AVOIDED GIGAWATTS THROUGH UTILITY CAPITAL RECOVERY FEES

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ABSTRACT

Electric rate structures can be used to provide customers with the proper pricing signals as well as provide economic incentives for increased market penetration for energy efficient new buildings. An innovative, marginal (replacement cost) rate structure is possible through the use of capital recovery fees for new electric meter hookups similar to those commonly used for new water and wastewater hookups where the developer/owner is required to capitalize the marginal cost of new demand.

By giving credit for the more efficient loads placed on an electric utility system, a utility could rapidly advance the market penetration of commercially available, highly efficient building systems and equipment resulting in potential gigawatts of conserved energy. Simultaneously, the capital costs of new generating plants could be shifted to the end-user from the already debt-burdened electric utility industry. This paper will explore this pricing option and analyze its potential on future electric load growth and the design of efficient new buildings.

BACKGROUND

Historically, electric utilities have enjoyed the enviable position of being a declining cost industry. Factors contributing to their decreasing marginal costs were: (1) significant technological advances in generation, transmission and transformation of electric power, (2) economies-of-scale through larger, more efficient generating units, and (3) relatively stable or declining primary fuel prices. In the 1970's, these favorable conditions changed dramatically and with little forewarning. The price of natural gas and oil skyrocketed with the formation of the OPEC cartel and the ensuing embargoes. Interest rates on bonded indebtedness reached record highs, adding tremendous revenue requirements for debt service on new plants and existing utility equipment. Delays in the licensing and construction of new nuclear power plants contributed dramatically to total project costs. High labor costs, stability in technology, high environmental costs, increased regulation and expensive litigation became the nemesis of the utility industry.(1)

These factors helped reverse the trend of declining costs for electric utilities. The per-unit costs of an additional Kilowatt hour (Kwh) of electricity for both energy and new capacity were, for the first time, higher than their average costs. At the same time, utilities in sunbelt states such as Texas were experiencing tremendous new load growth due to high levels of economic activity and the influx of people seeking jobs. Mega-trend cities such as Austin, Texas experienced annual growth rates of 15-20 percent in demand in the early 80's.

Marginal Cost Electricity Pricing. In the United States, we have essentially deregulated oil, gasoline, and natural gas and price them close to their marginal cost. Not so with electricity. The 1984 average price was 6.5¢/Kwh. But the replacement cost is about 12¢/Kwh. Why? Electric utilities are regulated monopolies; and regulators don't want to see them make obscene profits on cheap, depreciated dams and power plants. Therefore, we make them sell electricity at average cost. This of course signals users not to value electricity at more than 6¢/Kwh, and hence demotivates their investment in efficiency and renewables. So, electric demand grows; and we build more expensive new plants paid for by the general ratepayer--not the builder of new electricity guzzling buildings.

In principle, the solution is easy. Bill the customer at marginal prices. One marginal pricing solution with tremendous potential for immediately reducing electric demand and encouraging builders to construct efficient new buildings is capital recovery fees (CRFs).

CAPITAL RECOVERY FEES

CRF's are a form of hookups fee similar to those used to finance new water and waste treatment plants and are paid prior to new services being connected. CRFs can be structured to prepay the marginal-capacity related costs required to provide the service. Hookup fees for new buildings normally cover only the cost of the service drop and meter. The cost of distribution, transmission and generation plants are embedded in a historical rate structure. Assessing a CRF based upon the connected building load is one means of making growth "pay its own way" while simultaneously providing an economic incentive to builders and owners to optimize the economic efficiency of new buildings. Less efficient buildings with higher peak demand would be assessed (penalized) more for a hookup fee than their more efficient counterparts to reflect the additional capacity required.

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CAPITAL RECOVERY FEE OBJECTIVES

The objectives of a properly designed CRF would be to:

- Optimize the efficiency of new building loads on the system,
- Send the correct pricing signal for new electric demand by reflecting the marginal cost of new capacity,
- Provide a significant new source of capital for electric utilities,
- Shift a portion of the debt burden for new plants from the utility industry to the building mortgage market,
- Avoid unreasonable discrimination among ratepayers and builders, and
- Be easily understood and administered.

The last two objectives -- being easily understood and avoiding unreasonable discrimination -- are key objectives for any kind of new utility rate structure. The achievement of these objectives often requires tradeoffs between the utility, ratepayer, and society.

BENEFITS OF A CAPITAL RECOVERY FEE

The benefits of a CRF to a utility and its customers are numerous. By recovering the marginal capacity related costs from new customers through a CRF at the time of new meter connections, a utility would be better able to:

- Defer or avoid the need for new generating capacity,
- Lower their requirements for new capital by the amount collected through CRFs,
- Reduce peak demand for existing plants,
- Avoid using expensive fuels in peaking plants, and
- Decrease their need for higher revenue (rate) requirements.

Potential Peak Savings. The potential for deferring the need for new generating plants in areas of high economic growth such as Texas are tremendous when one considers the savings that are technically and economically possible in building shell improvements and HVAC systems. The 1984 Public Utility Commission of Texas long-term electric load forecast for twenty generating utilities in Texas predicts a net system capacity increase from 55,000 MW in 1983 to 75,500 MW in 1993 -- or a 20.5 Gigawatt (GW) increase. This is based on an overall annual increase in demand statewide of 4 percent. Assuming the average new power plant is 500 MW in size, Texas must have 40 new power plants on line in the next ten years (2) to maintain adequate reserve margins and meet new customer demands.

