BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 080677-EI
FLORIDA POWER & LIGHT COMPANY

IN RE: PETITION FOR RATE INCREASE BY FLORIDA POWER & LIGHT COMPANY

TESTIMONY & EXHIBITS OF:

PHILIP Q HANSER

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

FLORIDA POWER & LIGHT COMPANY

DIRECT TESTIMONY OF PHILIP Q HANSER

DOCKET NO. 080677-EI

Q. Please state your name and business address.

A. My name is Philip Q Hanser. My business address is *The Brattle Group*, 44 Brattle Street, Cambridge, MA 02138.

Q. By whom are you employed and what is your position?

A. I am a Principal of *The Brattle Group*, an economic and management consulting firm with offices in Cambridge, Massachusetts; Washington, D.C.; San Francisco, California; London, England; and Brussels, Belgium.

Q. Please describe your educational background and professional experience.

A. I hold an A.B. in Economics and Mathematics from The Florida State University and a Phil.M. in Economics and Mathematical Statistics from Columbia University. I completed the Ph.D. candidacy requirements in Economics and Mathematical Statistics at Columbia University. I have been a Principal at *The Brattle Group* in its Cambridge office for the last ten years and have over 25 years of experience in the electric power industry. I have worked for major utilities in North America on topics related to load forecasting and weather normalization. I have testified previously before the Federal Energy Regulatory Commission and various state public utility

commissions, as well as in federal and state courts, as an expert witness. My statement of qualifications, including testimony I have given over the past fifteen years, is attached as Exhibit PQH-1.

Q. On whose behalf are you testifying?

A. I am testifying on behalf of Florida Power & Light Company ("FPL" or the "Company").

Q. Are you sponsoring any exhibits in this case?

A. Yes. I am sponsoring the following exhibits:

- PQH-1– Statement of Qualifications
- PQH-2– FPL's Monthly NEL and Total Customer Model Descriptions

Q. Are you sponsoring or co-sponsoring any Minimum Filing Requirements in this case?

A. No.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to provide an expert opinion on the reasonableness of: (i) FPL's total customer and monthly net energy for load (NEL) forecasting models; (ii) inputs used in these forecasting models; (iii) adjustments made to the forecasting models; and (iv) FPL's overall forecasting approach for forecasting monthly NEL and total customers.

Q. Please summarize your testimony.

A. Based on my extensive review of FPL's models, assumptions, and outputs, I have concluded that the overall approach used by the Company to prepare its

forecast of monthly NEL and total customers is reasonable. Specifically, I have found that:

i. FPL's total customer and monthly NEL models are statistically and economically valid with strong predictive capabilities;

ii. The models use valid and accurately constructed inputs based on sound assumptions; and

iii. Adjustments made to the model predictions are reasonable and improve the accuracy of the forecasts.

In terms of the last point, FPL has appropriately addressed the current industry-wide phenomenon of over-forecasting by adjusting the results of its monthly NEL model. These adjustments improve the overall accuracy of the NEL forecast and are consistent with sound forecasting methods. Absent these adjustments, the forecasted level of NEL would likely be over-stated.

Q. Were you able to replicate FPL's monthly NEL and total customer models?

A. Yes. I re-estimated FPL's monthly NEL and total customer models using the underlying data provided by FPL and replicated the parameters of FPL's monthly NEL and total customer models.

Q. Were you able to replicate FPL's monthly NEL and total customer forecasts?

A. Yes. Using FPL's monthly NEL and total customer models, drivers of the models for the forecasting period and adjustment factors as provided by FPL, I successfully replicated FPL's monthly NEL and total customer forecasts.

Q. Why did you start your review of FPL's monthly NEL and total customer models by replicating the models and the forecasts generated by these models?

A. Replication is a key step in reviewing any quantitative analysis, including forecasting. My ability to replicate FPL's monthly NEL and total customer models as well as the forecasts allows me to conclude that these models and forecasts are transparent, reproducible, and free from computational errors.

TOTAL CUSTOMER AND MONTHLY NEL FORECASTING MODELS

Q. Please describe the total customer forecasting model.

A. The term "total customers" is defined as the average monthly number of total FPL customers. The total customer forecasting model is a monthly statistical regression model that explains the total number of customers using as variables an intercept term, Florida's monthly population, and several indicator variables for the months of the year to capture the seasonal variation in the number of customers. Due to the time-series nature of the data and the potential correlation in residual terms, the model also includes an autoregressive error term lagged one month and a seasonal multiplicative autoregressive error term lagged 12 months. Total customers is primarily driven by Florida's population. This model is estimated using data starting in January 1990 and extending through October 2008. Exhibit PQH-2 provides the econometric specification of the total customer model.

Q. Please describe FPL's monthly NEL forecasting model.

A. NEL refers to FPL's total generation net of plant use. The monthly NEL forecasting model is also a statistical regression model that explains the "NEL per customer" using as variables an intercept term, the real price of electricity, heating degree-hours, cooling degree-hours, Florida real household disposable income, an indicator variable for February, and another indicator variable for March 2003. The model also includes an autoregressive error term lagged one month in order to address the correlation of residual errors over time. This model is estimated using the data starting in January 1998 and extending through October 2008. Exhibit PQH-2 provides the econometric specification of the monthly NEL model.

VALIDATION OF THE INPUTS TO THE MONTHLY NEL AND TOTAL CUSTOMER MODELS

Q. Please describe the development of the actual variables used in the estimation of the monthly NEL and total customer models.

A. As described below, the variables used in the monthly NEL and total customer models are either obtained from outside sources or developed from other variables as follows:

i. The Florida Population series is obtained from the University of Florida's Bureau of Economic & Business Research (BEBR). The annual population series is converted into a monthly series. The

annual population numbers provided by University of Florida are as of April of each year, therefore interpolations are made from April of one year to April of the next year.

ii. The NEL per customer series is constructed in two steps. First, the observed NEL data are adjusted upwards for hurricane impacts. Then, the adjusted NEL data are divided by the number of total customers to obtain NEL per customer (in MWh per customer).

iii. The real price of electricity is constructed in the following steps. In the first step, the system price of electricity, which is provided by FPL, is divided by the Consumer Price Index (CPI). Next, twelve month moving averages of the real prices are calculated to obtain the real price of electricity used in the monthly NEL models.

iv. Heating degree-hours are calculated by subtracting the observed hourly composite temperature across FPL's service territory from a base temperature of 66° (negative values are ignored). The heating degree-hours are then summed together for the day and divided by twenty four to obtain daily heating degree-hours, which are then summed for the given month to obtain a monthly value.

v. Cooling degree-hours are calculated by subtracting a base temperature of 72° from the actual hourly composite temperature across FPL's service territory (negative values are ignored). The cooling degree-hours are then summed for the entire day and divided by twenty four

to obtain daily average cooling degree-hours, which are then summed for the given month to obtain a monthly value.

vi. Florida real household disposable income (in 2000 dollars) is defined as total personal income less income taxes, adjusted for inflation and divided by the total number of households. This series is provided by Global Insight, a well-known economic forecasting firm.

Q. Were you able to reconstruct the actual variables used in the estimation of the monthly NEL and total customer models from the underlying raw data?

A. Yes. I have successfully replicated the actual variables used in the estimation of the monthly NEL and total customer models from the underlying raw data provided by FPL.

Q. Are these variables constructed accurately from the underlying raw data and based on sound assumptions?

A. Yes. The underlying raw data used to construct these variables are developed by FPL and other reputable organizations such as Global Insights and ITRON Inc., a well-known provider of utility forecasting software and services. My review and subsequent reconstruction of model variables show that they are constructed accurately from the underlying raw data and are based on sound assumptions.

