BEFORE THE
STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

In the Matter of

Consolidated Edison Company Of New York, Inc.

Case 09-E-0428

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Prepared Testimony of:

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Q. Please state your name, employer, and business address.
A. My name is Anping Liu. I am employed by the New York State Department of Public Service (Department). My business address is Three Empire State Plaza, Albany, New York.
Q. What is your position at the Department?
A. I am employed as a Principal Econometrician in the Office of Regulatory Economics.
Q. Please describe your educational background and professional experience.
A. I received a Bachelor of Science in Mathematics from Shaanxi Normal University in 1982, a Master of Science from Huazhong University of Science and Technology in 1985, and a Ph.D. in Economics with specialties in Industrial Organization and Public Economics from Wayne State University in 1991. I joined the Department in 1992.
Q. Please briefly describe your current responsibilities with the Department.
A. My current responsibilities include developing electric sales forecasts and monitoring the wholesale electric market.
Q. Have you previously testified before the New

York State Public Service Commission (Commission)?

A. Yes. I have testified on sales forecasts, wholesale electricity supply costs, and the economic impact of the increase in the price of electricity.

Q. In what previous rate cases have you testified on electric utility sales forecasts?

A. I testified in Cases 08-E-0539 and 07-E-0523, Consolidated Edison Company of New York, Inc.; Case 05-E-1222, New York State Electric and Gas Corporation; Cases 03-E-0765, 02-E-0198, and 95-E-0673, Rochester Gas and Electric Corporation; and, Case 02-E-1055, Central Hudson Gas and Electric Corporation.

Q. What is the purpose of your testimony in this proceeding?

A. I will discuss my recommendation regarding the electric system peak load forecast and electric sales volume forecast for Consolidated Edison Company of New York, Inc. (Con Edison or the Company). My testimony will be divided into three sections: 1) weather adjusted peak load;

2) peak load growth in the next five years; and 3) sales volume forecast.

Q. In your testimony, will you refer to, or otherwise rely upon, any information produced during the discovery phase of this proceeding?

A. Yes. I will refer to, and have relied upon, several responses to Staff Information Requests (IRs). The IRs that I have relied upon are included in Exhibit ___ (AL-1).

Q. What is the purpose of the system peak load forecast?

A. The system peak load forecast is one of the key determinants of Con Edison's capital expense budget. The Company's Infrastructure Investment Panel (IIP) cites the increases in customer demand as one of the main drivers of Con Edison's proposed programs and projects for load relief. In recognizing that the transmission and distribution (T&D) system needs to be maintained to meet the load, an understated peak load forecast is undesirable as it might undermine reliability of the T&D system. On the other hand, a system peak load forecast should not be overstated, because it would directly affect the justness and reasonableness of electric rates.

Q. Please explain why electric rates are directly affected by overstated peak load forecasts.

A. If an overstated peak load forecast is adopted, ratepayers would pay unnecessary costs, in terms of both T&D capital expenses and installed capacity (ICAP) payments in the wholesale electricity market administered by the New York Independent System Operator (NYISO). Thus, a reasonable, objective and accurate forecast for the system peak load is very important in the process of ratemaking.

Q. Please summarize Con Edison's electric system peak load forecast.

A. The Company estimates a weather adjusted peak demand for 2008 of 13,700 MW. The Company projects that the system peak demand will grow by 755 MW over the next five years through 2013. Prior to adjustments for the impact of the Company's demand side management (DSM) programs, the Company projects that the system peak load will reach 14,455 MW by 2013.

Q. What is your recommendation regarding Con Edison's system peak load forecast?

A. I recommend that Con Edison's weather adjusted peak load for 2008 be reduced by 200 MW. This in effect reduces Con Edison's peak load forecast by 200 MW for each of the next ten years. In addition, I recommend that Con Edison's peak load forecast be gradually reduced by an additional 100 MW by 2013. Under my recommendation, Con Edison's weather adjusted peak load for 2008 would have been 13,500 MW, and the peak load would grow by 655 MW, before DSM adjustments, over five years to reach 14,155 MW in 2013.

Q Have you estimated the impact of this recommendation on the ICAP payment in Con Edison's service area?

A. Yes, I have. Over the past three years, ICAP market prices averaged about $6 per kW-month in Con Edison's service area. At this price, a load reduction of 200 MW would save customers approximately $14.7 million in ICAP payments on an annual basis (Exhibit ___ (AL-2), page 1).

Weather Adjusted Peak Load

Q. Please discuss your findings regarding the Company's weather adjusted peak load.

A. I found that the Company overstated the weather adjusted system peak load for 2008 by 200 MW. The overstatement results from utilizing a model with a flawed assumption that contradicts theory and evidence.

