BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Application of PPL Electric Utilities Corporation Filed Pursuant to 52 Pa. Code Chapter 57, Subchapter G, for Approval of the Siting and Construction of the Pennsylvania Portion of the Proposed Susquehanna-Roseland 500 kV Transmission Line in Portions of Lackawanna, Luzerne, Monroe, Pike and Wayne Counties, Pennsylvania	:	Docket No. A-2009-2082652
Petition of PPL Electric Utilities Corporation for a Finding that a Building to Shelter Equipment at the 500-230 kV Substation to be Constructed in the Borough of Blakely, Lackawanna County, Pennsylvania is Reasonably Necessary for the Convenience or Welfare of the Public	:	A-2009-2082832
Application of PPL Electric Utilities Corporation Under 15 Pa. C.S. §§1511(c) for a Finding and Determination that the Service to be Furnished by the Applicant Through Its Proposed Exercise of the Power of Eminent Domain to Acquire a Right-Of-Way and Easement Over and Across the Lands of the Property Owners Listed Below For the Proposed Susquehanna-Roseland 500 kV Transmission Line In Portions of Lackawanna, Luzerne, Monroe, Pike and Wayne Counties, Pennsylvania is Necessary or Proper for the Service, Accommodation, Convenience or Safety of the Public	:	
Chaudari Family Limited Partnership, David Murphy, and Marguerite T. Kranick	:	A-2009-2088297
HaRa Corporation	:	A-2009-2088337
Richard Coccodrilli, Jr., Jeffrey J. Coccodril, Jr, Ryan T. Coccodrilli, and Joseph Williams	:	A-2009-2088327

D&L Realty Company	:	A-2009-2088340
Kenneth Powell and Linda Powell	:	A-2009-2088359
Rudolph Saporito and Maria Saporito	:	A-2009-2088312
David Murphy	:	A-2009-2088360

DIRECT TESTIMONY

ROBERT M. FAGAN

On Behalf of the Pennsylvania

Office of Consumer Advocate

June 30, 2009

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I. INTRODUCTION AND SUMMARY

Q. PLEASE STATE YOUR NAME, OCCUPATION, AND BUSINESS ADDRESS.

A. My name is Robert M. Fagan. I am a Senior Associate at Synapse Energy Economics, Inc., 22 Pearl Street, Cambridge, Massachusetts, 02139.

Q. PLEASE SUMMARIZE YOUR PROFESSIONAL EXPERIENCE and educational background.

A. I am an energy economics analyst and mechanical engineer with over 20 years of experience in the energy industry. My work has focused on myriad electric power industry issues, including economic and technical analysis of competitive electricity markets development, electric power transmission pricing structures, examination of utility-scale wind power potential and integration, and assessment and implementation of demand-side resource alternatives. I hold an M.A. from Boston University in Energy and Environmental Studies (1992) and a B.S. from Clarkson University in Mechanical Engineering (1981). Details of my experience are provided in my resume as Exhibit RMF-1.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am testifying on behalf of the Pennsylvania Office of Consumer Advocate ("PA OCA").

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to examine and critique aspects of PJM/PPL transmission need modeling for the proposed Susquehanna – Roseland 500 kV ("SR500") line, especially the way PJM/PPL uses load forecasts, energy efficiency ("EE") resources, and demand response ("DR") resources in its need modeling.

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. The following summarizes my testimony:

1. **Load Forecast Update Needed**. PJM/PPL's baseline analysis uses an outdated January 2008 peak load forecast; its subsequent March 2009 "retool" analysis uses an updated January 2009 vintage load forecast. The bulk of the application materials depend upon analysis using the 2008 load forecast, which by PJM/PPL's own reckoning overstates peak demand in the relevant years for their analysis; i.e., non-coincident Eastern Mid-Atlantic Area Council ("EMAAC" or "Eastern MAAC")[1] extreme summer peak load was forecast to be more than 1,000 MW lower in January 2009, compared to the previous years' forecast. Given the unusual severity of the US economic downturn, and the timing of this downturn subsequent to PJM's updated January 2009 forecast, even that forecast and the March 2009 "retool" whose results depend on it are outdated. To properly assess current need for the proposed SR500 line, PJM/PPL must update its load forecast.

2. **Updated Needs Analysis with 2012/13 RPM Demand Response and Energy Efficiency Resources Required**. PJM/PPL must include, in an updated analysis, the results of the May 2009 PJM Reliability Pricing Model ("RPM") auction. PJM/PPL's current "retool" update (March 2009) does not include those results. In that auction, over 1,000 MW of eastern Mid-Atlantic Area Council demand response cleared for summer 2012, a capacity resource that PJM/PPL has not modeled in any of its need analyses to date. The location and size of this resource is critical to this particular proposed line need assessment; i.e., its incorporation alone delays by two years the level of modeled peak load that leads to claimed reliability violations used to support the applicant's assessment of need.

[1] The Mid-Atlantic Area Council, or "MAAC", used to be a sub-region of NERC (North American Electric Reliability Council); it no longer is. PJM still uses the term to describe the region of the original PJM service territories. "Eastern MAAC" is a subset of MAAC; it includes the service territories of all four New Jersey utilities, PECO (Philadelphia Electric Co.) and the Delmarva Peninsula; and it represents a historically transmission-congested sub-region of PJM.

3. **PJM/PPL Should Consider PA and NJ State Peak Electrical Demand Reduction Targets in Modeling the Need for the SR500 Line**. PJM/PPL fail to include future energy efficiency and demand response resources in their modeled assessment of need for the proposed line. Pennsylvania Act 129 and the New Jersey Energy Master Plan include statutory and policy aims to substantially reduce peak electrical load. Pennsylvania's Act 129 mandates peak demand reductions by 2013, and New Jersey's Energy Master Plan ("EMP") directs a series of energy efficiency initiatives involving various parties in the state with specified peak reduction targets for 2020. The intended effects of these initiatives are excluded from PJM's modeling; and are not even considered as a "sensitivity" analysis when assessing need. The attainment of even a portion of the peak reducing goals associated with these states' policies will push out the "net peak load" currently forecasted by PJM/PPL for 2012 to a later year and contribute towards a delay in the "year of need" for the proposed line.

4. **"Retool" Required to Comprehensively Analyze Current Need**. A retool using an updated load forecast and incorporating DR/EE from 2012/13 RPM is necessary to update the year and the extent of need, and reassess the severity and timing of identified claimed reliability violations. The retool should consider NJ and PA EE/DR improvements also, at a minimum as a sensitivity case.

5. **Proxy for Year of Need – "Net Peak Load" – Shifted Out Eight Years from 2012 to 2020 If Updated Input Assumptions Fully Considered**. The effect of all three of the elements identified in 1) through 3) above is to shift outward the modeled "net peak load" levels (i.e., load net of EE and DR resources and a load forecast update) in eastern MAAC by roughly eight years. Accounting for just DR and an updated load forecast, the shift is roughly three years, depending on the load forecast reduction

assumption used. Thus, the extreme "net peak load" forecasted for 2012 would not occur until 2020 when all these factors are accounted for.

6. **Year-of-Need Shift Would Require Further Capacity Availability Analysis**. If retool results indicate a later year of need, then revisions to generation capacity availability in PJM, and particularly in Eastern MAAC, must also be taken into account.

7. **Recommendation**. PJM/PPL should conduct a retool analysis of the proposed line, considering the effect of energy efficiency, demand response, and an updated load forecast accounting for the recent economic downturn in the region.

II. LOAD FORECAST

Q. WHAT LOAD FORECASTS ARE USED BY PJM IN ASSESSING NEED FOR THE SR500 LINE?

A. PJM and PPL use various data from the 2008 PJM Load Forecast Report, published in January 2008, for the underlying load forecast data.[2] PJM and PPL also use demand response data from the 2009 PJM Load Forecast Report.[3] The claimed reliability violations shown in Exhibit PFM-1 arise from use of these data. The "retool" analysis of the need for the SR500 line conducted by PJM in March of 2009 and included in the response to OCA-2-8 Supplemental uses underlying load forecast data from the 2009 PJM Load Forecast Report.

Q. WHICH DATA FROM THESE REPORTS ARE USED?

A. Specifically, PJM/PPL use "extreme" summer peak (90/10) load forecasts when assessing load deliverability into local zones. These data are shown on PJM's Table D-1

[2] The 2008 report is available at http://www.pjm.com/planning/resource-adequacy-planning/load-forecast-dev-process/~/media/documents/reports/2008-load-report.ashx.