Q. Is there sufficient variation in the variables used to estimate these models?

A. Yes. All variables used in the estimation of monthly NEL and total customer models exhibit substantial variation on both a month to month and year to year basis. This variation permits the identification of the relationship between the dependent variables (monthly NEL per customer and total customers) and their respective independent variables, and enhances the precision with which the relationship can be estimated.

Q. Please describe the development of the forecast variables used in the forecasts of the monthly NEL and total customer levels.

A. In order to forecast the monthly NEL per customer and total customer values from the estimated equations, one needs to have forecasts of the explanatory, or independent, variables. In the FPL models, the forecast period starts in January 2009 and extends through December 2011. Development of the forecasted explanatory variables are described below:

i. The Florida annual population forecasts are provided by University of Florida BEBR and converted into monthly values using the method described above.

ii. The real price of electricity forecasts are developed using FPL's system price of electricity and CPI forecasts. The CPI forecasts are based on the average of Global Insight's trend and pessimistic CPI scenarios.

iii. The heating degree-hour forecasts are based on the average monthly heating degree-hour values from 1988 through 2007.

iv. The cooling degree-hour forecasts are based on the average monthly cooling degree-hour values from 1988 through 2007.

v. The Florida real household disposable income forecasts are based on Global Insight's forecasts. FPL also examined the prior history of real household disposable income, especially the 1973 through 1976 recession period. FPL established an analogy between the 1973 - 1976 recession and the current recession and forecasts the real household disposable income using growth rates based on this analogy.

Q. Were you able to replicate the forecasted variables used in the forecasts of the monthly NEL and total customers?

A. Yes. I have successfully replicated the forecasted variables used in the forecasts of the monthly NEL and total customer models using the data provided by FPL.

Q. How were you able to replicate the forecasted variables?

A. I reconstructed the forecasts of these variables using the methodology described and the underlying data provided by FPL.

Q. What is the significance of being able to replicate these variables?

A. The forecasted variables are the drivers of FPL's monthly NEL and total customer forecasts. By replicating these variables, I verify that the variables driving the forecasts are transparent, reproducible and are not prone to computational errors.

Q. Are these variables forecasted reasonably and accurately from the underlying data?

A. Yes. My review and subsequent reconstruction of these variables show that they are forecasted accurately under a reasonable set of assumptions.

ASSESSMENT OF THE MONTHLY NEL AND TOTAL CUSTOMER MODELS

Q. Is FPL's total customer forecasting model reasonable?

A. Yes. All of the estimated coefficients from the model have the expected signs. All coefficients except for the constant term are statistically significant at least at the five percent level. The Florida population variable has a positive and significant coefficient which implies that the total number of customers increases with the increase in the Florida population. The adjusted R-squared from the regression is 0.99, which implies that the model successfully explains 99 percent of the variation in the dependent variable, *i.e.*, total number of customers. The Durbin-Watson (DW) test statistic indicates whether the autocorrelation in the residuals has been successfully removed by the inclusion of the autoregressive terms. Although the DW statistic of 1.61 implies that there is potentially some residual autocorrelation remaining in the error terms this is not an issue given the strong significance of all the coefficients.

Q. What measure do you rely on to assess the predictive power of the FPL monthly NEL and total customer models?

A. In order to assess the predictive power of the FPL forecasting model, we calculate a statistic called the mean absolute percentage error (MAPE). MAPE is a standard measure of accuracy in time series regressions and shows the average absolute percentage error that could not be explained by the model. The smaller the MAPE value, the more powerful the forecasting model. It is possible to calculate two types of MAPE values in a forecasting setting. The first is called an "in-sample MAPE" which is based on estimating the regression model over the entire sample period and calculating the MAPE over the same period. The other is called an "out-of-sample MAPE" and it is based on estimating the regression model on a portion of the full sample period and using the remaining portion of the sample to calculate the MAPE value.

Q. Does FPL's total customer forecasting model generate reasonable predictions?

A. Yes. I have calculated in-sample and out-of-sample MAPE values for the FPL's total customer forecasts. I calculated the in-sample MAPE as 0.07 percent by estimating the model and determining the percentage errors over the January 1990 through October 2008 period. I calculated the out-of-sample MAPE as 0.20 percent by estimating the model over the January 1990 through December 2006 period and determining the percentage errors over the January

2007 through October 2008 period. Both MAPE values are very small and indicate that FPL's total customer model generates precise predictions.

Q. Is FPL's monthly NEL forecasting model reasonable?

A. Yes. All of the estimated coefficients from FPL's monthly NEL forecasting model are statistically significant and have signs consistent with economic theory. The coefficient of the real household disposable income variable is statistically significant and has a positive sign which implies that the NEL per customer increases with increases in real household disposable income. The heating degree-hour variable has a positive and significant coefficient. The colder the weather, the greater the load, most likely from customers' use of electric heating, which yields higher NEL per customer. The cooling degree-hour variable also has a positive and significant coefficient implying that warmer weather increases FPL's load, most likely from customers' air conditioning use. The real price of electricity has a negative and significant coefficient which implies that the NEL per customer falls as the real price of electricity increases. The indicator variable for February is negative and significant. This is expected since the NEL is lower as a result of February having fewer days. Finally, the indicator variable for March 2003 is positive and significant and captures a one time surge in the load that was experienced in March 2003. The adjusted R-squared from the regression is 0.98 which implies that the model successfully explains 98 percent of the variation in the dependent variable, *i.e.*, NEL per customer. The DW statistic is 2.17 and

implies that inclusion of the AR (1) term has addressed any issue of autocorrelation in the error terms.

Q. Does FPL's monthly NEL forecasting model generate reasonable predictions?

A. Yes. My assessment of the predictive power of FPL's monthly NEL forecasting model is based upon calculating in-sample and out-of-sample MAPE statistics of the model's forecasts for the historical period over which it was estimated.

Q. What is the in-sample MAPE statistic calculated for FPL's monthly NEL forecasting model?

A. I calculated the in-sample MAPE as 1.75 percent by estimating the model and determining the percentage errors over the January 1998 through October 2008 period.

Q. What is the out-of-sample MAPE statistic calculated for FPL's monthly NEL forecasting model?

A. I calculated the out-of-sample MAPE as 3.73 percent by estimating the model over the January 1998 through December 2006 period and determining the percentage errors over the January 2007 through October 2008 period.

Q. What do these in-sample and out-of-sample MAPE statistics indicate about the model?

A. Both of these MAPE values are small and within the acceptable limits to deem a forecasting model to be a reliable forecasting model. The deviations of the

predicted values from the actual values expressed as percentages of the actual values are lower than six percent in absolute terms in all cases.

Q. Do you expect the MAPE statistics to differ between the total customer and NEL models?

A. Yes, I do expect the MAPE statistics to be different because the variables that are being forecast in the two models differ substantially in their potential to vary from month to month. As noted above, the total customer variable is driven by Florida population which, although it exhibits some month to month variation, is nonetheless quite stable in its trend. On the other hand, NEL per customer is affected by factors such as weather which exhibit substantial variability.