Q. What was the actual system peak load for Con Edison in 2008 and what is Con Edison's estimated weather adjusted peak load?

A. The actual peak load for 2008 was 12,987 MW and Con Edison's estimate of the weather adjusted peak load is 13,700 MW.

Q. How did Con Edison estimate the weather adjusted peak load?

A. Much like other summer peaking utilities in the electric industry, Con Edison uses a weather normalization process to estimate weather adjusted peak load. For a given year, this process involves collecting daily data for system peak loads, typically for weekdays during the summer months, and a temperature variable

(TV) during the peaking hours that measures the cumulative heat and humidity build-up. A regression analysis is then performed, to fit the observations of paired peak load and TV data, yielding an estimate of the peak load-temperature relationship in a functional form. Once the load-temperature relationship is estimated, the weather adjusted peak load is determined by evaluating the peak load temperature relationship at the design weather conditions.

Q. Does Con Edison use normal weather conditions for its weather adjustment?

A. No. Con Edison does not use normal weather conditions, but instead uses design weather conditions. The design weather conditions are represented by the assumed TV, which is approximately one degree higher than under normal weather conditions on a peak day, thus providing additional weight to extremely hot weather conditions. Normal weather conditions on a peak day have been generally based on actual peak day observations over the past 30 years. For the peak load forecasts, normal weather conditions are typically based on a design criterion of the 50th percentile. In other words, under normal conditions there is a 50% chance that the actual TV will exceed the forecast. In contrast, under Con Edison's weather design, there is only a 33% chance that the actual temperature will exceed the forecast.

Q. What is the implication of Con Edison's design weather conditions?

A. Not surprisingly, Con Edison's weather design leads to a higher peak load forecast than would result under normal weather conditions, implying that approximately 250 to 300 MW more T&D capacity is required to meet Con Edison's peak load.

Q. Do you agree with Con Edison's weather design?

A. Although Con Edison's weather design is conservative, I do not propose adjustments to it at this time.

Q. Please explain in general the load-temperature response relationship.

A. Con Edison's system peak load is primarily driven by air cooling appliances. Over the years, the appliances have been installed to meet the expected weather conditions on a peaking day. During the summer months, electric load goes up in response to higher temperatures, when more air cooling appliances start running or are used more intensively. At relatively low temperatures, each degree increase in temperature leads to greater responses in electric load, as more and more cooling appliances start running. This is characterized as an increasing load response to temperature. The pattern of temperature response will reverse once the temperature rises high enough. In particular, as the temperature nears or exceeds the expected peaking conditions, the cooling appliances start to reach full capacity. At this stage, each degree increase in temperature leads to smaller responses in load, and the rate of load response to temperature decreases.

Q. Can you explain this increasing and decreasing load response to temperature relationship with a graphic illustration?

A. Yes. I have provided a chart to illustrate the load-temperature relationship in Exhibit __ (AL-2), page 2. In this chart, the load-temperature relationship is represented by an S-shaped curve sandwiched by two horizontal lines. The lower horizontal line stands for the base load that is insensitive to temperature. The upper horizontal line stands for the maximum possible load, theoretically the load at the full capacity of the cooling appliances. The lower segment of the S-shaped curve is partially U-shaped, representing increasing load response to temperature. The upper segment of the S-shaped curve is partially arch-shaped, illustrating the decreasing load response to temperature.

Q. What does the load-temperature curve look like under Con Edison's assumption?

A. The curve is partially U-shaped all the way up, as those depicted in the chart on page 3 of Exhibit __ (AL-2). Unrealistically, Con Edison's assumption implies that cooling appliance capacity is not a finite number, and it will not start reaching full capacity even when the temperature goes above the design weather conditions. This assumption contradicts the theory, as I discussed above.

Q. Is there any evidence to support your view?

A. Yes. The actual load-weather observations in Con Edison's service area support my view that the load temperature relationship is not partially U-shaped for temperatures above normal weather conditions. To be more objective, I obtained a recent load forecast uncertainty study conducted by the NYISO, which I included in its entirety in my Exhibit ___ (AL-5) and in part on pages 4-5 of Exhibit ___ (AL-2). This study includes load temperature data from May through September for 1999-2008 in Con Edison's service area. Page 4 of Exhibit ___ (AL-2) shows the plot for the daily peak loads and temperature for the months of May through September observed in Con Edison's service area for the past 10 years. The relationship shows a partially arch-shaped curve beyond the normal temperature, at approximately 86 degree cumulative temperature humidity index (CTHI), for most years. NYISO's CTHI is a slightly different measure than Con Edison's TV, with a difference of about 1 degree. The next chart, on page 5 of Exhibit ___ (AL-2), shows the NYISO's fitted lines for the load-temperature relationship, which is arch-shaped downward above the normal temperature.