The residential and commercial sector in Texas accounted for 56 percent of the total electric peak load in 1980.(3) Buildings account for approximately 90 percent of the residential demand and 45 percent of the commercial demand.(4) With a system peak of 44 GW in 1984, it is easy to extrapolate building demand to be 20 GW or 45 percent of the total system peak. With a forecast of 20.5 GW needed by 1993 in Texas and the assumption that buildings will continue to contribute to 45 percent of demand, new building demand will account for 9.23 GW of the new demand.

Estimates of the technical potential for commercially available improvements in new building construction by building scientists range from 25 to 70 percent. A recent study conducted at Lawrence Berkeley Laboratory stated that by investing in a "cost of conserved energy" equal to today's average (historical) energy prices, one could reduce residential electricity consumption by 33 percent.(5) By investing at the margin through CRFs, the potential would obviously be even greater.

If one assumes a very modest 25 percent efficiency improvement in buildings at the margin through CRFs, Texas could easily defer 2.3 GW (25 percent of the 9.23 GW forecasted increase attributable to buildings) or the equivalent of four and one-half new 500 MW power plants at an average cost savings to the ratepayers of $4.5 Billion over the next ten years. This is mega-savings even in Texas where big is normally something to brag about.

Benefits to Building Owners. Building designers, builders, and owners subject to the marginal cost pressure of a CRF would be prompted to abandon the least "first cost" approach of building design to seek optimum, cost effective solutions based upon the life cycle cost of buildings. The benefits to the building owner and/or occupant would be:

- Lower rate of energy consumption,
- Lower overall utility bills as a result of prepaying the capacity charges at the time of hookup, and
- Increased building value and return-on-investment.

DESIGN OF A CAPITAL RECOVERY FEE

The success of a CRF in financing new demand and improving new building power requirements depends upon proper rate design and equitable allocation among new and existing customers.

Magnitude of a CRF. The level of a CRF should accurately reflect the relative difference between the incremental costs (the cost of adding new capacity) and the average, or historical costs. The marginal cost allocated to serving this new customer can be determined on a dollar per KW basis and could range from $200 to $2,000 per KW depending upon the type of new generating plant being deferred.

Phased Approach. The best way to focus the attention of builders on the design of low peak power buildings using CRFs, without causing an immediate disruption in the market value between new buildings and old buildings, would be to phase in the charge for at least 50 percent of the cost committment to new generation. This would help prevent existing building owners from reaping a "windfall profit" resulting in CRF's being assessed to new buildings. It would also help increase initial acceptance by lowering the initial dollar impact.

Application of the CRF. A CRF should be allocated to the class of new customers causing the new demand. Since most new buildings are either residential or commercial, it is reasonable to limit the charge to those customer classes for simplicity and ease of administration. It should be paid only once by a customer for a given level of connected load.

Varying the CRF Charge. To send the proper marginal pricing signal, the CRF should be increased for those buildings with higher peak loads. If the peak design load for a new residence is 50 percent less than its less efficient competitor, then the CRF should also be 50 percent less. Assuming a CRF of one dollar per watt, a new low power building of two KW of connected load would pay a $2,000 CRF times a 50 percent phase-in factor or a total of $1,000. A new building with 4 KW of connected load would pay twice as much or a fee of $2,000.

Experience of Other Utilities with CRFs. The issue of hookup fees to recover the marginal-capacity related costs for new demand is not new -- only the concept that it should be varied within the customer class based upon the level of connected load as an economic stimulus for efficient building strategies. In October 1980, San Diego Gas and Electric Company petitioned the California Public Utility Commission for authority to begin a $2,000 "connection charge" for all new residential meters based upon the cost of the new service and the premise that existing customers should not subsidize the higher costs for new customers. Although the California PUC denied imposition of the connection charge based upon insufficient evidence to support the request, they did find that a properly designed connection charge was lawful.(6)

In August 1984, the Electric Utility Commission of the City of Austin, Texas, requested Electric Utility Department staff to study the possibility of increased hookup fees designed to help new customers pay a fair share of the rapid system growth by tying the fee to the level of building consumption and the city's new home energy rating system.(7) In June 1985, the Austin City Council approved an increase in residential and commercial hookup fees to pay for the new transformer. The old fees only paid for the meter and service drop. Residential fees increased from $250 to $400 for the lowest level of demand and from $600 to $1,200 for the highest demand. The maximum commercial fee jumped from $6,435 to $34,120. The new fee structure is expected to raise $15 million in FY86 and require that new commercial customers pay 100 percent of the hookup cost. Austin's fee structure stops at the transformer and does not extend to the distribution and generation system as a CRF would.(8)

POTENTIAL IMPLEMENTATION PROBLEMS

Several potential problems arise when designing a CRF that is simple, justifiable, and does not unduly discriminate among existing and new customers. Some of the major problems are:

- insuring that an involuntary contribution of capital to an investor-owned utility through a CRF does not violate constitutional guarantees against undue discrimination,
- preventing a windfall profit to owners of existing, inefficient buildings after CRFs are imposed on all new units,
- controlling administrative costs while identifying which new customers are causing the increase in demand (2),
- determining accurately the amount of new, connected load upon which a variable rate CRF can be applied,
- discriminating against large buildings versus small buildings, and
- conveying a "no growth" signal to new industry and commerce.

Solving the administrative and equity issues will determine the ultimate potential to be gained through applying CRF's to buildings at the time of new service.

CONCLUSION

We presently live in an age of expensive new electric generating plants and relatively cheap efficiency. The potential for deferring new electric plants through the charging of Capital Recovery Fees to all new residential and commercial buildings is significant. Adoption of a CRF could potentially defer up to 4.5 new 500 MW generating plants in Texas over the next ten years. The long-term economic benefits to the end-consumer and utility would far exceed the implementation difficulties.

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