Q. Do you observe an over-forecasting tendency in FPL's monthly NEL forecasting model?

A. Yes. Starting in March 2008, the NEL per customer predictions from FPL's monthly NEL forecasting model are above the actual values of NEL per customer. I use the mean percentage error (MPE), which is a measure of bias in the forecasts to gauge the over-forecasting phenomenon in the NEL model. MPE takes the average of all percentage errors for a given forecast period. Because there are negative and positive percentage errors, this procedure allows cancelling out of the errors. MPE calculated over the January 1998 through October 2008 period is -0.04 percent which is very close to zero and indicates no overall bias. When MPE is calculated over the January 1998 through February 2008 period, the value of MPE is 0.16 percent which is

again small and indicates no overall bias. However, when MPE is calculated for the March 2008 through October 2008 period, the MPE is -3.08 percent which is still small, but definitely non-zero. Therefore, I conclude that FPL's monthly NEL model begins to over-forecast starting in early 2008.

Q. Is the over-forecasting phenomenon unique to FPL's monthly NEL models?

A. Absolutely not. In fact, recently more and more utilities are experiencing this over-forecasting phenomenon. This issue is being widely discussed. The article in the November 21, 2008 issue of the Wall Street Journal titled "Surprise Drop in Power Delivers Jolt to Utilities" discusses the recent declines in electricity sales experienced by Xcel Energy Inc, Duke Energy Corp. and American Electric Power Co.

Q. What are the causes of this phenomenon?

A. This phenomenon arises because econometric models used to forecast the future are, by necessity and construction, based on historic data. The most recent history is a substantial departure from the past. For example, the recent sudden and relatively precipitous change in economic conditions is largely not observed in the historical period upon which the model is based. Indeed, it appears that such economic changes have not been generally seen for three decades. Extending the model's historical data basis back that far would not likely improve the model's forecasting capability because since that time numerous changes have taken place in how FPL's customers use energy. In addition, there are other factors which contribute to this phenomenon, such as

changes in federally mandated efficiency standards, for which there is minimal history and whose impacts, by legislative mandate, will likely increase over time.

Q. Are there ways to address the over-forecasting phenomenon?

A. Yes. Two techniques are used and accepted. One technique is to introduce an explanatory variable. In some cases, this technique may suffice to correct for the over-forecasting phenomenon. The alternative technique is to introduce appropriate ex-post adjustments to the predictions to correct for the over-forecasting.

Q. Does FPL's forecast address this over-forecasting phenomenon?

A. Yes. FPL addresses the over-forecasting phenomenon using ex post adjustments that reduce the forecasted NEL values from the monthly NEL models. Development and implementation of these adjustments are described in the next section.

ADJUSTMENTS TO THE MONTHLY NEL PREDICTIONS

Q. What adjustments does FPL make to the forecasts generated by the monthly NEL models?

A. FPL makes four adjustments to the forecasts generated by the monthly NEL model to obtain the final NEL forecasts. First, FPL adjusts the NEL model predictions for incremental energy impacts expected to result from federally mandated efficiency standards, such as those from the Energy Policy Act of

2005 (EPACT) and the Energy Independence and Security Act of 2007 (EISA), as well as those from the increased adoption of compact fluorescent lamps. The second is a re-anchoring adjustment, which adjusts for the average level of over-forecasting in 2008. Third, FPL adjusts its forecast for recent unusual levels of minimal usage customers which has exacerbated the trend in over-forecasting. Finally, the forecast is adjusted for two wholesale contracts which are not included in the NEL forecast. These adjustments are all appropriate forms of ex-post forecasting adjustments to produce a more accurate and unbiased forecast. Each is discussed further below.

Q. Please describe how FPL implements these adjustments to the NEL forecasts.

A. FPL implemented the adjustments to the NEL forecasts following the steps below:

i. FPL calculates the NEL forecast multiplying the predicted NEL per customer from the NEL forecasting model by the total customer forecast from the total customer forecasting model.

ii. Next, the re-anchoring adjustment is made. The NEL 2008 model forecast is adjusted by the incremental energy efficiency impacts, and the Seminole contract. The resulting 2008 forecasts are then used to determine by how much the model should be re-anchored to the 2008 actual values.

iii. Starting in 2009, the NEL per customer forecasts from the model are multiplied by the total customer forecasts and then adjusted downward by the re-anchoring and minimal usage customer adjustment factors.

iv. The resulting forecasts from these adjustments are then further adjusted by the estimates of energy efficiency impacts, the Lee County contract, and Seminole contract, to obtain the final NEL forecasts.

Q. How does FPL adjust its forecast for federally mandated energy efficiency standards?

A. FPL adjusts the NEL model predictions for impacts expected to result from federally mandated energy efficiency standards, such as those from EPACT and EISA, as well as those from the increased adoption of compact fluorescent lamps because these impacts are not fully embedded in the historic data. As a result, predictions from the NEL model do not incorporate the incremental energy impacts brought about by the annual change in the appliance stock due to these federal energy efficiency standards. FPL uses energy impact estimates provided by ITRON to reduce the NEL predicted by the forecasting model.

Q. How does FPL perform its re-anchoring adjustment?

A. For each month in 2008, FPL calculates the percentage difference between the actual NEL and the predicted NEL accounting for the incremental energy efficiency impacts, and Seminole contract. On average, predicted load is 1.29 percent higher than the actual load after these adjustments. Therefore, FPL

adjusts the NEL forecasts downward by 1.29 percent starting in January 2009, thus, re-anchoring the base from which the forecast is calculated.

Q. How does FPL adjust for the unusual level of minimal usage customers in its service territory?

A. FPL adjusts the NEL forecasts to address the unusual increase in the number of minimal usage customers in its service territory. A minimal usage customer is defined as a residential customer whose monthly usage is between 1 kWh and 200 kWh. While there have always been minimal usage customers in FPL's service territory, the number of such customers has increased noticeably through the end of 2008 and that trend is expected to continue going forward for at least the next two years. As a result, FPL adjusts the NEL forecasts downward by 0.9 percent, 1.1 percent, and 0.55 percent in 2009, 2010, and 2011, respectively. FPL developed these minimal usage customer adjustment factors based on the deviations of projected minimal usage customer ratios from the historic average of seven percent. The steps for these calculations are:

i. Using the billing data, FPL determines the number of minimal usage customers as a percentage of the total number of residential customers by month.

ii. FPL extrapolates these ratios for 2009 and 2010 and then calculates the deviations of these ratios from the historic average of seven percent.

iii. Next, using the total number of residential customers in 2009 and 2010 and the ratios calculated in (ii), the increase in the number of minimal usage customers in 2009 and 2010 is calculated.

iv. Multiplying the increase in the minimal usage customers by the annual consumption of an average customer, FPL finds the average sales lost as a result of the increase in the number of minimal usage customers.

v. Finally, the reduction in sales due to the increased number of minimal usage customers is calculated as the ratio of the total forecasted billed sales in 2009 and 2010. These ratios yield the minimal usage customer adjustment factors that are used to adjust the monthly NEL forecast. The adjustment factor for 2011 is half of the 2010 value.

Q. How does FPL adjust its forecasts for wholesale contracts?

A. FPL makes adjustments to its NEL forecasts for two new wholesale contracts:

i. The first contract is a partial requirements service contract with Lee County Electric Cooperative (LCEC) which will start in 2010 and extend through 2011. FPL increases its NEL forecast by the amount of the projected service that will be required by LCEC. The LCEC average monthly requirement is projected to be 102,362 MWh in 2010 and 103,642 MWh in 2011. That forecast was provided by FPL.

ii. The second contract is a power sale contract to Seminole Electric Cooperative which has started in December 2008 and will extend through December 2009. FPL increases its NEL forecast by 10,390 MWh on average over the course of this period to reflect the projected

energy sold to Seminole. FPL provided the information for this estimate.

Q. Are adjustments standard in the load forecast practice?

A. Yes. Adjusting statistical forecasts is a standard way forecasters incorporate new information into the forecasting process. Integration of the new information increases the accuracy of the forecasts if implemented appropriately.