[3] The 2009 report is available at http://www.pjm.com/documents/~/media/documents/reports/2009-pjm-load-report.ashx.

in the load forecast report. An extreme summer peak (90/10) forecast means a forecast that has a probability of being exceeded of only 10%, and its use can be thought of as testing the system for reliability on an unusually hot and humid, non-holiday summer weekday. PJM/PPL use the median summer peak (50/50) load forecast for all other zones and for generation deliverability.[4] A median load forecast means a forecast that has a 50% probability of being exceeded. These data are shown on PJM's Table B-1 in the load forecast report. PJM's transmission analyses use peak demand data, not energy usage data. The claimed need for the SR500 line arises from peak, not average, use of the transmission system. Peak use occurs in the summer period in the PJM region.

Q. HOW DOES THE LOAD FORECAST CHANGE BETWEEN THE 2008 AND THE 2009 LOAD FORECAST REPORTS?

A. The January 2009 load forecast report reflects significantly lower PJM zonal peak demands than the January 2008 load forecast report. For example, the January 2009 PJM Mid-Atlantic Area ("MAAC")[5] coincident peak[6] forecast for summer 2009 (62,452 MW) is 3.5% lower than the previous year's forecast for summer 2009 (64,724 MW). It is 4.1% lower for the summer 2010 period. The first part of Table 1 below contains the 2008 and 2009 extreme peak load forecast for MAAC. It also shows the difference in MAAC peak load between the January 2008 load forecast and the January 2009 load forecast. The remainder of the table shows similar comparative forecasts for two subsets of the MAAC region, i) eastern MAAC, consisting of the New Jersey utilities, the

[4] Response to OCA-2-1.

[5] The "Mid-Atlantic" area portion of PJM consists of the original group of PJM utilities serving load in New Jersey, most of Pennsylvania, most of Maryland, Delaware, and Washington, DC.

[6] Coincident peak refers to the actual peak load seen across several or many regions or zones, and it accounts for the fact that not all zones will experience their own peak demand at the same time as other zones. Coincident peak load across a series of zones is usually lower than the sum of the non-coincident peak loads for those same zones.

Delmarva peninsula, and the PECO service territories; and ii) New Jersey. The peak load in the eastern MAAC region, and especially the New Jersey service territories, is a key driver of the claimed need for the proposed SR500 line.

Q. WHAT DOES THE FORECAST COMPARISON ILLUSTRATE?

A. At a high level, it illustrates that the extreme summer peak forecast reduction between the forecast vintages 2009 and 2008 in MAAC, Eastern MAAC, and New Jersey is such that the extreme peak load has been "pushed out" one to three years.

Q. PLEASE EXPLAIN.

A. Table 1 shows, for example, that the coincident peak load forecast (summer extreme, 90/10) for 2012 for the MAAC region from the 2008 PJM Load Forecast is 67,617 MW. The 2009 PJM Load Forecast projects a 2012 value of 66,416 MW, or a 1,201 MW decline form the 2008 Forecast.

For the eastern MAAC region, the 2008 Forecast projection for non-coincident peak load in 2012 was 37,974 MW; using the 2009 Forecast, the equivalent value is 36,928 MW, a 1,046 MW decline from the 2008 Forecast value.

The "declines" in earlier years – 2011, 2010, and 2009 – are even steeper, as the table shows.

Yet another way to view this is that the extreme coincident peak load level projected for MAAC for the summer of 2010, for example (65,811 MW) will not be met or exceeded until 2012 (projected peak = 66,416 MW). This same conclusion – i.e., year 2010 extreme peaks will not be met or exceeded until 2012 - applies to the Eastern MAAC and New Jersey zone forecasts as well.

Table 1. PJM 2008 and 2009 Load Forecast Comparisons – Extreme Summer Peak (90/10) Load Forecast for Mid-Atlantic Region and Sub-Regions

Comparison of Mid-Atlantic (MAAC) 90/10 Coincident Peak (CP) Load (MW) Between 2008 and 2009 PJM Load Forecasts

	2008 Values			Forecast Values										
	Metered	Unrestricted	Normal	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
MAAC 90/10 CP Load Based on 2008 Fcst				63,554	64,724	65,811	66,826	67,617	68,740	69,966	71,010	71,871	72,845	73,646
MAAC 90/10 CP Load Based on 2009 Fcst	59,653	60,192	60,120		62,452	63,133	64,957	66,416	67,890	68,940	69,748	70,590	71,449	71,915
Difference					2,272	2,678	1,869	1,201	850	1,026	1,262	1,281	1,396	1,731

Comparison of Eastern MAAC 90/10 Coincident Peak Load (MW) Between 2008 and 2009 PJM Load Forecasts

	2008 Values			Forecast Values										
	Metered	Unrestricted	Normal	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
EMAAC CP Load Based on 2008 Fcst				35,295	36,015	36,666	37,349	37,804	38,543	39,372	40,018	40,548	41,179	41,587
EMAAC CP Load Based on 2009 Fcst					34,404	34,733	35,863	36,851	37,705	38,371	38,808	39,199	39,669	39,979
Difference					1,611	1,933	1,486	953	839	1,001	1,210	1,349	1,509	1,608

Comparison of Eastern MAAC 90/10 Non-Coincident Peak Load (MW) Between 2008 and 2009 PJM Load Forecasts

	2008 Values			Forecast Values										
	Metered	Unrestricted	Normal	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
EMAAC NCP Load Based on 2008 Fcst				35,452	36,176	36,829	37,515	37,974	38,711	39,543	40,192	40,726	41,358	41,771
EMAAC NCP Load Based on 2009 Fcst	32,840	33,038	33,110		34,452	34,782	35,901	36,928	37,735	38,405	38,855	39,218	39,686	40,076
Difference					1,724	2,047	1,614	1,046	976	1,138	1,337	1,508	1,672	1,695

Comparison of New Jersey Zones (AE, JCPL, PS, RECO) 90/10 Non-Coincident Peak Load (MW) Between 2008 and 2009 PJM Load Forecasts

	2008 Values			Forecast Values										
	Metered	Unrestricted	Normal	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
NJ Zones NCP Load Based on 2008 Fcst				21,834	22,300	22,722	23,205	23,460	23,951	24,538	24,947	25,272	25,672	25,896
NJ Zones NCP Load Based on 2009 Fcst	20,031	20,192	20,410		21,401	21,702	22,459	23,103	23,643	24,109	24,378	24,572	24,873	25,104
Difference					899	1,020	746	357	308	429	569	700	799	792

Source: PJM 2008 Load Forecast Report, Table D-1. PJM 2009 Load Forecast Report, Table D-1 and Table B-1 ("2008 Values"). Diversity factor for EMAAC CP forecast estimated from response to OCA-2-8, which contained an EMAAC CP value from the 2008 forecast.

Q. WHAT IS THE RELIABILITY IMPLICATION OF THE PEAK LOAD BEING "PUSHED OUT" ONE TO THREE YEARS, FOR EXAMPLE?

A. Roughly speaking, it means that the timing of most modeled claimed reliability violations would also tend to get "pushed out" by a similar amount, if all other assumptions are held constant, since peak load is a key driver of transmission system need.

