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APR 11 1975

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SUGGESTIONS ON RESPONSE TO COMMENTS ON WPPSS1 AND 4 DES NEED FOR POWER SECTION 460/513

The enclosed represents a uraft of suggested staff response to comments on the WPPS 1aand 4 DES. The suggested response material uses service area specific information contained in the draft supplemental testimony of Dr. Connor of Argonne. Presumably, the enclosed could be adopted by him in preparation of supplemental testimony. The approach taken is reasonably generic and is quite similar to that used in responding to EDG comments on the Douglas Point DES. The additional material was prepared by D. Rathbun.

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Attachment 1

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ATTACHMENT 1

(For WNP-1 and WNP-4)

REASONABLENESS OF WGF FORCASTS

In the opinion of the staff, the WGF forecast is adequate for four reasons. First, the Loads and Resources Subcommittee of the PNUCC (which prepares the WGF) is an experienced group in forecasting electrical energy and load demand in the Pacific Northwest. Secondly, the forecasting accuracy of the WGF has been good over the period 1958-59 through 1972-73. During this period, the annual average-load forecasts and the percent deviation of the actual from the forecast are shown in Table 1 (which appears in the DES and FES as Table 8.2). Third, statistical analysis of these data with the results given in Table 2 (Table 8.3 of the DES and FES) was prepared by the staff. According to those results, the root-mean-square error per year of forecast lead time is of the order of one percent per year. Forecasting error was somewhat larger for short-term forecasts. However, the staff notes that forecasting error was smaller for long-term forecasts. The longer-term forecasts have typically been underestimated, as shown by the "mean error" column of Table 2. Since the average annual growth rate over the period was about 6.7 percent, the forecast annual-average load value occurred no more than a year earlier or later than initially predicted. Last, the data used by WGF in preparing an energy and load forecast for the WPPS service area includes factors considered to be

important in determining future loads by the Federal Power Commission (FPC).[1] The forecasting methodology employed by WGF in preparing an energy and peak load forecast is consistent with the current forecasting methods reviewed by the FPC in the National Power Survey.[2]

In addition, the staff makes the following observation concerning electrical demand forecasting. Long run forecasting of electrical energy demand and associated growth in peak load may proceed by either projecting the electrical load parameters directly or more indirectly, based upon economic theory, relate the economic determinants of electrical energy demand and project the determinants forward in order to estimate future electrical energy demand. With regard to long run forecasting of electrical energy demand, there is no a priori reason to believe that the indirect methodology described above will be any more accurate than the direct methodology most commonly employed by electric utilities.

With regard to forecasting methodology, a survey of twenty-eight environmental reports from different utilities indicates that a variety of different forecasting methodologies are currently employed by electric utilities. Most commonly, utilities including WPPS prepare a forecast from a broad data base which includes information obtained from builders, developers, local government planning agencies, trends in sales of appliances, and so forth. Knowledge of new industrial and commercial loads is typically acquired through contact

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[1] Federal Power Commission, 1970 National Power Survey (Washington: Government Printing Office), Chapter 4, Volume IV, pp. 31-34.

[2] Federal Power Commission, 1970 National Power Survey (Washington: Government Printing Office), Chapter 5, Volume IV, Current Forecasting Methods, pp. 35-44.

with current or prospective customers. Significant portions of the input to the preparation of the load forecast are judgmental and not subject to straightforward quantification.

None of the environmental reports surveyed above indicated that the electric utility had prepared its service area load forecast on the basis of an econometric model. Thus, it does not appear that sufficient operational experience has been gained with this forecasting methodology in order to validate its accuracy or reliability versus alternative forecasting methodologies currently employed by utilities.

For the reasons cited above, the staff concludes that the forecasting methodology prepared by WGF for the WPPS constitutes a reasonable approach consistent with the state of the art practiced by other utilities in long range planning of additional generating capacity.