Q. Were the adjustments FPL made appropriate?

A. Yes. Each of these adjustments has a separate basis for appropriateness which I discuss below.

Q. Why was the federally mandated energy efficiency adjustment appropriate?

A. FPL models were estimated using historical data which do not incorporate incremental energy impacts expected to be realized in the forecasting period. For that reason, FPL used the energy efficiency impacts provided by ITRON to account for these incremental impacts outside of the model. As a result of my review of the ITRON estimates, I conclude that these estimates introduce reasonable monthly energy efficiency impacts. Moreover, ITRON's average efficiency impacts are comparable to other independent estimates of energy efficiency impacts from the federally mandated efficiency standards such as the American Council for an Energy Efficient Economy (ACEEE).

Q. Why was the re-anchoring adjustment appropriate?

A. As noted earlier in my testimony, beginning in March 2008, FPL's monthly NEL forecasting model consistently over-forecasts the monthly NEL per customer. Thus, FPL adjusted the forecasts to mitigate this tendency of the model, in essence, re-anchoring the place from which the model begins its forecast. If the model had not exhibited such a tendency in a consistent way, this re-anchoring would not have been deemed appropriate. As described earlier in my testimony, FPL calculates the average deviation of the forecasts from the observed values in 2008 as 1.29 percent and re-anchors the forecasts for 2009, 2010, and 2011 using this number. This approach is appropriate as it incorporates the most recent full-year historic information on FPL's monthly NEL model over-forecasting tendency. I note that the effect of this is to essentially shift the forecast downward by this factor, but it does not affect the overall trend of the forecast.

Q. Why was the minimal usage customer adjustment appropriate?

A. FPL has detected a noticeable increase in the number of minimal usage customers through the end of 2008. However, FPL model predictions would not reflect the impacts of the increasing trend in the minimal usage customers as the models are estimated using the historic data which has little history of such a behavior. For that reason, FPL adjusted the forecasts for the impact of the increasing number of minimal usage customers outside of the model. As discussed earlier in my testimony, FPL utilized the billing data to trace the changes in the number of minimal usage customers and to infer the impact of

the increase in the number of minimal usage customers on the monthly NEL. This is an appropriate adjustment for incorporating new developments to the forecasts that would otherwise be excluded.

Q. Why were the Lee County and Seminole contract adjustments appropriate?

A. These are known contracted loads and are not forecasted by FPL's model. Therefore, they should be accounted for outside of the model through an ex-post adjustment that FPL has made. These adjustments are appropriate as the contracted loads are not incorporated in the NEL model, but would certainly affect the overall level of monthly NEL.

Q. Please summarize your review of FPL's forecasting models.

A. FPL's models are reasonably constructed and estimated and perform well for the period over which they were estimated. FPL has appropriately addressed any factors that would adversely affect the quality of the forecast and which could not be accounted for solely in the estimated models.

Q. Does this conclude your direct testimony?

A. Yes.

PHILIP Q HANSER **Principal**

Philip Q Hanser is a principal of *The Brattle Group* and has over twenty-five years of consulting and litigation experience in the energy industry. His expertise includes issues ranging from industry structure, market power and associated regulatory questions, to specific operational and strategic questions such as transmission pricing, generation planning, tariff strategies, fuels procurement, environmental issues, forecasting, demand-side management, and other management and financial issues. He has supported clients' efforts in insurance recovery of environmental liabilities arising from former manufactured gas plant sites, assessed liability risk in mass tort suits, and designed statistical database auditing procedures.

He has appeared as an expert witness before the U.S. Federal Energy Regulatory Commission (FERC), the California Energy Commission (CEC), the New Mexico Public Service Commission (NMPSC), the Public Service Commission of Wisconsin (PSCW), the Vermont Public Service Board (VPSB), the Public Utilities Commission of Nevada (PUCN), the Connecticut Siting Commission, the Pennsylvania Department of Environmental Protection, before arbitration panels, and in Federal and state courts. He served for six years on the American Statistical Association's Advisory Committee to the Energy Information Administration (EIA). He serves on CIGRE's (Conseil International des Grands Reseaux Electriques) Working Group C5-8, Working Group on Renewables and Energy Efficiency in a Deregulated Market. Prior to joining *The Brattle Group*, he served as the manager of the Demand-Side Management Program at the Electric Power Research Institute (EPRI). He has published widely in leading industry and economic journals. Mr. Hanser has taught at the University of the Pacific, University of California at Davis, and Columbia University, and guest lectured at the Massachusetts Institute of Technology, Stanford University, and the University of Chicago.

REPRESENTATIVE EXPERIENCE

Forecasting and Weather Normalization

- For an electric utility in the Southeast, reviewed the existing weather normalization process and diagnosed problems with weather data and regression model. Developed alternative daily and monthly normalization models, improved degree day specification, selection of weather stations, and regression specification to double

prediction accuracy and improve stability of normalization process.

- For PJM, conducted a comprehensive review of its models for forecasting peak demand and re-estimated new models to validate recommendations. Individual models were developed for 18 transmission zones as well as a model for the entire PJM system.

- For a Southwestern utility, developed models for forecasting monthly sales and loads for the residential, commercial and industrial customer classes using primary data on customer loads, weather conditions and economic activity.

- For the Public Service Company of New Mexico, provided expert testimony before the Public Utilities Commission of New Mexico regarding the forecasted growth of the El Paso, Texas and Juarez, Mexico markets and their electricity requirements.

- For a Southeastern utility, developed a model for forecasting monthly demand that incorporated the impacts of its significantly declining housing market and which served the basis for its treasurer's revenue forecast.

Rate Design and Related Issues

- For Ameren/UE's Missouri subsidiary, provided expert testimony on its rate design before the Missouri Public Utility Commission. Assisted the development of company witnesses' rationale for the choice of cost of service allocation method, developed benchmarks for the rate increase against similarly situated utilities, as well for other commodities' escalations, and evaluated proposed demand-side management programs and rate options.

- For Ameren/UE's Illinois subsidiaries, provided expert testimony on the potential for gas demand-side management. The testimony discussed potential rate implications of such programs on the revenue of the utilities.

- For the Edison Electric Institute, co-authored a series of papers with regard to issues

facing utilities. The reports covered the issues of fuel adjustment clauses, mitigating large rate increase impacts, and the Energy Policy Act of 2005.

- For a U.S. electric utility, assisted in the valuation of generation assets for use in its testimony on stranded costs. This included development a financial model to determine the generation assets' market value, development of a convolution algorithm to convert market scenarios into a probability distribution of asset values, and statistical analysis of the relationship of the utility's generation assets' operating costs in comparison to its competitors. The assignment also included testimony preparation, interrogatories, and rebuttals.

- For the City of Vernon submitted testimony to the FERC regarding its revenue requirements for transmission.

Analysis of Electricity Generation, Contracts, and Wholesale Markets

- For the California Department of Water Resources provided expert testimony in federal bankruptcy court with regard to the public interest standard to be applied to Calpine Corporation's rejection of its contracts. This assignment included a valuation of the contract over time through the use of a simulation model of the California market, as well as an assessment of the potential reliability implications for the California market.

- For the California Department of Water Resources and the California Attorney General's Office, provided expert testimony on damages resulting from Sempra Energy Resources breaches of its power purchase agreement in both arbitration hearings and California state court. Analyzed two years of hourly data on energy deliveries, market prices, ISO charges, and invoice charges to identify and evaluate performance violations and invoice overcharges. Assisted counsel in developing the theory of the case and provided general litigation support in preparation for and during arbitration.