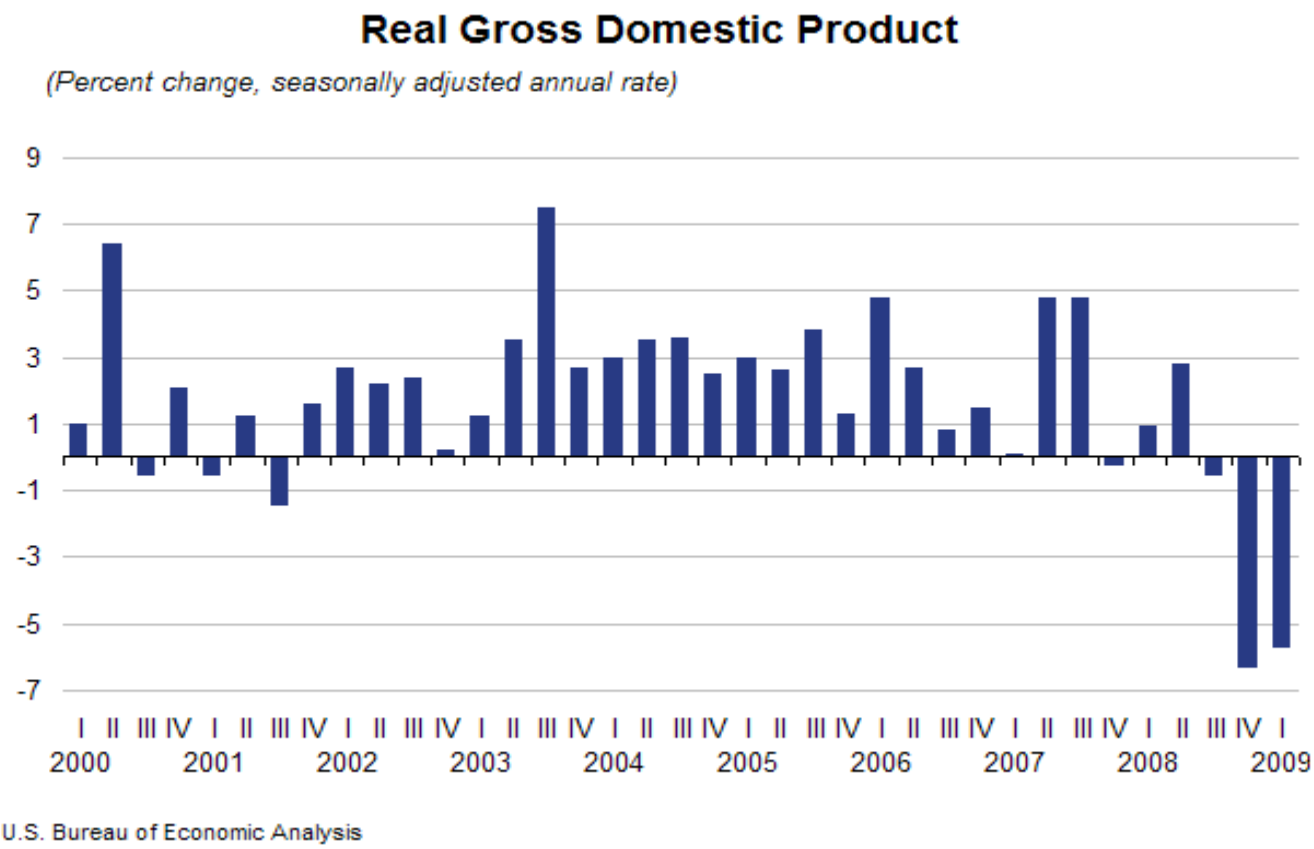
Q. IF PJM WERE TO UPDATE ITS ANALYSIS TO REFLECT A LOAD FORECAST OF MORE RECENT VINTAGE THAN THE JANUARY 2009 LOAD FORECAST REPORT, WHAT WOULD YOU EXPECT?

A. If PJM updated its analysis using a more current vintage load forecast, due to the extremely unusual economic situation in the nation and the region, the actual peak load differences between those used in PJM/PPL's model runs (based on the 2008 PJM Load Forecast) and those that would arise from a current forecast would be even greater than that shown in Table 1.

Q. WHY IS IT IMPORTANT TO USE A CURRENT VINTAGE FORECAST, RATHER THAN ONE FROM JANUARY 2009, TO UPDATE THE TRANSMISSION NEED MODELING?

A. It is important to use a current forecast because the general downturn in the US economy has been extremely severe since the last quarter of 2008, when PJM's 2009 load forecast was developed. The following Figure 1 from the US Bureau of Economic Analysis illustrates the severity and the timing of the downturn.

Figure 1. Real US GDP, by Quarter, 2000-2009



Source: US Bureau of Economic Analysis, http://www.bea.gov/briefrm/gdp.htm, May 29, 2009 update.

Q. WHAT DOES THIS CHART SHOW?

A. This chart illustrates in a general manner the timing and severity of the economic downturn on a national basis. As can be seen, the 3rd quarter of 2008 begins a recent trend of depressed economic activity, with the last quarter of 2008 and the first quarter of 2009 showing unprecedented steepness of decline of activity since the year 2000.

Q. DOES PJM USE INDICATORS OF ECONOMIC ACTIVITY IN ITS LOAD FORECAST?

A. Yes. PJM uses quarterly Gross Metropolitan Product values.[7] Thus, a forecast developed now would likely have more information available on the state of the economy than PJM's January 2009 Load Forecast Report.

Q. ARE THERE OTHER UPDATES TO THE MODELING THAT SHOULD ALSO BE UNDERTAKEN TO REFLECT CHANGED CIRCUMSTANCES?

A. Yes. I describe those in the following section.

III. DEMAND RESPONSE AND ENERGY EFFICIENCY

Q. WHAT LEVEL OF DEMAND RESPONSE AND ENERGY EFFICIENCY IS USED IN THE MODELING OF THE NEED FOR THE PROPOSED LINE?

A. PJM uses demand response and energy efficiency resources based on the information in the PJM 2009 Load Forecast Report (January, 2009). These resources include a combination of DR cleared in the 2011/12 RPM auction and interruptible load resources (ILR); energy efficiency resources are listed as zero in the report for all PJM regions (Table B-8), since the incorporation of these resources into PJM's planning framework only commenced with the May 2009 RPM auctions. Table 2 below shows demand response values for the MAAC, EMAAC, and New Jersey regions.

[7] PJM Manual 19, Load Forecasting and Analysis, Revision 14, December 1, 2008, page17.

Table 2. Demand Response Used in PJM/PPL Modeling for the Proposed SR500 Line

DR + EE, MW	2009	2010	2011	2012	2013	2014
MAAC	2,311	1,863	1,996	1,996	1,996	1,996
EMAAC	1,033	684	613	613	613	613
NJ	562	364	278	278	278	278

Source: PJM, Table D-1, 2009 Load Forecast Report. MAAC values taken directly. EMAAC values based on sum of values for NJ, DPL, and PECO territories. NJ values based of sum of values for NJ service territories. The response to OCA-2-1(a) also contains these same 2012 values for EMAAC and MAAC.

Q. IS THIS THE MOST RECENT INFORMATION AVAILABLE CONCERNING THE AMOUNT OF DEMAND RESPONSE THAT WILL BE AVAILABLE TO PJM IN 2012?

A. No. In May of 2009 (subsequent to the re-tool conducted by PJM in March of 2009) the most recent RPM auction cleared a significant increase in the amount of demand response – and for the first time in an RPM auction, energy efficiency – available for use as a capacity resource throughout PJM. This includes substantial increases over the values in Table 2 above for the MAAC, EMAAC and NJ areas. Table 3 below reproduces a table from the PJM RPM auction report in May 2009 that shows the level of offered and cleared demand response and energy efficiency resources by utility service territory.

Table 3. DR and EE Offered and Cleared in the 2012/13 RPM Auction (May, 2009)

	Offered MW*			Cleared MW*		
Zone	Demand	EE	Total	Demand	EE	Total
AECO	78.9	1.9	**80.8**	75.1	1.2	**76.3**
AEP	1352.7	2.6	**1355.3**	710.8	0	**710.8**
APS	582.4	0	**582.4**	272.9	0	**272.9**
BGE	1370.6	105.8	**1476.4**	1312.9	103.2	**1416.1**
COMED	1049	386.4	**1435.4**	658	386.4	**1044.4**
DAY	405.6	0	**405.6**	112.3	0	**112.3**
DOM	1237.9	76.6	**1314.5**	494.7	2.4	**497.1**
DPL	289.6	12.7	**302.3**	283	12.2	**295.2**
DUQ	190.8	0.2	**191**	74.8	0.2	**75**
JCPL	362.7	2.8	**365.5**	321.9	1.8	**323.7**
METED	267.2	0	**267.2**	252	0	**252**
PECO	581.2	2.9	**584.1**	496.4	1.9	**498.3**
PENELEC	286.1	0.2	**286.3**	276.3	0.2	**276.5**
PEPCO	485.1	56.5	**541.6**	460.8	56.5	**517.3**
PPL	832.9	0	**832.9**	783.3	0	**783.3**
PSEG	472.9	4.1	**477**	460.1	2.9	**463**
RECO	2	0	**2**	2	0	**2**
Total	**9847.6**	**652.7**	**10500.3**	**7047.3**	**568.9**	**7616.2**

*All MW Values are in UCAP Terms

Source: PJM, 2012/2013 RPM Base Residual Auction Results, Table 3A, "Comparison of Demand Resources and Energy Efficiency Resources Offered versus Cleared in the 2012/13 BRA represented in UCAP". May 2009.

Table 4 below aggregates the values in the table above to produce the levels for MAAC, EMAAC, and New Jersey.

Table 4. Updated Levels of DR and EE Based on Results of 2012/13 RPM Auction

DR + EE, MW	2009	2010	2011	2012	2013	2014
MAAC	2,311	1,863	1,996	4,904	4,904	4,904
EMAAC	1,033	684	613	1,659	1,659	1,659
NJ	562	364	278	865	865	865

Q. HAS PJM UPDATED THEIR ANALYSIS TO TAKE THESE INCREASED DEMAND SIDE RESOURCES INTO ACCOUNT?

A. No. PJM has stated that they have not done such analysis yet:

> "PJM has not yet performed any sensitivity analysis based on the results of the 2012/13 RPM Base Residual Auction."[8]

Q. WHAT IS THE INCREASE IN DEMAND RESPONSE AND ENERGY EFFICIENCY RESOURCE AVAILABILITY ARISING FROM THE RECENTLY COMPLETED RPM AUCTION?