Q. The chart you show includes data for the months of May through September. What does it show for July 1 through August 15 for recent years?

A. The chart on page 6 of Exhibit ___ (AL-2) shows the peak loads and temperature variable plot for the period of July 1 through August 15 over the past 4 years. It also indicates a partially arch-shaped curve for load response to temperature beyond normal weather conditions at 85 degrees.

Q. Are the data contained in your illustration the same data that Con Edison used to estimate its weather adjusted peak loads?

A. No. Con Edison uses a smaller sample from July 1 through August 15.

Q. Is there any information about peak load data for June that you would like to discuss?

A. Yes. The most recent 10-year data shows that Con Edison's system peak load occurred in the month of June in four of the ten years, including two times in early June. Furthermore, the 2008 data do not clearly indicate that a peak load that occurred in June is lower than a peak load that occurred between July 1st and August 15th (Exhibit __ (AL-2), page 7).

Q. Is your view about Con Edison's load-temperature response assumption supported by the peak-temperature data for Con Edison's selected time period?

A. Yes. Even Con Edison's highly selective data does not indicate that the system load increases at a higher rate at or beyond the normal temperature (Exhibit ___ (AL-2), Page 8). In fact, as shown in its response to Staff IR DPS-125, which I included in my Exhibit ___ (AL-1), Con Edison's own regression analysis does not pass the t-test (Exhibit __ (AL-1), page 6).

Q. Would you please explain your recommendation that the 2008 weather adjusted system peak load for Con Edison's service area should be 13,500 MW?

A. My recommendation is based on the results of alternative models, which I developed from Con Edison's peak loads and temperature variables over the past four years 2005-2008. These models are estimated using a pooled regression method, which simultaneously determines the temperature response curve for each of the four years. The functional forms of the models were chosen in accordance with theory and evidence and the estimates pass the required statistical tests (Exhibit ___ (AL-2), page 9).

Q. What data did you use for your pooled regression analysis?

A. I used the same data as Con Edison used to estimate the weather adjusted peak load for each of the past four years, for the time period July 1 through August 15. Therefore, there is no data issue in the difference between my estimates and the Company's estimates. The difference between my forecast and the Company's pertains to methodologies, assumptions, and statistical tests.

Q. What are the advantages of pooling four year's of data to estimate the weather adjusted peak loads?

A. Con Edison did not experience warm summer months in 2007 and 2008. As a result, the relatively limited data at the higher end of the temperature response curve makes it difficult to obtain a reliable estimate for the weather adjusted peak loads if they are estimated separately year by year. The advantage of the pooled data regression method is that it does not pick and choose, or even create data, and instead uses all actual data without prejudice or modification, except that the peak loads and temperature variables are associated with a created dummy variable indicating the occurring year. As a result, the relative absence of high peak load data for 2007 and 2008 is offset by the availability of high peak load data for 2005 and 2006.

Q. Do you have any evidence that Con Edison's method, which estimates weather adjustment separately year by year, does not yield a reliable estimate?

A. Yes. Indeed, Con Edison's model for 2008 weather adjusted peak load is very sensitive to individual observations. I did a sensitivity analysis for Con Edison's model for individual observations. These tested individual observations including three of the four adjusted peak loads observed in 2007 at relatively high temperatures. Con Edison adjusted these three observations by 1.1% and used them in its 2008 weather adjustment analysis. The individual observations I tested also include two adjusted peak loads observed in early June 2008. My analysis shows that Con Edison's model fails the basic t-test for all cases (Exhibit ___(AL-2), pages 10-12). Con Edison's model must be rejected.

Q. How did Con Edison adjust the three peak loads in 2007 before adding them to estimate 2008 weather adjustment?

A. In its response to Staff IR DPS-125, which I included in my Exhibit ___(AL-1), Con Edison explains that it adjusted these peak loads by 1.1%, which it calculated using a linear regression analysis for the middle section of the load response to temperature curves for 2007 and 2008. By doing so, Con Edison assumed that the temperature response is constant at the middle to higher temperatures and then increasing as the temperature goes even higher near design conditions. This is counter-intuitive. It contradicts theory and evidence, as discussed earlier, and cannot be accepted. Con Edison's use of adjusted 2007 peak load data has provided additional evidence that its weather adjustment model is flawed.

Q. Are you aware of any independent study that supports your recommendation?

A. Yes. As seen in Exhibit __ (AL-2), page 5, a recent NYISO study on the ICAP reserve margins estimates Con Edison's system peak for 2008, at the design weather conditions, as approximately 13,500 MW.