- For Dominion Electric Marketing, Inc. (DEMI), provided assistance in their response to a complaint by United Illuminating (UI) regarding their wholesale supply contract. The dispute centered on the allocation of reliability must run costs between UI as a load-serving entity and DEMI as wholesale supplier.

- For the California Department of Water Resources critically reviewed the California ISO's proposed implementation of locational marginal pricing (LMP) and analyzed implications for "seller's choice" supply contracts. Developed a framework for quantifying the incremental congestion costs that ratepayers would face if suppliers financially delivered power to the lowest priced nodes; estimated potential incremental contract costs using a third party's GE-MAPS market simulations (and helped to improve their model inputs to more accurately reflect the transmission system in California). Made recommendations to the CAISO as to how to address the issue.

- Provided expert testimony in Massachusetts state court on the damages incurred by a power plant developer as a result of alleged contractual violations by a supplier for a plant constructed in ISO-NE.

- For a Florida utility, provided a confidential expert report evaluating the benefits of the power from a co-generator and its potential rate implications, and assisted in the negotiation of a co-generation contract with a large industrial customer.

- Assisted a U.S. electric utility in the preparation of a bid proposal to an industrial firm for the leasing of a new power plant. The assignment included risk analysis of the proposal, assessment of financial and rate impacts, and market assessment of competitors' potential offerings.

Resource Planning and Procurement

- For the Edison Electric Institute, co-authored a report on the general inapplicability of standard financial portfolio theory to the resource portfolios of utilities.

- For the investor-owned utilities of Wisconsin, provided testimony before the Public Service Commission of Wisconsin on cost of capital issues for use in its statewide resource planning exercise.

- For an international development bank, evaluated generation resource needs for an Eastern European country as well as a determination of alternative means to meet those generation needs. This assignment included analysis of the impact of privatization on the country's economy, its import and export sectors, and future development of electricity and gas resources.

Environment

- For an Eastern utility with substantial coal-generating facilities, provided advice with regard to maintenance procedures and risk exposure to New Source Review standards under the Clean Air Act Amendments.

- For a Western generator with substantial coal-generating facilities he has provided assistance with regard to responding to allegations by the Environmental Protection Agency of failure to comply with the New Source Review standards under the Clean Air Act Amendments.

- For Illinois Power Company, provided expert testimony in federal court on the regulatory and rate base implications of the Clean Air Act Amendments, in support of the calculation of noncompliance economic damages arising from New Source Review.

- For a gas utility, assisted in the development of potential manufactured gas liabilities for use in insurance recovery and in estimating potential recovery under a variety of insurance allocation theories and estimated the risk distribution of the estimates.

- For a gas utility, assisted in the assessment of the announcement effect of environmental liabilities on its cost of capital. This assignment included estimation of changes in market betas for pre- and post- environmental liability announcement.

Energy Efficiency, Demand-Side Management, and Renewables

- For Central Vermont Public Service, provided expert testimony on the impact of its demand-side management programs before the Vermont Public Service Board.

- For Ameren/UE's Illinois subsidiaries, provided expert testimony on the potential for gas demand-side management and resulting potential rate implications.

- For a Northeast utility developed an assessment of the potential penetration rate of microturbines. For the utility service territories under consideration, evaluated the back-up generation rates and connection charges likely to be incurred for such systems to determine customer costs and benefits.
- For a utility located in WECC procuring renewable resources, provided a system integration study for a range of renewable project proposals. Used production costing and power flow models to estimate the "deliverability" of various proposals, including estimating the LMP prices and the potential congestion costs. Ranked the proposed renewable power projects by their estimated benefits and costs, and delivered a formal presentation at the completion of the project.

- For a power marketer and developer of independent power projects in Great Britain, assisted in the preparation of comments on proposals by the UK pool regarding the role of demand-side bidding and the pricing of transmission losses.

- For a Texas utility, provided expert testimony regarding breach of contract claims made against it by an industrial participant in an energy efficiency project. Reviewed the energy efficiency impacts of program. Calculated the net present value of the project in relation to various rate options and market prices.

- For Connecticut Light and Power, provided testimony in support of an application for a Certificate of Environmental Compatibility and Public Need for the construction of a 345-kV electric transmission line and reconstruction of an existing 115-kV electric

transmission line. At issue was the use of distributed resources to substitute for the proposed lines.

Analysis of Market Power

- For the California Parties, provided litigation support and testimony regarding manipulation of energy and ancillary service market prices and the outage behavior of gas fired power plants during 2000-01. The proceeding, before the Federal Energy Regulatory Commission involved Enron, Dynegy, Mirant, Reliant, Williams, and other suppliers in the U.S. and Canada. The analyses focused on the use by suppliers of generation outages to affect market prices through physical withholding, as well as the use of pricing to yield economic withholding.

- For the California Parties, provided litigation support and testimony regarding Enron's transmission and ancillary services market manipulation strategies, including 'Death Star' and 'Get Shorty.'

- For Southern California Edison, submitted testimony before the FERC describing the implications for the electricity market of the manipulation of gas market prices.

- For Sierra Pacific Resources Company, provided expert testimony before the Public Utilities Commission of Nevada and the FERC regarding the market power implications of generation asset divestiture required for the merger of Sierra Pacific Power and Nevada Power Company. Developed a Cournot market model to assess the market power implications of selling off alternative groupings of generation.

- For the Pennsylvania-New Jersey-Maryland Interconnection, LLC (PJM) co-authored annual report on the state of its markets. The report included an assessment of the market's competitiveness and potential structural deficiencies, and identified potential instances of market abuse.

- For PJM, developed an ensemble of metrics for assessing market power in its markets. The metrics included an early warning system to permit PJM interventions into market abuse at the earliest possible stage.

- For PJM, developed software for unilateral market power assessment and assisted PJM in its preliminary implementation. Its use was demonstrated with an incident involving potential market power abuse by PJM members.

RTO Design and Participation

- For Northeast Utilities provided testimony before the FERC with regard to the economics of imposing local installed capacity (LICAP) requirements on ISO-NE. Also has provided expert testimony before the FERC in support of its applications for market-based rate authority.

- For NSTAR provided testimony before the FERC on several matters including the necessity of imposing bid caps on the New England electricity market, replacement energy rates for generators when transfer capability into a transmission-constrained zone was reduced because of system upgrades, and the appropriateness of granting market-based rate authority to a generator in a transmission-constrained zone. Developed a Cournot market model to forecast the potential impact on market prices in the transmission-constrained zone that the majority of NSTAR's service territory is located.

- For Nevada Power Company, provided expert testimony before the FERC for its market-based rate authority application.

- For Otter Tail Power Company, provided an affidavit to the FERC assessing how the Midwest ISO's proposed Transmission and Energy Market Tariff would affect Otter Tail Power both operationally and financially. Based on the strategies that were pursued by some market participants during the 2001 California electricity market crisis, demonstrated the potential to pursue similar strategies in MISO and harm Otter Tail and its customers.

- For Edison Mission Energy's subsidiary Midwest Gen, provided expert testimony to the FERC for its market-based rate authority application.

- For a Midwest utility, examined the implications of differing configurations of the independent system operator on potential market power concerns. The issue particularly examined was the question of seams and how different ISO configurations affected the costs of transactions.

- Co-authored a report for the New York Independent System Operator's (NYISO) assessing the reliability implications of modifying its rules regarding installed capacity.