A. Table 5 below shows the increase. In 2012, there is an increase of 2,908 MW of demand side resources compared to the level PJM/PPL has included in its modeling of transmission line need. There is an increase of over 1,000 MW available in eastern MAAC, the regions encompassing New Jersey, the Delmarva Peninsula and the PECO service territory. And there is 587 MW of additional resources for the New Jersey territories alone. There is no change to available DR and EE in 2009 through 2011 because the RPM results are for three years ahead. The values modeled subsequent to 2012 (shown only through 2014 here) are the same as the 2012 levels until PJM conducts the next RPM auction.[9]

Table 5. Increase in Available DR and EE for 2012 Compared to PJM/PPL Modeled Levels

Delta (DR + EE), MW	2009	2010	2011	2012	2013	2014
MAAC	0	0	0	2,908	2,908	2,908
EMAAC	0	0	0	1,046	1,046	1,046
NJ	0	0	0	587	587	587

Source: Computed from the difference between the values in Tables 3 and 4 above.

[8] Response to OCA-11-5(a).

[9] Arguably, incremental DR for the years beyond the current RPM year could still be considered as potentially available for future RPM auctions, and could be modeled as available as a future resource.

Q. SHOULD PJM PERFORM A "RE-TOOL" AND ACCOUNT FOR THIS SUBSTANTIAL INCREASE IN DEMAND SIDE RESOURCES?

A. Yes. A re-tool is necessary to properly assess the level of need that currently exists for the proposed SR500 line.

Q. HOW DO ENERGY EFFICIENCY RESOURCES AFFECT PEAK LOAD?

A. In general, the implementation of energy efficiency resources lowers peak load. In addition to reducing consumption of energy (kWh), energy efficiency implementation can also reduce end-user load or demand (kW) during utilities' peak usage period.

Q. HOW DOES PJM/PPL INCORPORATE ADVANCES IN ENERGY EFFICIENCY IN THEIR LOAD FORECAST AND IN THE MODELING OF THE NEED FOR THE PROPOSED SR500 LINE?

A. PJM's econometric-based load forecast accounts for historical trends in energy efficiency seen in the individual utility service territories.[10] However, PJM does not subtract planned energy efficiency savings, or account for any potential changes to historical trends that might be relevant. That would include, for example, the effect on future load of changes in state policy or state law that require increasing amounts of electric energy efficiency beyond what would occur in the absence of such directives. For future transmission modeling exercises, PJM will incorporate the effect of energy efficiency peak load savings that clear in the RPM auction.[11]

[10] Response to OCA-2-1 (a). "Energy efficiency is accounted for to the extent that it is a part of historical metered load."

[11] Direct Testimony, John M. Reynolds, PPL Electric Statement No. 9, 8: 5-9. After an extensive process, PJM proposed and FERC accepted a revision to RPM rules that now allow verified energy efficiency savings to participate as capacity resources. Capacity resources are available to meet peak load needs.

Q. PJM NOW ALLOWS FOR THE PEAK SAVINGS EFFECT OF ENERGY EFFICIENCY RESOURCES TO PARTICIPATE AS A RESOURCE IN THE RPM AUCTION. DOES THAT CAPTURE THE EFFECT OF ENERGY EFFICIENCY FOR SR500 PLANNING NEED PURPOSES?

A. It does capture an effect of energy efficiency, but in this instance it fails to capture key eastern PJM energy efficiency resources that would begin to be available prior to 2012 but are not included as 2012 resources because they did not clear, or perhaps did not even offer, into the auction. As seen in the results of the most recent RPM auction (Table 3 above in this testimony), New Jersey service territories cleared very little energy efficiency. The combined four utility territories (AECO, JCPL, PSEG, RECO) cleared a total of 5.9 MW for the 2012/13 resource year (to meet 2012 summer peak capacity obligations).

However, this does not mean that an increased level of energy efficiency resources won't be available in 2012 in these areas. Energy efficiency resources can begin to deliver in relatively short time frames, and the three-year horizon of the RPM auction (i.e., the auction for 2012 summer peak resources is held in the spring of 2009) can fail to capture some resource availability, especially when programs are still ramping up, as in New Jersey and Pennsylvania.

Also, PJM will model future year energy efficiency (i.e., beyond the one-year time frame of the RPM auction) as being equal to the amount cleared in the current RPM auction. Future incremental increases in energy efficiency (beyond those cleared in the most recently completed RPM auction) that may be part of a statewide program or mandated by statute are not modeled as resources in the transmission need process unless

and until they "clear" in a future RPM auction, and thus their contributions to reducing peak load in years beyond the immediate RPM delivery year are discounted.

Q. HOW SHOULD PJM ACCOUNT FOR THIS SHORTCOMING?

A. There are a number of different ways that they could account for the shortcoming. For transmission planning, PJM could consider the projections of energy efficiency savings for 2012 (or other years) based on NJ EMP and PA Act 129 peak load reduction trajectory information.

New Jersey and Pennsylvania State Energy Efficiency Targets

Q. CAN YOU SUMMARIZE THE EASTERN PENNSYLVANIA AND NEW JERSEY PJM REGIONS' ENERGY EFFICIENCY AND DEMAND RESPONSE PLANS?

A. Yes. New Jersey is in the process of implementing energy efficiency programs arising from the state's Energy Master Plan, issued in October 2008, which seeks to dramatically reduce peak load growth by 2020 net of energy efficiency, demand response and some distributed generation.[12] The NJ EMP provision will affect the peak load growth of PSEG, JCPL, AECO and RECO, New Jersey's electric utilities. Pennsylvania utilities must meet the energy efficiency and demand response provisions of Act 129, which requires them to reduce their average peak load in the top 100 hours of the summer of 2007 to levels 4.5% below that average by the summer of 2012.[13] These provisions affect PA utilities, including MetEd, PPL, and PECO.

[12] "New Jersey Energy Master Plan", October 2008, available at http://nj.gov/emp/docs/pdf/081022_emp.pdf.

[13] The provision states that the reduction must be in place by May 31, 2013.

Q. PLEASE SUMMARIZE THE PEAK LOAD SAVINGS ANTICIPATED FROM THE NEW JERSEY ENERGY MASTER PLAN ENERGY EFFICIENCY INITIATIVES.

A. New Jersey plans to reduce peak load by 3,300 MW between its base year of 2004 and 2020, solely from energy efficiency resources.[14] Peak demand for 2020 is projected to be approximately 21,900 MW, exclusive of the effect of intended incremental distributed generation and demand response. PJM currently projects a non-coincident peak of 25,717 MW for the four New Jersey utilities (PJM 2009 Load Forecast Report; see Table 1 above). Thus there is a difference of roughly 3,800 MW of peak load (in 2020) between what PJM projects for New Jersey, and what New Jersey is aiming for with its Energy Master Plan. New Jersey also plans for additional peak load reduction of 900 MW from demand response resources and 1,500 MW from distributed generation, by 2020.

Depending on the "ramp rate" of such efficiency and demand response gains, New Jersey could see energy efficiency and demand response peak savings in 2012 of anywhere from tens of MW to hundreds of MW, and most if not all of these savings are not considered in PJM's modeling of the need for the SR500 line.

Q. WHAT IS THE RELEVANT LANGUAGE IN PENNSYLVANIA'S ACT 129 IN REGARDS TO PEAK DEMAND REDUCTION?

A. The relevant language is as follows:

[14] The Energy Master Plan also projects demand response savings of 900 MW over this time frame, and distributed generation of 1,500 MW. See "Modeling Report for the Energy Master Plan, Appendix A: BAU vs. Alternative Scenarios", October 21, 2008, available at http://www.nj.gov/emp/docs/pdf/10122208ceeepModEMP.pdf (downloaded June 5, 2009).

(1) By May 31, 2013, the weather-normalized demand of the retail customers of each electric distribution company shall be reduced by a minimum of 4.5% of annual system peak demand in the 100 hours of highest demand. The reduction shall be measured against the electric distribution company's peak demand for June 1, 2007, through May 31, 2008.

Source: 66 Pa.C.S. Section 2806.1(d).

Q. PLEASE SUMMARIZE THE PERTINENT EFFECT OF PENNSYLVANIA'S ACT 129 ON THE ELECTRIC UTILITIES IN EASTERN PENNSYLVANIA.

A. Table 6 below is reproduced from the Pennsylvania Public Utility Commission's Order from March 26, 2009. It summarizes the level of peak demand reduction that must be attained by May 31, 2013 (the end of the PJM 2012/2013 planning period. The statute illustrates that the state is aiming to achieve a 1,193 MW peak demand reduction.