Peak Growth in the Next Five Years

Q. How did Con Edison forecast the peak load growth?

A. Con Edison used combined "top-down" and "bottom-up" approaches to forecast the system peak load. The top-down method involves using the system-wide energy and appliance end-use models to forecast commercial and residential peak loads, and the bottom-up method involves primarily tracking construction projects by network for the residential, commercial, and governmental sectors.

Q. From which approach did you make your adjustment to the peak load forecast?

A. My adjustment is from the Company's top-down approach.

Q. Please discuss Con Edison's commercial peak load forecast.

A. Con Edison's commercial peak load forecast is based on an econometric model. Its principal inputs include economic variables such as GDP, employment, number of customers, real price of electricity and weather. The model produced a volume forecast which is converted to peak demand via a load factor. Separately, Con Edison also used a per-employee commercial space model to project the commercial load growth. The two forecasts are brought together to produce the Company's final forecast of demand growth of 272 MW by 2013.

Q. What are your findings regarding the Company's top-down study for commercial demand growth?

A. I found that the economic inputs to Con Edison's commercial peak demand forecast are inconsistent with the economic inputs to Con Edison's T&D revenue forecast. As shown in Exhibit ___ (AL-3), page 1, Con Edison's sales volume estimate for the commercial peak load forecast is about one percent higher than its sales volume estimate for the T&D revenue forecast. In addition, the employment forecast for the commercial peak load forecast is about 2 percent above the employment forecast for the T&D revenue forecast.

Q. Which set of economic inputs should be used?

A. The economic inputs to Con Edison's T&D revenue forecast were provided at a later date and should also be used for the commercial peak load forecast.

Q. What is your adjustment to the forecast for commercial peak load growth?

A. Con Edison's forecast of total commercial load growth should be reduced by 25 MW over the next five years. This adjustment is the result of using Con Edison's commercial sales volume estimate for the T&D revenue forecast, provided by Con Edison's Forecasting Panel (FP) in the current case, in the commercial peak load model.

Q. Please discuss Con Edison's residential peak load forecast.

A. Con Edison's residential peak load forecast is based on an appliance end-use model. The model's primary inputs are appliance saturation rates, per-unit kW use, coincidence factors, and the number of households in Con Edison's service area. The historical data and forecast for the number of households were provided by Moody's Economy.com, and the saturation rates for the electric appliances such as air conditioners, electric fans, refrigerators, television sets, computers, and lighting, etc., were based on the data the Company collected from customer surveys. Con Edison projects that the residential peak demand will grow 290 MW over the next five years.

Q. What is your assessment of the Company's residential peak load forecast?

A. The Company's forecast for the residential peak load growth is overstated and should be reduced by about 75 MW over the next five years.

Q. Please explain your adjustment.

A. My adjustment results from assuming slightly lower growth rates of appliance saturation than the levels that Con Edison assumed, for consistency with the historical trend and the current economic forecast in Con Edison's service area. Economic growth in Con Edison's service area is expected to be significantly slower for the next five years than the average over the past five years.

Q. Are there any economic indicators to illustrate the forecast of slower growth in the economy of Con Edison's service area?

A. Yes. Employment and real personal income are two of the key determinants of electric consumption and electronic appliance ownership. As shown in (Exhibit ___ (AL-3), page 2, both employment and real personal income are expected to grow at a much lower rate over the next five years than in the past five years. Employment growth over the next five years is forecasted to be approximately one-third of that observed in the last three to five years. Real personal income growth for the next five years is expected to be less than one-half of the level observed over the past five years.

Q. How did Con Edison forecast the appliance saturation growth?

A. Con Edison's projected growth rates of residential appliance saturation for 2013 are based on the historical trend over the past few years ((Exhibit ___ (AL-3), pages 3-9). This is not realistic based on the economic data I just discussed. As such, I adjusted the saturation growth downward to reflect slower economic growth and used Con Edison's model to develop my estimate.

Q. What is your total adjustment for the residential and commercial peak load growth?

A. My total adjustment is 100 MW to the cumulative load growth over the five-year period 2008-2013. This, along with my 200 MW adjustment to the 2008 weather adjusted peak load, will reduce Con Edison's peak load forecast by 300 MW for 2013.

