Demand Ratchets

The Theory Underlying Demand Ratchets, Their Advantages and Disadvantages

Demand ratchets are generally included in electric utility rates to reduce the risks of serving certain types of customers who have potentially large swings in demand during the year. Typically, ratchets are imposed upon large industrial customers who are often connected to the system at the transmission level. A large amount of investment in transmission lines and other facilities may be dedicated solely to these customers; consequently, a significant decline in their demand could severely diminish the utility's ability to recover the fixed costs of these facilities. The imposition of a demand ratchet will allow the utility to earn a fair return on its investment, even when the customer's demand falls to low levels.

Ratchets have several advantages. First, they help to stabilize the utility's revenues and minimize the risk of serving large customers. From the system viewpoint, they tend to encourage the industrial customers to increase their annual load factor, which often promotes favorable load characteristics. Moreover, ratchets can improve the equity of a utility's rate design. For example, a transformer may be dedicated to the use of one customer who has a large load for only two months and is inoperative during the rest of the year. If some kind of demand ratchet is not imposed, the fixed costs of that transformer will tend to be recovered through other users during the 10 months that the customer is off the system. A ratchet provides a mechanism for the utility to recover the costs of the transformer from the customer who is responsible for those costs.

However, there are also disadvantages to demand ratchets. For instance, they tend to encourage excessive energy consumption. A high demand ratchet places an extreme emphasis on a customer's demand during just one hour (or less) of the year; hence, customers will have relatively little incentive to conserve during all the other hours of the year, particularly if the energy rate is low.

For example, if a 100% demand ratchet was imposed, a customer would be billed on the basis of his maximum peak KW demand for the year, no matter how low his actual demand for the current month might be. As long as the customer stays below his annual peak, his day-to-day consumption decisions will not have an effect upon the demand portion of his bill. Except during the brief period when his demand is near its annual peak, the customer will not be encouraged to conserve energy. This is particularly true if a large part of the customer's bill is collected through the demand ratchet, and the KWH rate is minimal. of course, this anomaly is most serious when a 100% ratchet is imposed in conjunction with a high KW rate; but it also results to a lesser degree under lower ratchets. Demand ratchets may also be perceived as being inequitable. It may seem unfair to a customer to be required to pay for KWs that he did not actually use during the current month, especially if his low level of demand during a particular month frees up capacity which can be used by other customers.

How the Level of Demand Ratchets Should be Determined

In theory, a customer should be required to pay for costs which are directly attributable to his presence on the system, and the ratchet should ideally be designed to help ensure the proper cost recovery. However, because a large portion of an electric utility's costs are incurred for facilities that serve more than one customer, the task of assigning cost responsibility becomes very difficult, and it is not always, easy to establish an appropriate ratchet which is fair to all of the affected customers.

Some costs can be readily assigned. When a particular transformer serves only one customer, the cost of that transformer can generally be directly attributed to that customer. However, cost assignment becomes increasingly elusive the further away from the customer level of service and the closer towards the system level an analyst moves. For instance, a substation may serve several customers; a transmission line may serve several large groups of customers, and a generating plant, the utility's entire service area. The greater the number of customers sharing facilities, the more fungible those facilities become.

In other words, when a single customer cuts back his load or drops off the system, another customer can use that capacity. Hence, no single customer is solely responsible for these capacity costs. At the generation level and other levels where considerable sharing takes place, the same capacity can often be used to serve large groups of customers at different times. For example, a utility may serve only two classes of customers: one class tends to have its highest load during mid-day, while the other class peaks at night. Because of the diversity of the class loads, the generating capacity which was installed to serve the two classes does not have to be sufficient to meet the sum of their demands; it must only meet the coincident peak demand of the two classes. The cost of serving both classes together is less than the total cost of serving each class separately. Hence, neither of the two classes is solely responsible for most of the cost of the generating capacity. In designing a demand ratchet, it is important to compare the amount of capacity which is dedicated to a single customer with the amount of capacity that can be shared with others. If the capacity is useable (and can be paid for) by other customers, it is less important to ensure recovery of the costs from a specific customer. Thus, it is less appropriate to use a ratchet to recover these types of fungible costs.