Table 6. Reproduction of Peak Demand Savings Table from PA PUC Order Implementing Act 129

Table 2. Average Historical Peak Loads and Act 129 Mandated Peak Demand Reductions as Measured in Megawatts		
EDC	Load	4.5% Reduction
Duquesne	2,518	113
Met-Ed	2,644	119
Penelec	2,395	108
Penn Power	980	44
PPL	6,592	297
PECO	7,899	355
West Penn	3,496	157
Total	26,524	1,193

Source: PA PUC Order, Docket No. M-2008-2069887, "Energy Consumption and Peak Demand Reduction Targets", March 26, 2009.

Q. ARE ANY OF THE PEAK LOAD REDUCTIONS PROJECTED HERE INCLUDED IN THE ENERGY EFFICIENCY RESOURCES THAT CLEARED IN THE 2012/13 RPM AUCTION, OR THE PJM JANUARY 2009 LOAD FORECAST?

A. None of these savings are considered in the January 2009 Load Forecast. It is possible that the RPM auction includes amounts that would be obtained through programs or initiatives resulting from the law, but the fraction is so small as to be *de minimus* relative to the required savings. The amount of energy efficiency clearing in the RPM auction from these utilities is very small – a total of 1.9 MW, all from the PECO zone.

Q. IN CONCLUSION, FOR THE PURPOSES OF TRANSMISSION PLANNING, DOES PJM/PPL MODEL ANY SIGNIFICANT LEVEL OF THE PROJECTED ENERGY EFFICIENCY SAVINGS MANDATED BY PA ACT 129 OR BEING IMPLEMENTED AS PART OF NEW JERSEY'S ENERGY MASTER PLAN?

A. No, as seen in the results of the 2012/13 RPM, and as verified by PJM, PJM does not model the projected effect of these programs, either directly or as a sensitivity analysis to determine the effect on peak load if such programs achieve their aims. PJM states:

> "…The timing and quantity of any of the proposed energy efficiency programs which may ultimately be implemented is inherently uncertain, cannot be relied upon in planning for a reliable transmission system and therefore are not incorporated in the PJM analysis".[15]

[15] Response to OCA 2-12 (d).

Q. DOES PJM CONDUCT ANY SENSITIVITY OR SCENARIO ANALYSIS THAT WOULD CONSIDER DEMAND RESPONSE OR ENERGY EFFICIENCY RESOURCES SUCH AS THE PA ACT 129 OR NEW JERSEY EMP IMPLEMENTATION?

A. No. PJM/PPL do not attempt to assess the sensitivity of their needs analysis to energy efficiency implementation that is not already part of their load forecast or is not cleared in the RPM auction.

Q. WHAT DO YOU CONCLUDE FROM YOUR EXAMINATION OF PJM/PPL'S MODELING ASSUMPTIONS FOR THE LOAD FORECAST, DEMAND RESPONSE RESOURCES, AND ENERGY EFFICIENCY RESOURCES?

A. I conclude that the use of an outdated load forecast, the exclusion of considerable DR and EE resources made available through the 2012/13 RPM auction, and the lack of consideration of additional PA and NJ demand side resources pursuant to state law and policy results in a flawed transmission need modeling result.

IV. MODELING OF EASTERN PJM CAPACITY RESOURCES

Q. COULD SUPPLY-SIDE RESOURCE ALTERNATIVES REDUCE CLAIMED RELIABILITY VIOLATIONS?

A. Yes. Additional capacity resources in New Jersey and other eastern PJM regions could reduce both the number and severity of claimed reliability violations by being available for operation during peak periods. Depending on the extent of resources, they could eliminate need for the line or reduce the extent of violations such that construction of a 500 kV line would be an unreasonable option to implement.

Q. HASN'T PJM ALREADY ACCOUNTED FOR CAPACITY RESOURCES IN THEIR MODELING?

A. Yes, to some extent. However, important synergies arise if the year of need for the line is pushed out due to the combination of increased energy efficiency, demand response, and the economy's effect on the underlying gross load forecast. Additional capacity resources that have not yet signed an interconnection service agreement ("ISA")[16] and therefore were not used by PJM/PPL in the original modeling may become available.

Q. WHAT EVIDENCE IS THERE THAT ADDITIONAL RESOURCES MIGHT BE AVAILABLE?

A. In response to OCA-2-1 Attachment 1 and OCA-2-2, Attachment 1, PJM/PPL indicated that the 2012 load deliverability analysis uses a total of 0 MW of new generation in the JCPL zone, and 20 MW of new generation in the PSEG zone. For the generation deliverability analysis, there is 0 MW of new generation in both of these zones. There are additional generation resources currently in PJM's generation queue that seemingly were not modeled in the 2012 deliverability analyses by PJM.[17] Those include the following New Jersey resources:[18]

- JCPL zone, queue Q8, Q11, R11 – natural gas - 50, 300, and 440 MW = 790 MW total; and

[16] An interconnection service agreement between a generator and PJM is an important milestone in a generator's process of obtaining final connection to the grid. PJM uses the existence of an ISA as a key indicator in its assessment of generation resources to include in transmission planning models.

[17] The response to OCA-2-2 c. states that "existing and new generators (2,570 MW) in queues R through T were modeled online in the load deliverability case and not in the generator deliverability case as the generation deliverability case is the base case to be used for these interconnection studies". However, that statement appears to conflict with the table provided as Attachment 1 to OCA-2-1, which includes 0 MW and 20 MW of new generation, respectively, for JCPL and PSEG zones.

[18] PJM Interconnection Queue Q, R, T, available at http://www.pjm.com/planning/generation-interconnection/generation-queue-active.aspx.

- PSEG zone queue T42, T43, T44 – natural gas - 79, 178, and 205 MW = 462 MW.

Q. WHY ARE POTENTIAL CAPACITY RESOURCES IN THESE ZONES IMPORTANT?

A. The claimed reliability violations are mostly load deliverability violations to New Jersey zones or to the overall Eastern MAAC zone. Generation capacity added to the transmission planning model in these zones will tend towards reducing the severity of claimed reliability violations, either shifting the timing of the violation to a future year, or possibly eliminating the violation.

V. MODELING ASSUMPTION EFFECT ON TIMING OF CLAIMED RELIABILITY VIOLATIONS

Q. WHAT IS THE OVERALL EFFECT OF USING INCOMPLETE OR OUTDATED INPUT ASSUMPTIONS TO THE MODELING PROCESS?

A. The overall effect is that the timing of the claimed reliability violations seen in Exhibit PFM-1 and the supplemental response to OCA-2-8 appear much closer in time than is likely to occur; i.e., violations projected to begin occurring in a certain year would likely occur in later years, if updates were made to critical input assumptions.

Q. IS THERE ANY DIRECT EVIDENCE OF THIS ALREADY?

A. Yes. As seen in Table 1 of the Direct Testimony of Peter Lanzalotta, the use of the January 2009 load forecast in the March 2009 retool resulted in changes to the year of occurrence of many of the claimed reliability violations first identified by the applicants using the January 2008 load forecast. Most of these changes were later-year occurrences of identified claimed reliability violations. These March 2009 retool results were supplied by PJM/PPL in the supplemental response to OCA-2-8 on June 25, 2009.

Q. DOES LOWER "NET PEAK LOAD" IN EASTERN MAAC REDUCE THE SEVERITY AND POSSIBLY THE TIMING OF CLAIMED RELIABILITY VIOLATIONS SEEN IN EXHIBIT PFM-1 AND THE SUPPLEMENTAL RESPONSE TO OCA-2-8?

A. In general, yes. When modeling the need for the SR500 line, reduced "net peak load" (or peak load minus the effect of updated load forecasts, energy efficiency and demand response resources not already accounted for) in the eastern MAAC region[19] - especially New Jersey - directly reduces the relative severity or even the existence of claimed reliability violations listed in Exhibit PFM-1 and in the supplemental response to OCA-2-8. For example, to the extent that energy efficiency and demand response effects are present in 2012 and are not tested in PJM/PPL's current planning process for that period, the modeling outcome results shown in Exhibit PFM-1 and in the supplemental response to OCA-2-8 represent overstated claimed reliability violations, assuming all other input assumptions used in the modeling – e.g., generation capacity resource levels in Eastern PJM - remain the same.

Q. PLEASE EXPLAIN.

A. The claimed reliability violations shown in Exhibit PFM-1 and in the supplemental response to OCA-2-8 include PJM-zone-based "load deliverability" violations, and PJM-wide "generation deliverability" violations. Each of the "load deliverability" violations are modeled using an extreme summer peak load (i.e., PJM's 90/10 forecast peak load) in the particular zone, and each of the "generation deliverability" violations use PJM's 50/50 forecast of peak load throughout the region. PJM/PPL's modeling tests the system

[19] It is also possible that energy efficiency and demand response resources outside of "eastern MAAC", for example in the MetEd and PPL territories, also help to relieve the reliability violations described in Exhibit PFM-1 and the supplemental response to OCA-2-8.

reliability during times of peak load. In addition to the peak load forecast, PJM decrements the load modeled for demand response or interruptible load resources. However, PJM has not yet reduced its modeled peak load to test the effect of i) an updated base load forecast, ii) the demand response resource increase available as a result of the 2012/13 RPM auction, and iii) increased energy efficiency and demand response resources available from the directives of PA's Act 129 and New Jersey's Energy Master Plan.