- Submitted testimony to the Public Utilities Commission of Texas (PUCT) regarding a proposed rule to allocate costs of procuring replacement reserves to market participants in ERCOT. The proposed rule required ERCOT to assign the majority of such costs directly to market participants who relied on ERCOT's balancing energy (*i.e.*, real-time energy) market. However, a review of the market rules and the historical evidence indicated that the majority of the procurement of replacement reserves was not caused by this behavior. The PUCT rejected the proposed cost allocation rule, and instead required ERCOT to uplift the replacement reserve costs based on the load ratio shares of market participants until the implementation of a reasonable allocation rule or the start of the Texas Nodal Market.

- For the Edison Electric Institute, authored a report on standard market design and its implications for utilities within regional transmission organizations.

Transmission

- Before staff members of the FERC, assisted in the development of a review of the implications of the restructuring in transmission assets' cost of capital.

- For a power marketer and developer of independent power projects in Great Britain, assisted in the preparation of comments on proposals by the UK pool regarding the pricing of transmission losses and the role of demand-side bidding.

- For a European transmission company, provided an analysis of the likely development of the European electricity market. Also assessed market implications for the transmission company of modifications to the transmission grid.

- For Hydro Quebec, provided expert testimony before the Regie d'Energie regarding whether a set of privately held transmission facilities constituted a looped transmission system and, thus, was subject to requests for transmission service.

Plant Performance and Strategy

- For the Keystone-Conemaugh Project Office, performed a benchmarking analysis to identify the areas in which Keystone and Conemaugh coal units were better performing or under-performing compared to other units with similar characteristics. This involved comparing the historical operational and cost performance of the Keystone and Conemaugh coal units against their peer groups; identifying the areas where the performance of the Keystone and Conemaugh coal units were above and below the average quartile of their peer groups; and developing metrics and methodologies to combine the results of individual comparisons across the operational and cost performance assessments.

- For a U.S. electric utility, assisted in the development of a legislative and regulatory strategy with regard to restructuring. This assignment included generation asset valuation in a competitive market, development of stand-alone transmission and distribution rates under cost-of-service and performance-based regulation, and estimation of stranded costs.

Other energy experience

- For the Electric Power Research Institute (EPRI), developed and directed a research program to provide electric utilities the following capabilities: marketing research, pricing and rate design, integrated resource planning, capital budgeting,

environmental impacts of electric utilities and end-use technologies, load research, forecasting, and demand-side management through software tools, database development and technology development. Assisted in the development of the Load Management Strategy Testing Model (LMSTM), enhancements to the Electric Generation Expansion Analysis Model (EGEAS). Co-wrote reports on the environmental impacts of electric technologies, environmental externalities, cost-benefit analysis of evaluation of DSM programs, rate design and costing, integrated resource planning, impacts of interruptible and curtailable loads, product differentiation, activity-based costing, DSM program evaluation, and others. Served as project manager of the Edison Electric Institute (EEI), National Rural Electric Cooperatives Association (NRECA), American Public Power Association (APPA), and National Association of Regulatory Utility Commissioners (NARUC) jointly sponsored Electric Utility Rate Design Study (EURDS). Represented the Institute before various regulatory commissions, Federal agencies, and utility executives. He served on the Environmental Protection Agency's advisory committee for the Clean Air Act Amendments. He also served as the operating agent for Annex IV, Improved Methods for Integrating Demand-Side Options into Utility Resource Planning, of the International Energy Agency Agreement on Demand-Side Management.

- For a California utility, supervised short- and long-term forecasts of sales and peak demand for use in resource and corporate planning. Supervised and helped prepare forecast documentation for public hearings before the California Energy Commission and represented the utility to the Commission on the forecast. Supervised the design and implementation of long-term strategic planning and financial models, and prepared both marginal and embedded cost of service studies for the utility and assisted in their use for the design of customer rates. Evaluated the impact of energy conservation programs and legislation on long-term system resource requirements. Designed and implemented the residential survey of appliance holdings and commercial customer equipment survey.

Non-energy Related

- Submitted testimony in bankruptcy court regarding the estimation of inventory subject to reclamation by a wholesale pharmaceuticals supplier which was sold to a bankrupt retail drug chain. The retail chain failed to maintain proper inventory records and a statistical approach which used a combination of data on overall inventory and the shipment and replenishment records of the supplier was used to develop the estimate.

- Designed a statistically valid database sampling procedure for assessing the validity of insurance claims arising from mass tort actions. The database contained summary information on the claims and for each claim there was, at times, voluminous information on the individual cases. The sampling procedure was used to determine which records would be chosen and assessed the individual's claim eligibility.

- Assessed the liability risk of an insurance company that provided coverage relevant to a mass tort suit. A Markov chain model was developed to estimate the size of the potential population and then a risk model was developed to calculate potential exposure.

TESTIMONY AND REGULATORY FILINGS

Before the Pennsylvania Public Utility Commission, Docket No. P-2008-2020257, prepared testimony on behalf of Wellsboro Electric Company concerning the causes and pricing of transmission congestion, July 30, 2008.

Before the Regie De L'Energie, Prepared Affidavit on Behalf of Hydro-Quebec regarding the public availability of SIS reports performed by a transmission provider, June 19, 2008.

Before the Federal Energy Regulatory Commission, Docket No. EL08-__-000, Prepared Direct Testimony on Behalf of the City of Vernon's revised TRR filing with the FERC, April 3, 2008.

Before the Regie De L'Energie, Prepared Expert Report on Behalf of Hydro-Quebec TransEnergie to

assess whether the transmission facilities owned by ELL may be considered as a "radial generator lead", March 13, 2008.

Before the American Arbitration Association, Case No. 74Y1980019606MAVI, Prepared Rebuttal Report on Behalf of the California Department of Water Resources to evaluate the reports that William Hogan, Jeffrey Tranen, and Ellen Wolfe provided on behalf of Sempra Generation, June 4, 2007.

Before the American Arbitration Association, Case No. 74Y1980019606MAVI, Prepared Expert Report on Behalf of the California Department of Water Resources to evaluate certain claims made by the California Department of Water Resources ("DWR") in its Demand for Arbitration regarding the performance of Sempra Energy Resources, now known as Sempra Generation, under the Energy Purchase Agreement between the parties, and to calculate amounts that Sempra would owe to DWR assuming liability is established, May 14, 2007.

Before the United States Bankruptcy Court, Northern District of Ohio, Eastern Division, Case Nos. 01-44007 through 01-44015, Expert Report in regard to McKesson's inventory reclamation in the Phar-Mor bankruptcy, March 9, 2007.

Before the Public Utility Commission of Texas, Docket No. 33416, Prepared Rebuttal Testimony on Behalf of Constellation New Energy, Inc.'s appeal and complaint of ERCOT decision to approve PRR 676, PRR 674 and request for expedited relief, January 11, 2007.

Before the Public Utility Commission of Texas, Docket No. 33416, Prepared Direct Testimony on Behalf of Constellation NewEnergy, Inc. to analyze and discuss the flaws and potential negative impacts of the allocation methods under Protocol Revision Request ("PRR") 676 which relates to procurement costs for Replacement Reserve Service ("RPRS") and Out of Merit Capacity, November 22, 2006.

Before the American Arbitration Association, Case No. GIC 789291, Prepared Rebuttal Report on Behalf of California Department of Water Resources vs. Sempra Energy Resources, July 11, 2006.

Before the State Office of Administrative Hearings, Prepared Expert Report on Behalf of TXU

Energy Solutions, regarding their demand-side management program and the difference between the actual and projected savings in the energy bill of University of Texas, July 7, 2006.