FINANCING AND OWNERSHIP OF WNP-4

With respect to the question of how the higher generating costs of thermal plants (relative to existing hydro plants) will be transferred to consumers, WNP-1 costs will in effect be assumed by Bonneville Power Administration (BPA) via "net billing" of consumer-owned utilities and exchange agreements with the investor-owned utility participants. The increased cost incurred by BPA will presumably be reflected in BPA wholesale rates with a resulting increase in average cost of energy to BPA customers. The industrial BPA customers will

transfer the cost to ultimate consumer via rate increases. The financing and ownership of WNP-4 are not yet resolved. However, it appears probable that the Applicant will need to have firm contracts from utilities to purchase the WNP-4 output at cost before financing can be arranged. The resulting cost to the utilities can be expected to reach ultimate consumers via rate increases. The rate increases referred to here are general increases. Although changes in rate structures may also occur (e.g., penalties rather than discounts for increased consumption), the staff sees no logical coupling between the two different types of rate changes.

STUDIES OF ELECTRICITY PRICE RESPONSIVENESS

With regard to the impact of electricity price on demand, a review of a number of articles and reports concerned with econometric analyses of electricity demand indicates that electricity price has been shown in most

studies to be a significant determinant of electricity demand.[1-8] However, electricity price elasticities or substitute energy price cross elasticities statistically estimated using either current or historical data may not accurately characterize the nature of the future market for electricity. Furthermore, if it were accepted that good predictions of future consumer price responsiveness could be made, an accurate forecast must be made of the future real prices of both electricity and substitute energy.

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[1] K. P. Anerson, Residential Energy Use: An Econometric Analysis (Rand: Santa Monico, California, R-129-NSF. October, 1973).

[2] J. G. Asbury, The Econometric Approach to Electricity Supply and Demand: Review and Analysis (Argonne, Illinois: Argonne National Laboratory, May, 1974).

[3] R. E. Baxter and R. Rees, "Analysis of the Industrial Demand for Electricity," The Economic Journal, June, 1968, pp. 277-298.

[4] D. Chapman, T. Mount, T. Tyrrell, Electricity Demand in the United States: An Econometric Analysis. (Oak Ridge, Tennessee: Oak Ridge National Laboratory, June, 1973).

[5] F. M. Fisher and C. Kaysen, The Demand for Electricity in the United States (Amsterdam: North-Holland Publishing Company, 1962).

[6] R. Halvorsen, "Residential Electricity: Supply and Demand," Sierra Club Conference on Power and Public Policy, Johnson City, Vermont, January 14-15, 1972.

[7] Phyllis H. Kline, Forecasts of Electric Energy and Demand to the Year 2000, A Report by the Task Force Review to the Technical Advisory Committee on Power Supply.

[8] J. W. Wilson, "Residential Demand for Electricity," Quarterly Review of Economics and Business, Spring, 1971, pp. 7-22.

For instance, the substitute energy form for electrical energy most commonly used in econometric measurements of electricity demand is natural gas. Energy substitution between natural gas and electricity is particularly important in the WPPS service area for water and space heating applications. The substitutability between energy sources is dependent upon, among other things, the availability of the energy sources such as electricity and natural gas at market prices. If increased supplies of an energy resource such as natural gas are not available to meet increased demand, a significant portion of the excess energy demand may be shifted to electrical or other alternative energy source.

The staff notes a moratorium on gas connections to new residential, commercial, or industrial customers could be a substantial stimulant to electrical demand. Furthermore, there is significant uncertainty regarding the long term availability of natural gas. There is limited historical experience with this condition in the energy markets of inelastic substitute energy (gas) supply coupled with regulated prices for gas and electricity.

The staff concludes that this condition could reduce the validity of the statistical estimation of own price and cross-price elasticities cited above made in time periods when adequate natural gas supplies were available.