Q. IS THERE ANY WAY TO ASCERTAIN HOW AN UPDATED LOAD FORECAST AND ADDITIONAL DEMAND RESPONSE AND ENERGY EFFICIENCY RESOURCES WOULD AFFECT THE NEED FOR THE LINE?

A. Yes. PJM can and should perform a "retool" analysis incorporating these effects. The retool itself can even be used as a form of "scenario" or sensitivity analysis; multiple retools can be conducted to determine, for example, how critical PA Act 129 and NJ EMP demand side resources may be in determining the need, or the year of need, for the proposed SR500 line. If the results of the re-tool were to illustrate a later year of need, then revisions to base assumptions for transmission upgrades (i.e., other RTEP improvements) and supply-side resource availability would also need to be made.

Q. YOU REFER TO PJM/PPL'S NEED TO INCLUDE AN UPDATED LOAD FORECAST, 2012/13 RPM DEMAND RESPONSE, AND ADDITIONAL NJ AND PA DEMAND SIDE RESOURCES. WITHOUT PERFORMING A RE-TOOL ANALYSIS, CAN YOU EXAMINE HOW THE CLAIMED RELIABILITY VIOLATIONS OF PFM-1 AND OF THE SUPPLEMENTAL RESPONSE TO OCA-2-8 MAY "SHIFT" TO LATER YEARS WITH THESE ASSUMPTIONS?

A. Yes, roughly. Table 7 below shows how the overall pattern of "net peak load", or peak load minus demand response resources and energy efficiency resources would change when considering these resources, for the eastern MAAC region. The table also includes, for illustrative purposes, a 300 MW decrement to the base load forecast that might be seen with a more current forecast than the one from the January 2009 Load Forecast Report. For the PA Act 129 reductions, the full level of statutory reductions for the PECO territory is used, since they are the only PA utility in PJM's designation of eastern MAAC. For New Jersey, a conservative 50% of the EMP goals for energy efficiency and demand response was used, along with a projected ramp rate for installation of the resources.

Table 7. Illustration of Shift of Year of Need Based on Updated Modeling Assumptions

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Eastern MAAC NCP 90/10 Load Forecast, 2009	**36,928**	37,735	38,405	38,855	39,218	39,686	40,076	40,531	41,062
Increase in DR Resources from 2012/13 Auction	1,046	1,046	1,046	1,046	1,046	1,046	1,046	1,046	1,046
Incremental EE/DR Act 129 - PECO - Flat after 2013	355	355	355	355	355	355	355	355	355
Incremental EE/DR NJ - 50% of Goal, and Assumed Ramp	275	525	788	1,050	1,313	1,575	1,838	2,100	2,100
Illustrative EMAAC Load Reduction - Updated Forecast	300	300	300	300	300	300	300	300	500
Net Peak Load Difference for Planning	1,976	2,226	2,488	2,751	3,013	3,276	3,538	3,801	4,001
Illustrative Revised Net Peak Load Forecast	34,953	35,510	35,917	36,105	36,205	36,411	36,538	36,731	**37,062**

Q. PLEASE EXPLAIN THESE RESULTS.

A. The table shows that in general, the combination of an updated load forecast, recognition of demand response and energy efficiency resources from the 2012/13 RPM results, and inclusion of at least a portion of the energy efficiency and demand response targets from PA Act 129 and the NJ EMP leads to a shift in the Eastern MAAC "net peak load" of eight years, from 2012 to 2020. In other words, the "net peak load" currently forecast for 2012 for eastern MAAC would not be met or exceeded until 2020 if the assumed DR and EE resource levels were attained, and if an updated load forecast resulted in the lower peak load illustrated here. All else equal, this implies that most of the claimed reliability violations could also be pushed out from 2012 to 2020.

VI. CONCLUSIONS AND RECOMMENDATIONS

Q. WHAT DO YOU CONCLUDE FROM YOUR ANALYSIS OF THE PROPOSED SR500 LINE?

A. 1. PJM has not yet quantified the effect of DR and EE that cleared in the 2012/13 RPM auction on the year of need for the proposed line. PJM has also not attempted to ascertain the effect of NJ and PA law mandating energy efficiency on the potential for peak load reduction and how it may affect need for the line. PJM also has not performed a load forecast that reflects the extreme economic downturn in the first half of 2009.

2. I estimate that the decline in Eastern MAAC "net peak load" associated with inclusion of all such resources in the modeling, relative to PJM's input assumptions, results in a potential "year of need" shift of eight years.

Recommendations

- PJM/PPL should conduct a "re-tool" analysis, with appropriate sensitivity analyses, to demonstrate the effect of increased EE and DR, and should use an updated load forecast when doing so.
- PJM/PPL should file the results of any such retool analyses in this docket as part of this application.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

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BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Application of PPL Electric Utilities Corporation Filed Pursuant to 52 Pa. Code Chapter 57, Subchapter G, for Approval of the Siting and Construction of the Pennsylvania Portion of the Proposed Susquehanna-Roseland 500 kV Transmission Line in Portions of Lackawanna, Luzerne, Monroe, Pike and Wayne Counties, Pennsylvania	:	Docket No. A-2009-2082652
Petition of PPL Electric Utilities Corporation for a Finding that a Building to Shelter Equipment at the 500-230 kV Substation to be Constructed in the Borough of Blakely, Lackawanna County, Pennsylvania is Reasonably Necessary for the Convenience or Welfare of the Public	:	A-2009-2082832
Application of PPL Electric Utilities Corporation Under 15 Pa. C.S. §§1511(c) for a Finding and Determination that the Service to be Furnished by the Applicant Through Its Proposed Exercise of the Power of Eminent Domain to Acquire a Right-Of-Way and Easement Over and Across the Lands of the Property Owners Listed Below For the Proposed Susquehanna-Roseland 500 kV Transmission Line In Portions of Lackawanna, Luzerne, Monroe, Pike and Wayne Counties, Pennsylvania is Necessary or Proper for the Service, Accommodation, Convenience or Safety of the Public	:	
Chaudari Family Limited Partnership, David Murphy, and Marguerite T. Kranick	:	A-2009-2088297
HaRa Corporation	:	A-2009-2088337
Richard Coccodrilli, Jr., Jeffrey J. Coccodril, Jr, Ryan T. Coccodrilli, and Joseph Williams	:	A-2009-2088327

D&L Realty Company	:	A-2009-2088340
Kenneth Powell and Linda Powell	:	A-2009-2088359
Rudolph Saporito and Maria Saporito	:	A-2009-2088312
David Murphy	:	A-2009-2088360

EXHIBITS TO THE

DIRECT TESTIMONY

ROBERT M. FAGAN

On Behalf of the Pennsylvania

Office of Consumer Advocate

June 30, 2009

Robert M. Fagan

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SUMMARY

Mechanical engineer and energy economics analyst with over 20 years experience in the energy industry. Activities focused primarily on electric power industry issues, especially economic and technical analysis of transmission pricing structures, wholesale electricity markets, renewable resource alternatives and assessment and implementation of demand-side alternatives.

In-depth understanding of the complexities of, and the interrelationships between, the technical and economic dimensions of the electric power industry in the US and Canada, including the following areas of expertise:

- Wholesale energy and capacity provision under market-based and regulated structures; the extent of competitiveness of such structures.
- Potential for and operational effects of wind power integration into utility systems.
- Transmission use pricing, encompassing congestion management, losses, LMP and alternatives, financial and physical transmission rights; and transmission asset pricing (embedded cost recovery tariffs).
- Physical transmission network characteristics; related generation dispatch/system operation functions; and technical and economic attributes of generation resources.
- RTO and ISO tariff and market rules structures and operation.
- FERC regulatory policies and initiatives, including those pertaining to RTO and ISO development and evolution.
- Demand-side management, including program implementation and evaluation; and load response presence in wholesale markets.
- Building energy end-use characteristics, and energy-efficient technology options.
- Fundamentals of electric distribution systems and substation layout and operation.
- Energy modeling (spreadsheet-based, GE MAPS and online DOE-2 residential).
- State and provincial level regulatory policies and practices, including retail service and standard offer pricing structures.
- Gas industry fundamentals including regulatory and market structures, and physical infrastructure.

