**Time-of-Day Pricing**

Time-of-Day-Rates

As the name implies, these rates vary according to the time of day. For instance, the price per KWH might be 3 cents during all hours, except from 8:00 a.m. to 8:00 p.m., when the price might be 5 cents. This example is the simplest form of time-of-day rates. More complicated variations have a large number of time categories with a different rate for each category.

The Theory Behind Time-of-Day Pricing

It is widely recognized that the cost of producing electricity varies from hour to hour. This conclusion holds true under virtually any method of calculating costs. As indicated previously, the most significant type of cost is marginal cost. The marginal cost of producing electricity varies widely, depending upon the total load and the particular generating units used to serve this load. The theory behind time-of-day rates is simply to vary the price of electricity in accordance with fluctuations in production costs. When the cost of production is high, the price would also be high. Conversely, when the cost of production is low, the price would be low.

Time-of-day pricing is actually a special case of marginal cost pricing. Since marginal cost theory suggests that prices should be equal to marginal costs, and marginal costs vary from hour. to hour, the price of electricity should logically vary from hour to hour. The efficiency advantages of such a pricing system are readily apparent. For example, if additional electricity costs 20 cents per KWH at a particular moment, it is hardly efficient to charge just 3 cents per KWH. If the utility charged the higher amount, some (perhaps many) customers would cut down on their usage of electricity by adjusting thermostats, turning off lights, and the like. obviously, for these "flexible" or "adjustable" uses, customers are willing to pay the lower amount of 3 cents per KWH, but not 20 cents. Yet for every KWH which is eliminated, the utility's costs will be reduced by 20 cents. The situation is economically inefficient: the utility spends 20 cents per KWH to produce electricity which is worth far less to its customers. If the utility charged a price equal to the marginal cost of producing electricity, consumers would continue only those uses which were worth as much as the cost of producing the electricity.

The equity advantages of time-of-day pricing are also apparent. To illustrate, there are two customers who are the same in every way except for their consumption patterns. The first customer only uses electricity late at night when the marginal costs of production are very low, like 1 cent per KWH; the second customer only uses electricity at the peak usage hours of the day when the marginal costs of production are very high, like 10 cents per KWH. Given their usage, it is hardly fair to charge them same price. Under a time-of-day pricing system, this inequity can be corrected because the nocturnal user is charged less than the peak-hour consumer.

Practical Difficulties with Time-of-Day Pricing

In theory, marginal cost pricing can be applied with a high degree of exactness: a different price is charged every hour, depending upon the marginal costs of the system. In fact, many utilities use this type of pricing system when they interchange power with

other utilities. The actual marginal costs of the selling utility are calculated for each hour when the power is interchanged; this rate is used as the price charged the purchasing utility.

Realistically, such a pricing system cannot be applied to all customers, even though it is theoretically possible. When two utilities interchange power, a rather substantial amount of electricity is normally involved. Thus, the transaction cost of calculating the bill under such a complicated pricing system is small, relative to the total value of the transaction. But if the transaction costs per KWH are very high for small customers, a complicated pricing system would not be appropriate.

Furthermore, utilities are fairly sophisticated consumers of electricity. When they purchase power from another system, they presumably have the knowledge and the time commitment to make wise purchasing decisions, even under a pricing system which varies hourly. obviously, most small residential and commercial customers lack the time and knowledge to constantly monitor their usage of electricity under highly variable conditions.

Finally, implementation of such a pricing structure would require relatively expensive metering equipment, like magnetic recording. Hence, metering costs would undoubtedly be prohibitive for very small customers, although a more simplified price structure may be feasible.

## Can Time-of-Day Pricing be Practically Applied to Industrial Customers

In reviewing each of these practical problems, it is apparent that they are a matter of degree. While a highly refined time-of-day pricing system would not be practical for the average residential or small commercial customer, it would be realistic for industrial customers who consume large amounts of electricity. Many large industrial users of electricity have already demonstrated the necessary knowledge and motivation to install sophisticated control programs which optimize their use of electricity under traditional pricing schemes. This same ingenuity could also be applied under a time-of-day pricing system -- even a highly complicated one.

Sophisticated magnetic recording meters, which are expensive but readily available, can monitor a customer's consumption minute by minute. For large industrial customers, the cost of these meters, both to purchase and read them, is very small, compared to their total annual bills. To them, such costs are not a significant obstacle to applying time-of-day pricing.

For smaller industrials and large commercial customers, the situation is less clear. Although it might be impractical to implement a time-of-day pricing system where the price changed every hour, it does seem feasible to adopt a more simplified approach with two or three different price levels. If properly designed, this approach would be a major improvement over the timeless rates now used; it could be simple enough for customers to understand and modify their usage patterns, if they wished.

For residential and small commercial customers, there are considerable practical difficulties with adopting a universal time-of-day pricing system. Metering costs alone are a major obstacle. Also, these customers are less likely to acquire the necessary knowledge to adapt their purchasing decisions to a time-of-day pricing system. Consequently, it would seem wise to carefully consider the needs and attitudes of residential customers, in order to establish a time-of-day pricing system which they will

accept and understand.

What a State Public Utility Commission could do Regarding Time-of-Day for Small Customers

A Commission could approve an optional time-of-day pricing tariff for residential and small commercial customers who wish to take advantage of such an opportunity. Of course, the tariff would have to cover the additional metering costs. But if the customers are willing to pay these costs, they should be given the opportunity to purchase electricity on a time-of day rate.

Under the traditional timeless price structure, customers may be treated unfairly because they consume relatively little electricity during the peak-usage hours and relatively large amounts during low-usage periods, like the middle of the night. Some customers may be willing to modify their usage patterns, in order to take advantage of lower rates. If they do so, it would be advantageous to everyone. These customers would benefit from lower electric bills, while other consumers would benefit from their absence during the peak hours, thereby reducing system fuel costs and the need for additional capacity at the peak hours.