86
Borrowings	1	4	256
Net free (+) / Net borrowed (–)	+ 124	– 10	– 170
Federal Funds—Seven Large Banks			
Interbank Federal fund transactions			
Net purchases (+) / Net sales (–)	+ 2,113	+ 1,903	+ 1,370
Transactions of U.S. security dealers			
Net loans (+) / Net borrowings (–)	+ 819	+ 1,178	+ 401

*Includes items not shown separately. ‡Individuals, partnerships and corporations.

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