PROFESSIONAL EXPERIENCE

Synapse Energy Economics, Inc., Cambridge, MA. 2004 – Present. Senior Associate
Responsibilities include consulting on issues of energy economics, analysis of electricity utility planning, operation, and regulation, including issues of transmission, generation, and demand-side management. Provide expert witness testimony on various wholesale and retail electricity industry issues. Specific project experience includes the following:

- Analysis of need for transmission facilities in Maine and Ontario.
- Ongoing analysis of wholesale and retail energy and capacity market issues in New Jersey, including assessment of BGS supply alternatives and demand response options.
- Analysis of PJM transmission-related issues, including cost allocation, need for new facilities and PJM's economic modeling of new transmission effects on PJM energy market.
- Ongoing analysis of utility-sponsored energy efficiency programs in Rhode Island as part of the Rhode Island DSM Collaborative.
- Analysis of proposals in Maine for utility companies to withdraw from the ISO-NE RTO.
- Analysis of utility planning and demand-side management issues in Delaware.
- Analysis of effect of increasing the system benefits charge (SBC) in Maine to increase procurement of energy efficiency and DSM resources; analysis of impact of DSM on transmission and distribution reinforcement need.
- Evaluation of wind energy potential and economics, related transmission issues, and resource planning in Minnesota, Iowa, Indiana, and Missouri; in particular in relation to alternatives to newly proposed coal-fired power plants in MN, IA and IN.
- Analysis of need for newly proposed transmission in Pennsylvania and Ontario.
- Evaluation of wind energy "firming" premium in BC Hydro Energy Call in British Columbia.
- Evaluation of pollutant emission reduction plans and the introduction of an open access transmission tariff in Nova Scotia.
- Evaluation of the merger of Duke and Cinergy with respect to Indiana ratepayer impacts.
- Review of the termination of a Joint Generation Dispatch Agreement between sister companies of Cinergy.
- Assessment of the potential for an interstate transfer of a DSM resource between the desert southwest and California, and the transmission system impacts associated with the resource.
- Analysis of various transmission system and market power issues associated with the proposed Exelon-PSEG merger.
- Assessment of market power and transmission issues associated with the proposed use of an auction mechanism to supply standard offer power to ComEd native load customers.
- Review and analysis of the impacts of a proposed second 345 kV tie to New Brunswick from Maine on northern Maine customers.

Tabors Caramanis & Associates, Cambridge, MA 1996 -2004. Senior Associate.

- Provided expert witness testimony on transmission issues in Ontario and Alberta.

- Supported FERC-filed testimony of Dr. Tabors in numerous dockets, addressing various electric transmission and wholesale market issues.
- Analyzed transmission pricing and access policies, and electric industry restructuring proposals in US and Canadian jurisdictions including Ontario, Alberta, PJM, New York, New England, California, ERCOT, and the Midwest. Evaluated and offered alternatives for congestion management methods and wholesale electric market design.
- Attended RTO/ISO meetings, and monitored and reported on continuing developments in the New England and PJM electricity markets. Consulted on New England FTR auction and ARR allocation schemes.
- Evaluated all facets of Ontario and Alberta wholesale market development and evolution since 1997. Offered congestion management, transmission, cross-border interchange, and energy and capacity market design options. Directly participated in the Ontario Market Design Committee process. Served on the Ontario Wholesale Market Design technical panel.
- Member of TCA GE MAPS modeling team in LMP price forecasting projects.
- Assessed different aspects of the broad competitive market development themes presented in the US FERC's SMD NOPR and the application of FERC's Order 2000 on RTO development.
- Reviewed utility merger savings benchmarks, evaluated status of utility generation market power, and provided technical support underlying the analysis of competitive wholesale electricity markets in major US regions.
- Conducted life-cycle utility cost analyses for proposed new and renovated residential housing at US military bases. Compared life-cycle utility cost options for large educational and medical campuses.
- Evaluated innovative DSM competitive procurement program utilizing performance-based contracting.

Charles River Associates, Boston, MA, 1992-1996. **Associate**. Developed DSM competitive procurement RFPs and evaluation plans, and performed DSM process and impact evaluations. Conducted quantitative studies examining electric utility mergers; and examined generation capacity concentration and transmission interconnections throughout the US. Analyzed natural gas and petroleum industry economic issues; and provided regulatory testimony support to CRA staff in proceedings before the US FERC and various state utility regulatory commissions.

Rhode Islanders Saving Energy, Providence, RI, 1987-1992. **Senior Commercial/Industrial Energy Specialist**. Performed site visits, analyzed end-use energy consumption and calculated energy-efficiency improvement potential in approximately 1,000 commercial, industrial, and institutional buildings throughout Rhode Island, including assessment of lighting, HVAC, hot water, building shell, refrigeration and industrial process systems. Recommended and assisted in implementation of energy efficiency measures, and coordinated customer participation in utility DSM program efforts.

Fairchild Weston Systems, Inc., Syosset, NY 1985-1986. Facilities Engineer. Designed space renovations; managed capital improvement projects; and supervised contractors in implementation of facility upgrades.

Narragansett Electric Company, Providence RI, 1981-1984. Supervisor of Operations and Maintenance. Directed electricians in operation, maintenance, and repair of high-voltage transmission and distribution substation equipment.

EDUCATION

Boston University, M.A. Energy and Environmental Studies, 1992
Resource Economics, Ecological Economics, Econometric Modeling

Clarkson University, B.S. Mechanical Engineering, 1981
Thermal Sciences

Additional Professional Training and Academic Coursework
Utility Wind Integration Group - Short Course on Integration and Interconnection of Wind Power Plants Into Electric Power Systems (2006).
Regulatory and Legal Aspects of Electric Power Systems – Short Course – University of Texas at Austin (1998)
Illuminating Engineering Society courses in lighting design (1989).
Coursework in Solar Engineering; Building System Controls; and Cogeneration at Worcester Polytechnic Institute and Northeastern University (1984, 1988-89).
Graduate Coursework in Mechanical and Aerospace Engineering – Polytechnic Institute of New York (1985-1986)

SUMMARY OF TESTIMONY, PUBLICATIONS, AND PRESENTATIONS

TESTIMONY

Delaware Public Service Commission. Report on Behalf of the Staff of the Delaware Public Service Commission, filed in Docket No. 07-20, Delmarva's IRP docket, "Review of Delmarva Power & Light Company's Integrated Resource Plan", April 2, 2009. Jointly authored with Alice Napoleon, William Steinhurst, David White, and Kenji Takahashi of Synapse Energy Economics. Hearings scheduled for July 2009.

State of Maine Public Utilities Commission. Pre-filed Direct Testimony on the Application of Central Maine Power for a Certificate of Public Convenience and Necessity for the proposed Maine Power Reliability Project (MPRP), a $1.55 billion transmission enhancement project. Testimony focus on the non-transmission alternatives analysis conducted on behalf of CMP. Maine PUC Docket 2008-255, filed January 12, 2009 on behalf of the Maine Office of Public Advocate. Docket proceeding; no hearings to date.

New Jersey Board of Public Utilities. Oral testimony before the Board, jointly with Bruce Biewald, on certain aspects of the Basic Generation Service (BGS) procurement plan for service beginning June 1, 2009. Docket No. ER08050310. Hearing conducted on September 29, 2008.

Wisconsin Public Service Commission. Direct and Surrebuttal Testimony in Docket 6680-CE-170 on behalf of Clean Wisconsin in the matter of an application by Wisconsin Power and Light for a CPCN for construction of a 300 MW coal plant. The testimony focused on the alternative energy options available with wind power, and the effect of the MISO RTO in helping provide capacity and energy to the Wisconsin area reliably without needed the proposed coal plant. The CPCN was denied by the WPSC in December 2008. Testimony filed in August (Direct) and September (Surrebuttal), 2008.

Ontario Energy Board. Pre-Filed Direct Testimony filed on behalf of Pollution Probe in the matter of the Examination and Critique of Demand Response and Combined Heat and Power Aspects of the Ontario Power Authority's Integrated Power System Plan and Procurement Process, Docket EB-2007-0707. The testimony addressed issues associated with the planned levels of procurement of demand response, combined heat and power, and NUG resources as part of Ontario Power Authority's long-term integrated planning process. Testimony filed on August 1, 2008. Docket is open; additional Power System Plan and Procurement filings expected from the Ontario Power Authority.

Ontario Energy Board. Direct and Supplemental Testimony filed jointly with Mr. Peter Lanzalotta on behalf of Pollution Probe in the matter of Hydro One Networks Inc. application to construct a new 500 kV transmission line between the Bruce Power complex and the town of Milton, Ontario. Docket EB-2007-0050. The testimony addressed issues of congestion (locked-in energy) modeling, need, and series compensation and generation rejection alternatives to the proposed line. Testimony filed on April 18, 2008 (Direct) and May 15, 2008 (Supplemental).