Before the Missouri Public Service Commission, Case No. ER-2007-0002, Prepared Direct Testimony on Behalf of Union Electric Company with regard to Ameren UE's rate design proposals, July 5, 2006.
Before the American Arbitration Association, Case No. GIC 789291, Prepared Expert Report on Behalf of California Department of Water Resources vs. Sempra Energy Resources, June 9, 2006.

Before the Superior Court of the State of California, J.C.C.P. Nos. 4221, 4224, 4226 and 4228, Prepared Declaration in support of California State Agencies' opposition to motion on shortened time and motion in support of preliminary approval of class action settlement, June 8, 2006.

Before the Superior Court of the State of California, J.C.C.P. Nos. 4221, 4224, 4226 and 4228, Prepared Declaration in support of California State Agencies' opposition to proposed publication notice, January 13, 2006.

Before the United States Bankruptcy Court, Case No. 05-60200 (BRL), Prepared Declaration on Behalf of Calpine Corporation with regard to the public interest standard for the rejection of the contract, December 30, 2005.

Before the FERC, Docket No. EL05-76-001, Prepared Direct Testimony on Behalf of Dominion Energy Marketing, Inc. (DEMI), regarding a dispute between DEMI and The United Illuminating Company as to which party is responsible for paying certain costs associated with Reliability Must-Ran agreements under a December 28, 2001 Power Supply Agreement between the two parties, December 5, 2005.

Before the American Arbitration Association, Case No. 74Y1980019304VSS, Prepared Expert Report on Behalf of California Department of Water Resources vs. Sempra Energy Resources with regard to damages from multiple contract breaches, May 2005.

Before the FERC, Docket No. EL03-180-000, Prepared Supplemental Testimony on Behalf of the California Parties with regard to Enron's circular scheduling and paper trading gaming practices,

January 31, 2005.

Before the FERC, Docket No. ER96-496-010, *et al.*, Prepared Affidavit on Behalf of Northeast Utilities Service Company and affiliated companies market-based rate authorization, September 27, 2004, Revised December 9, 2004.

Before the Connecticut Siting Board, Docket 217, Prepared Testimony on Behalf of Connecticut Light and Power in support of its application for a Certificate of Environmental Compatibility and Public Need for the construction of a 345-kV electric transmission line and reconstruction of an existing 115-kV electric transmission line between Connecticut Light and Power Company's Plumtree Substation in Bethel, through the Towns of Redding, Weston, and Wilton, and to Norwalk Substation in Norwalk, Connecticut, November, 2004.

Before the FERC, Docket No. ER04-691-000, Prepared Affidavit on Behalf of Otter Tail Power Company (OTP) regarding problems that may result from the implementation of MISO's markets tariff in OTP's region, May 7, 2004.

Before the FERC, Docket No. ER03-563-030, Prepared Joint Affidavit with Judy W. Chang on Behalf of Devon Power LLC, *et al.*, March 24, 2004.

Before the FERC, Docket No. EL03-180-000, Prepared Direct Testimony on Behalf of the California Parties with regard to Enron's circular scheduling and paper trading gaming practices, February 27, 2004

Before the Commonwealth of Massachusetts, Case No. 99-6016, Prepared Expert Report on Behalf of Alstom Corporation and Black and Veatch vs. Meriden Corporation, LLC, Review of *"Value of the Meriden Power Project"*, January 9, 2004

Before the FERC, Docket No. EL03-159-000, Prepared Declaration on Behalf of The California Parties, Re: Gaming Activities Of Modesto Irrigation District, October, 2003.

Before the FERC, Docket No. ER03-118-000, Prepared Affidavit on Behalf of Otter Tail Power Company For Otter Tail Power Company, assessing how the Midwest ISO's proposed Transmission

and Energy Market Tariff will affect Otter Tail Power both operationally and financially, September 15, 2003.

Before the Pennsylvania Environmental Hearing Board, New Jersey Department of Environmental Protection vs. Pennsylvania Department of Environmental Protection and Lower Mount Bethel Energy, LLC, Docket No. 2001-280-C, Prepared Expert Report on Behalf of Pennsylvania Power and Light, May 2, 2003.

Before the FERC, Docket No. EL00-95-069, Prepared Rebuttal Testimony on Behalf of Southern California Edison for the California Parties regarding manipulation of energy and ancillary service market prices and the outage behavior of gas fired power plants, March 20, 2003.

Before the FERC, Docket No. EL00-95-069, Prepared Testimony on Behalf of Southern California Edison for the California Parties regarding manipulation of energy and ancillary service market prices and the outage behavior of gas fired power plants, February 24, 2003.

Before Southern District Court of Illinois, Docket No.99-833-MBR, Prepared Expert Report for Department of Justice, Environmental Protection Agency vs. Illinois Power Company and Dynegy Midwest Generation regarding the likely rate treatment of, July 29, 2002.

Before the FERC, Docket No. ER99-3693-000, Prepared Direct Testimony on Behalf of Edison Mission Energy and Edison Mission Marketing and Trading, Inc. on behalf of Midwest Generation's application for market-based rate authority, April 1, 2002.

Before the FERC, Docket No. ER01-890-000, Prepared Rebuttal Testimony on Behalf of NSTAR on the appropriate rates for generators during transmission upgrades or enhancements requiring substantial and sustained reduction in transfer capability, September 21, 2001.

Before the FERC, Docket No. EL01-79-000, Prepared affidavit on Behalf of NSTAR, in their intervention of the granting of market-based rate authority to Sithe, May 2001.

Before the FERC and the Public Utilities Commission of Nevada, Docket No. EC0-173-000, Prepared Affidavit on Behalf of Sierra Pacific Resources Company, regarding the market power

implication of generation asset divestiture required for the merger of Sierra Pacific Power and Nevada Power Company, February 23, 2001.

Before the California Energy Commission, Prepared Expert Report on Behalf of Calpine Corporation; Socioeconomic Resources: Economic Benefits of the Metcalf Energy Center, October 27, 2000.

Before the FERC, Docket No. EL00-83-000, Prepared Affidavit on Behalf of NSTAR with regard to the necessity of imposing bid caps on the New England electricity market, June 23, 2000.

Before the FERC, Docket No. ER99-2338-001, Prepared Direct Testimony on Behalf of Nevada Power Company in support of the divestiture of its generation assets, June 24, 1999.

Before the FERC, Docket No. ER99-2338-001, Prepared Direct Testimony on Behalf of Nevada Power Company in support of the divestiture of its generation assets, March 30, 1999.
Before the Vermont Public Service Board, Docket No. 6018, Prepared Rebuttal Testimony on Behalf of Central Vermont Public Service Corporation on the impact of its demand-side management programs, April 10, 1998.

Before the New Mexico Public Utility Commission, Case No. 2769, Prepared Direct Testimony prepared on Behalf of the Public Service Company of New Mexico regarding forecasted growth of the El Paso and Juarez, Mexico markets, 1997.

Before the Public Service Commission of Wisconsin, Docket No. 05-EP-7, Prepared Direct Testimony on Behalf of investor-owned utilities of Wisconsin on the utilities cost of capital, May 8, 1995.

Before the FERC, Docket No. RP95-363-015, Prepared Affidavit on Behalf of Southern California Edison describing the implications for the electricity market of the manipulation of gas market prices.