Electric Sales Volume Forecast

Q. Please discuss your recommendations concerning the electric sales volume forecast to be used in this proceeding.

A. Con Edison forecasts that its T&D sales volume for the rate year ending March 31, 2011 will be 57,722 Gigawatt hours (GWH), a 0.8% decrease from the weather normalized sales for the historical test year 2008. For the twelve months ending March 2012 and 2013, the Company's forecasted growth rates are 0.5% and 0.35%, respectively, from the same period in the previous year. Con Edison derived its sales volume forecast from econometric models, and the economic forecast was provided by Moody's Economy.com. The weather forecast assumes a 30-year average of heating and cooling degree days. The final forecast reflects projected DSM savings in both energy (GWhs) and demand (MW).

Q. Are the Company's sales forecast models generally acceptable?

A. Yes. Con Edison's forecasting models are generally acceptable under econometric standards, although I have some concerns with certain aspects of some of the Company's forecasting models.

Q. Have you developed your own models or modified the Company's models to address your concerns?

A. Yes, I have. For each major service class, I either developed my own forecasting model or modified the Company's model, if necessary, to address my concerns. The print-out of these models is provided in Exhibit ___ (AL-4), Pages 1-8. However, in aggregate, the forecast produced by these alternative or modified models does not differ materially from the Company's forecast (Exhibit ___ (AL-4), page 9). I consider the difference to be within the range of acceptable error for forecasting model purposes. Nevertheless, I used my models to take into account the Commission's preferred approach for using weather normalized data, as described below.

Q. What is your recommendation regarding the measure of normal weather to be used for sales volume forecasting in Con Edison's service area?

A. I recommend that the most recent 10-year average of heating and cooling degree days be used as the measure of normal weather for the forecasting period.

Q. Explain why you recommend a 10-year average of historical degree days for the sales volume forecast.

A. The Commission adopted the 10-year weather normalizing approach for sales forecasting in its recent decision in the Central Hudson Gas & Electric Corporation (Central Hudson) rate case. The Commission adopted this approach on the grounds that the averaging method has the advantages of providing a simple, easily applied rule based on readily available data and the 10-year average is consistent with the approach taken by the Energy Information Administration of the U.S. Department of Energy (see the Order Adopting Recommended Decision with Modifications, Cases 08-E-0887, 08-G-0888, and 09-M-0004, June 22, 2009, pages 13-15).

Q. Did the Commission make any statements concerning the use of that methodology in other rate cases?

A. Yes. On page 15 of its Order, the Commission stated "we expect these averages to be utilized for forecasting purposes in future rate filings".

Q. Did Con Edison use the 10-year average degree days in forecasting sales volumes?

A. No, it did not. Con Edison used 30-year average heating and cooling degree days for forecasting sales volumes. It also declined a Staff request to provide a forecast using 10-year average degree days (see Con Edison's response to Staff IR DPS-47.16R1, included in my Exhibit ___ (AL-1)). Con Edison nevertheless provided the daily data for the 10-year average heating and cooling degree days.

Q. Did you develop a weather forecast based on the daily 10-year average degree days?

A. Yes, I did. I was able to use the daily average degree days and the information for billing cycles to develop the 10-year averages for all weather variables used in my sales volume forecasting models. A summary of the 10-year average heating and cooling degree days, along with the difference from the 30-year average used by Con Edison, are provided in Exhibit ___ (AL-4), page 10.

Q. What are the advantages of using the 10-year average degree days in your sales forecast?

A. The advantages are simplicity and consistency. This approach is straight-forward, in that the 10-year average degree days are developed using the simple averages for each day of the year. Weighted by billing cycles, they are then summed over the days for the month or quarter. This approach also ensures consistency, since all degree days of the year are used in the calculation of the 10-year average so that the sum of the average degree days for the year is equal to the 10-year average of annual degree days. Con Edison's method of calculating the 30-year average degree days does not have these advantages.

Q. Please explain.

A. First, the data for degree days are not readily available for all months of the year for 30 years, as explained in Con Edison's response to DPS-47.15, which I included in my Exhibit __ (AL-1). Consequently, 30-year simple average degree days cannot be developed for all months of the year. Second, Con Edison did not use all the degree days for the year in the calculation of the 30-year average, resulting in an inconsistency that the sum of the average degree days for the year does not equal the 30-year average of annual degree days.

Q. Have you reflected the 10-year average degree days in your sales forecast adjustment?

A. Yes, I have.

Q. Have you provided an adjustment to Con Edison's sales volume forecast?

A. Yes, I have. I recommend an upward adjustment of 148 GWhs, 119 GWhs, and 146 GWhs, respectively, for the rate years 2011-2013. A summary of my sales volume forecast is provided in Exhibit ___ (AL-4), page 11. The detailed monthly figures of the forecast were provided to Staff witness Randt, who provides the corresponding sales revenue adjustment.

Q. Does this conclude your testimony at this time?

A. Yes, it does.