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MEMORANDUM

TO: ROGER WHITE, ENERGY COST MANAGEMENT INC.
FROM: LARRY KAUFMANN
SUBJECT: RESPONSE TO INFORMATION REQUEST ON START DATE ANALYSIS
DATE: 5/8/2008
CC:

As requested at the 6 May Stakeholder conference, the following memorandum provides further details on PEG's "start date" analysis. This memo supplements the description of the start date analysis that appears in PEG's February 2008 report (pp. 60-63). As explained in that report, our start date analysis was used to determine the sample period for which total factor productivity (TFP) trends for US power distributors were estimated. These TFP trends are, in turn, used to calibrate the recommended productivity factor for 3rd Generation IRM in Ontario.

Our start date analysis was based on a comparison of economic activity and weather variables in various years relative to the values of those variables in 2006. Our measure of overall economic activity was the state level and US unemployment rates (UR), as reported by the US Bureau of Economic Analysis. Each utility was assigned the UR of the state in which its service territory is located. We also gathered data on cooling degree days (CDD, a measure of summer weather severity) and heating degree days (HDD, a measure of winter weather severity) from the US Climatic Center and mapped them to individual utilities in our sample. US Climatic Center provides CDD and HDD data by airport and each utility in the data was mapped to or assigned the value of an airport's CDD and HDD data found in its service territory.

Our model regressed each company's total factor productivity (TFP) on values for that company's HDD, CDD and unemployment rate in the same year. This was done for a sample of 69 US power distributors for 1994-2006 sample period (*i.e.* a so-called "panel" dataset, which uses both time series and cross sectional data). While we used 13 years of data per utility, we only

had 11 years of data for one utility, which provided us 895 number of observation for the analysis. We regressed each distributor's (natural log) of TFP in a given year on the (natural logs) of the unemployment rate, CDD and HDD. The model used for this purpose is given by:

$$\ln(TFP_{it}) = \alpha_o + \alpha_{UR} * \ln(UR_{it}) + \alpha_{HDD} * \ln(HDD_{it}) + \alpha_{CDD} * \ln(CDD_{it}) + \alpha_t * t + \varepsilon_{it} \quad i = 1 \dots N, \quad t = 1 \dots T$$

Here, the index i references the firm, from $i = 1$ to 69, and the index t references the sample year, from $t = 1994$ to 2006. We found that there was a statistically significant relationship between all three of independent variables and TFP levels, and in all cases the coefficients had the expected signs. That is, HDD and CDD are expected to have positive signs, since higher values for these should be associated with greater kWh deliveries, and therefore, higher TFP. The unemployment rate is expected to have a negative sign since higher unemployment will lead to lower kWh deliveries and hence lower TFP. The model results are provided in Table I below.

Table I

VARIABLE KEY

LTFP = log of TFP levels
 LCDD = log of cooling degree days
 LHDD = log of heating degree days
 LUR = log of unemployment rate

Dependent Variable: LTFP

Explanatory Variables	Parameter Estimate¹	T-Statistic
Constant	-0.608	-5.722
Trend	0.012	11.433
LCDD	0.056	7.65
LHDD	0.035	5.061
LUR	-0.031	-1.829
Sample Period		1994-2006
Adjusted R-squared		0.18
Number of Observations		895

¹Each parameter is the elasticity of TFP with respect to the variable due to the double log form of the model.

This regression was then used to determine the relative importance of these three factors on TFP growth. For the overall sample, we computed how the values for the unemployment rate, CDD and HDD in each year since 1990 compared to the values for these variables in 2006. For each variable, this relative difference (in logarithmic terms) was multiplied by its regression coefficient. The results were then summed to obtain an overall measure of the similarity of conditions in each year since 1990 and those same conditions in 2006.

This start data analysis is summarized in Table 13 in PEG's February 2008 report. It can be seen that 1995 is the year that is most similar to the end-date for our TFP analysis (2006). Our analysis therefore indicates that the most appropriate period for estimating the long-run TFP trend for US power distributors is 1995-2006. Over this period, TFP growth for the US electric distribution industry grew at 0.88% per annum.