PHILIP Q HANSER
Principal

ACADEMIC HISTORY

Guest Lecturer, Energy Laboratory Short Courses, Massachusetts Institute of Technology, Cambridge, MA	1997-1998
Visiting Lecturer, Department of Economics, University of California, Davis; Davis, CA	1981-1982
Assistant Professor, Departments of Economics and Mathematics, University of the Pacific, Stockton, CA	1975-1980
Ph.D. Candidacy Requirements Completed, Columbia University, NY	1975
Phil.M. (Economics and Mathematical Statistics) Columbia University	1975
A.B. (Economics and Mathematics) The Florida State University, FL	1971
Time Series and Econometric Forecasting, University of California at Berkeley Engineering Extension Course	September 1979
Data Analysis and Regression, American Statistical Association Short Course, San Diego, CA	August 1978

PROFESSIONAL MEMBERSHIPS

American Statistical Association,	1974-current
Member of Committee on Energy Statistics,	1993-1999
Institute of Electrical and Electronics Engineers,	1986-current
Association of Energy Service Professionals, Board Member,	1991-1995
Journal of ADSMP, Editor,	1995
American Economic Association,	

HONORS

Teaching Incentive Award, University of the Pacific	1979
Teaching Assistantship in Econometrics, Columbia University	1974

National Science Foundation Research Traineeship	1972 - 1974
Undergraduate and Graduate Research Assistantships, Florida State University	1968 - 1972
Omicron Delta Epsilon, Economics Honor Society	1971

PUBLICATIONS AND PRESENTED PAPERS

"Utility Supply Portfolio Diversity Requirements" (with Frank Graves), *The Electricity Journal*, Vol. 20, Issue 5, June 2007.

"Electric Utility Automatic Adjustment Clauses Revisited: Why They Are Needed More Than Ever" (with Frank Graves and Greg Basheda), *The Electricity Journal*, Vol. 20, Issue 5, June 2007.

"Rate Shock Relief" (with Frank Graves and Greg Basheda), *Electric Perspectives*, May/June 2007.

"Rate Shock Mitigation" (with Frank Graves and Greg Basheda), prepared for Edison Electric Institute, May 2007.

"Wire We Here? Coal in the West," Law Seminars International, Coal in the West Conference, Denver, Colorado, March 30, 2007.
"Electric Utility Automatic Adjustment Clauses: Benefits and Design Considerations" (with Frank Graves and Greg Basheda), Edison Electric Institute, August 2006.

"Can Wind Work In An LMP Market?" (with Serena Hesmondhalgh and Dan Harris), *Natural Gas & Electricity*, November 2005.

"The CAISO'S Physical Validation Settlement Service: A Useful Tool for All LMP-Based Markets" (with Jared S. des Rosiers, Metin Celebi, Joseph B. Wharton), *The Electricity Journal*, September 2005.

"Does SMD Need a New Generation of Market Models? Or How I Learned to Stop Worrying and Enjoy Carrying a Pocket Protector," SMD Conference, Washington, D.C., December 5, 2002.

"A Summary of FERC's Standard Market Design NOPR," Edison Electric Institute, August 2002.

"Standard Market Design in the Electric Market: Some Cautionary Thoughts," SMD Conference, May 10, 2002, Chicago, Illinois.

"The Design of Tests for Horizontal Market Power in Market-Based Rate Proceedings" (with James Bohn and Metin Celebi), *The Electricity Journal*, May 2002.

"The State of Performance-Based Regulation in the U.S. Electric Industry" (with D.E.M. Sappington, J.P. Pfeifenberger, and G.N. Basheda), *The Electricity Journal*, October 2001.

"Deregulation and Monitoring of Electric Power Markets" (with R.L.Earle and J.D. Reitzes), *The Electricity Journal*, October 2000.

"Shortening the NYISO's Installed Capacity Procurement Period: Assessment of Reliability Impacts," NYISO, May 2000.

"PJM Market Competition Evaluation White Paper," (with Frank C. Graves), prepared for PJM, L.L.C., October 1998.

"Lessons from the First Year of Competition in the California Electricity Market" (with R.L.Earle, W.C. Johnson, and J.D. Reitzes), *The Electricity Journal*, October 1999.

Comments to the FERC concerning Regional Transmission Organizations Notice of Proposed Rule Making, RM99-2, (with Peter Fox-Penner), September 17, 1999.

"In What Shape is Your ISO?" (with J.P. Pfeifenberger, G.M. Basheda and P.S. Fox-Penner), *The Electricity Journal*, Vol. 11, No. 6, July 1998.

"What's in the Cards for Distributed Resources?" (with J. P. Pfeifenberger and P.R. Ammann), in Special Issue of *The Energy Journal, Distributed Resources: Towards a New Paradigm of the Electricity Business*, January 1998.

"One-Part Markets for Electric Power: Ensuring the Benefits of Competition" (with F.C. Graves, E.G. Read, and R.L. Earle), in *Power Systems Restructuring: Engineering and Economics*, ed. M. Ilic, F. Galiana, and L. Fink, (Boston, MA: Kluwer Academic Publishers, 1998)

"Power Market Price Forecasting: Pitfalls and Unresolved Issues" (with R.L. Earle and F.C. Graves), forthcoming in *The Energy Journal.*

Ten EPRI reports and approximately 20 articles in EPRI Reports and Conference Proceedings.

"Insurance Recovery for Manufactured Gas Plant Liabilities" (with G.S. Koch and K.T. Wise), *Public Utilities Fortnightly*, April 1997.

"Real-Time Pricing - Restructuring's Big Bang?" (with J.B. Wharton and P. Fox-Penner), *Public Utilities Fortnightly*, March 1997.

"Load Impact of Interruptible and Curtailable Rate Programs" (with D.W. Caves, J.A Herriges, and R.J. Windle), *IEEE Transactions on Power Systems*, Vol. 3, No. 4, November 1988.

"Estimating Hourly Electric Load with Generalized Least Squares Procedures" (With N. Toyama and C.K. Woo.), *The Energy Journal*, April 1986.

"Transfer Function Estimation Using TARIMA," *SAS User's Group International, 1982 Proceedings*. Cary, North Carolina: SAS Institute. Inc., 1982.

"Invited Editorial Response to Behavioral Community Psychology: Integrations and Commitments," by Richard Winett, *The Behavior Therapist* 4(5), Convention, 1981.
Statistics Through Laboratory Experiences (with D. Christianson and D. Hughes), Stockton, CA: University of the Pacific 1976-1977.
"Unsolved Advanced Problem," *American Mathematical Monthly*, May 1975.

"Multiattribute Utility Theory and Earthquake Mitigation Policy" (with T. Munroe), Western Economic Association Conference, June 1978.

"Introduction to Multivariate Data Analysis Techniques," Bureau of Applied Social Research, Columbia University, New York, NY, 1973.

Exhibit PQH-2

FPL's Monthly NEL and Total Customer Model Descriptions

1- Total Customer Model

$$Total\_Customer_t = \beta_0 + \beta_1 FL\_POPULATION_t + \beta_2 JAN + \beta_3 FEB + \beta_4 MARCH + \beta_4 APRIL + \beta_5 JUNE + \beta_6 JULY + \beta_7 AUG + \beta_8 SEP + \beta_9 OCT + \beta_{10} NOV + u_t$$

where $u_t = \rho u_{t-1} + \delta u_{t-12} + \rho\delta u_{t-13} + \varepsilon_t$ and ε_t is a normally distributed error.

2- Monthly NEL model

$$NEL\_per\_Customer_t = \alpha_0 + \alpha_1 \text{Re}al\_PRICE_t + \alpha_2 HDH_t + \alpha_3 CDH_t + \alpha_4 FL\_INCOME + \alpha_5 FEB + \alpha_6 MARCH2003 + u_t$$

where $u_t = \rho u_{t-1} + \varepsilon_t$ and ε_t is a normally distributed error.