IMPLEMENTING PEAK LOAD PRICING OR TIME OF DAY METERING TO REDUCE PEAK LOADS

A review of the daily peak load demands for the WPPS system shows that the highest peaks occur during the week, (exclusive of holidays), the peak demands are reduced on Saturday, and the lowest peak demand occurs on Sunday. Generating requirements are also less on holidays than during the week and load requirements are less at night than during the day. With peak load pricing, the WPPS electricity users during times of peak use (on a daily basis) are billed at a higher rate to more accurately reflect the higher marginal cost of producing the peak power. The costs of supplying energy at peak periods are higher because high variable cost-low capital costs units (oil, combustion turbine) are used. The base and intermediate load portion of the load is supplied, in general, by high capital, low-cost variable cost generating units (such as nuclear) which operate at higher rates of annual utilization to spread the capital cost over a great many megawatt hours of annual generation. In order to register consumption at different times by electricity users, an additional metering arrangement is typically required.

The effectiveness of peak load pricing as a mechanism for reducing system load peaks depends to a large extent upon the price elasticity of demand for use of the appliance or other load types causing the peaks. For example, the electricity demand for either air conditioning or space heating may turn out to be very unresponsive to price changes, and may

depend instead principally on outside temperature. In order to make correct estimates of this elasticity, it would be necessary to disaggregate load data and identify the fraction of the load attributable to space conditioning.

Furthermore, to the extent that peaks were flattened, the base or intermediate load requirements may reasonably be expected to rise as the system load factor increases. In theoretical terms, this substitution may be discussed in terms of the cross price elasticity of demand which relates system off-peak electrical energy use to electricity price at the time of system peak. If peak load pricing were implemented, the rate of growth of WPPS system peaks might be reduced. However, improvement in the system load factor might increase the race of growth of generating requirements for base and intermediate load.

Economic theory indicates that implementation of substantial revisions in rate structure such as peak load pricing could result in some changes in the pattern and growth of electricity demand. The body of literature on quantitative demand analysis for the electricity market does not address the effects of rate structure changes per se although price responsiveness by electricity consumers is generally indicated. Other authors have discussed the potential consequences in theoretical terms of rate structure changes upon demand for electricity. However, a review.

of the literature on this subject[1-8] does not indicate a commonly agreed upon methodology by economists which the staff could use to estimate devoid of substantial speculation what effect peak load pricing would have upon projected electricity demand within the WPPS service area. A primary data deficiency is that peak load pricing is not in widespread use in the United States. Consequently, there is currently insufficient information for quantitatively assessing how this measure would affect service area load growth for a utility such as WPPS.

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[1] P. O. Steiner, "Peak Load and Efficient Pricing", Quarterly Journal of Economics 71 (1957): pp. 585-610.

[2] O. E. Williamson, "Peak Load Pricing and Optimal Capacity", American Economic Review 56 (1966): p. 810.

[3] H. Mohring, "The Peak Load Problem with Increasing Returns and Pricing Constraints", American Economic Review, September, 1970, pp. 693-705.

[4] R. Turvey, "Marginal Cost Pricing in Practice", Economics 31 (1964): pp. 426-432.

[5] R. Turvey, "Marginal Cost", The Economic Journal 79 (1969): pp. 282-299.

[6] R. Turvey, Optimal Pricing and Investment in Electricity Supply (Cambridge, Mass, MIT PRess), 1969.
R. Turvey, "Peak Load Pricing", Journal of Political Economy 76 (1968): pp. 101-113.

[7] M. Boiteux, "Peak Load Pricing", Journal of Business, April, 1960: pp. 1550179.

[8] H. S. Houthaker, "Electricity Tariffs in Theory and Practice", Economic Journal, March, 1951, pp. 1-25.

In addition, the staff notes that neither the Applicant nor NRC has any authority to alter the rate design by which electrical energy produced by WNP-1 and WNP-4 is sold to ultimate consumers. Utilities such as WPPS themselves would generally not be able to implement rate re-design measures without a specific legislative authorization since serious questions of equity among electricity customers and stockholders of the utility would arise. Such questions would arise because utilities are in general required to sell electric energy on a cost of service basis by state regulation of the utility and by the franchise area charter. Any subsidy to one group of customers must be balanced by increased cost to others. The cost includes a fair return on stock-holders equity.