Federal Energy Regulatory Commission. Direct and Rebuttal Testimony on PJM Regional Transmission Expansion Plan (RTEP) Cost Allocation issues in Dockets ER06-456, ER06-954, ER06-1271, ER07-424, EL07-57, ER06-880, et al. The testimony addressed merchant transmission cost allocation issues. Testimony filed on behalf of the New Jersey Department of the Public Advocate, Ratepayer Division. Testimony filed on January 23, 2008 (Direct) and April 16, 2008 (Rebuttal).

Minnesota Public Utilities Commission. Supplemental Testimony and Supplemental Rebuttal Testimony on applicants' estimates of DSM savings in the Certificate of Need proceeding for the Big Stone II coal-fired power plant proposal. In the Matter of the Application by Otter Tail Power Company and Others for Certification of Transmission Facilities in Western Minnesota and In the Matter of the Application to the Minnesota Public Utilities Commission for a Route Permit for the Big Stone Transmission Project in Western Minnesota. OAH No. 12-2500-17037-2 and OAH No. 12-2500-17038-2; and MPUC Dkt. Nos. CN-05-619 and TR-05-1275. Testimony filed December 21, 2007 (Supplemental) and January 16, 2008 (Supplemental Rebuttal).

Pennsylvania Public Utility Commission. Direct testimony filed before the Commission on the effect of demand-side management on the need for a transmission line and the level of consideration of potential carbon regulation on PJM's analysis of need for the TrAIL transmission line. Docket Nos. A-110172 *et al*. Testimony filed October 31, 2007.

Iowa Public Utilities Board. Direct testimony filed before the Board on wind energy assessment in Interstate Power and Light's resource plans and its relationship to a proposed coal plant in Iowa. Docket No. GCU-07-01. Testimony filed October 21, 2007.

New Jersey Board of Public Utilities. Direct testimony before the Board on certain aspects of PSE&G's proposal to use ratepayer funding to finance a solar photovoltaic panel initiative in support of the State's solar RPS. Docket No. EO07040278. Testimony filed September 21, 2007.

Indiana Utility Regulatory Commission. Direct Testimony filed before the Commission addressing a proposed Duke – Vectren IGCC coal plant. Testimony focused on wind power potential in Indiana. Filed on behalf of the Citizens Action Coalition of Indiana, Cause No. 43114 May 14, 2007.

State of Maine Public Utilities Commission. Pre-filed testimony on the ability of DSM and distributed generation potential to reduce local supply area reinforcement needs. Testimony filed before the Commission on a Request for Certificate of Public Convenience and Necessity to Build a 115 kV Transmission Line between Saco and Old Orchard Beach. Testimony filed jointly with Peter Lanzalotta, on behalf of the Maine Public Advocate. Docket No. 2006-487, February 27, 2007.

Minnesota Public Utilities Commission. Rebuttal Testimony on wind energy potential and related transmission issues in the Certificate of Need proceeding for the Big Stone II coal-fired power plant proposal. In the Matter of the Application by Otter Tail Power Company and Others for Certification of Transmission Facilities in Western Minnesota and In the Matter of the Application to the Minnesota Public Utilities Commission for a Route Permit for the Big Stone Transmission Project in Western Minnesota. OAH No. 12-2500-17037-2 and OAH No. 12-2500-17038-2; and MPUC Dkt. Nos. CN-05-619 and TR-05-1275. December 8, 2006.

British Columbia Utilities Commission. In the Matter of BC Hydro 2006 Integrated Electricity Plan and Long Term Acquisition Plan. Pre-filed Evidence filed on behalf of the Sierra Club (BC Chapter), Sustainable Energy Association of BC, and Peace Valley Environment Association. October 6, 2006. Testimony addressing the "firming premium" associated with 2006 Call energy, liquidated damages provisions, and wind integration studies.

Maine Joint Legislative Committee on Utilities, Energy and Transportation. Testimony before the Committee in support of an Act to Encourage Energy Efficiency (LD 1931) on behalf of the Maine Natural Resources Council, February 9, 2006. The testimony and related analysis focused on the costs and benefits of increasing the system benefits charge to increase the level of energy efficiency installations by Efficiency Maine.

Nova Scotia Utilities and Review Board (UARB). Testimony filed before the UARB on behalf of the UARB staff, In The Matter of an Application by Nova Scotia Power Inc. for Approval of Air Emissions Strategy Capital Projects. Filed Jaunary 30, 2006. The testimony addressed the

application for approval of installation of a flue gas desulphurization system at NSPI's Lingan station and a review of alternatives to comply with provincial emission regulations.

New Jersey Board of Public Utilities. Direct and Surrebuttal Testimony filed before the Commission addressing the Joint Petition Of Public Service Electric and Gas Company And Exelon Corporation For Approval of a Change in Control Of Public Service Electric and Gas Company And Related Authorizations (the proposed merger), BPU Docket EM05020106. Joint Testimony with Bruce Biewald and David Schlissel. Filed on behalf of the New Jersey Division of the Ratepayer Advocate, November 14, 2005 (direct) and December 27, 2005 (surrebuttal).

Indiana Utility Regulatory Commission. Direct Testimony filed before the Commission addressing the proposed Duke – Cinergy merger. Filed on behalf of the Citizens Action Coalition of Indiana, Cause No. 42873, November 8, 2005.

Illinois Commerce Commission. Direct and Rebuttal Testimony filed before the Commission addressing wholesale market aspects of Ameren's proposed competitive procurement auction (CPA). Testimony filed on behalf of the Illinois Citizens Utility Board in Dockets 05-0160, 05-0161, 05-0162. Direct Testimony filed June 15, 2005; Rebuttal Testimony filed August 10, 2005.

Illinois Commerce Commission. Direct and Rebuttal Testimony filed before the Commission addressing wholesale market aspects of Commonwealth Edison's proposed BUS (Basic Utility Service) competitive auction procurement. Testimony filed on behalf of the Illinois Citizens Utility Board and the Cook County State's Attorney's Office in Docket 05-0159. Direct Testimony filed June 8, 2005; Rebuttal Testimony filed August 3, 2005.

Indiana Utility Regulatory Commission. Responsive Testimony filed before the Commission addressing a proposed Settlement Agreement between PSI and other parties in respect of issues surrounding the Joint Generation Dispatch Agreement in place between PSI and CG&E. Filed on behalf of the Citizens Action Coalition of Indiana, Consolidated Causes No. 38707 FAC 61S1, 41954, and 42359-S1, August 31, 2005.

Indiana Utility Regulatory Commission. Direct Testimony filed before the Commission in a Fuel Adjustment Clause (FAC) Proceeding concerning the pricing aspects and merits of continuation of the Joint Generation Dispatch Agreement in place between PSI and CG&E, and related issues of PSI lost revenues from inter-company energy pricing policies. Filed on behalf of the Citizens Action Coalition of Indiana, Cause No. 38707 FAC 61S1, May 23, 2005.

Indiana Utility Regulatory Commission. Direct Testimony filed before the Commission concerning the pricing aspects and merits of continuation of the Joint Generation Dispatch Agreement in place between PSI and CG&E. Filed on behalf of the Citizens Action Coalition of Indiana, Cause No. 41954, April 21, 2005.

State of Maine Public Utilities Commission. Testimony filed before the Commission on an Analysis of Eastern Maine Electric Cooperative, Inc.'s Petition for a Finding of Public Convenience and Necessity to Purchase 15 MW of Transmission Capacity from New Brunswick

Power and for Related Approvals. Testimony filed jointly with David Schlissel and Peter Lanzalotta, on behalf of the Maine Public Advocate. Docket No. 2005-17, July 19, 2005.

State of Maine Public Utilities Commission. Testimony filed before the Commission on an Analysis of Maine Public Service Company Request for a Certificate of Public Convenience and Necessity to Purchase 35 MW of Transmission Capacity from New Brunswick Power. Testimony filed jointly with David Schlissel and Peter Lanzalotta, on behalf of the Maine Public Advocate. Docket No. 2004-538 Phase II, April 14, 2005.

Nova Scotia Utilities and Review Board (UARB). Testimony filed before the UARB on behalf of the UARB staff, In The Matter of an Application by Nova Scotia Power Inc. for Approval of an Open Access Transmission Tariff (OATT). Filed April 5, 2005. The testimony addressed various aspects of OATTs and FERC's *pro forma* Order 888 OATT.

Texas Public Utilities Commission. Testimony filed before the Texas PUC in Docket No. 30485 on behalf of the Gulf Coast Coalition of Cities on CenterPoint Energy Houston Electric, LLC. Application for a Financing Order, January 7, 2005. The testimony addressed excess mitigation credits associated with CenterPoint's stranded cost recovery.

Ontario Energy Board. Testimony filed before the Ontario Energy Board, RP-2002-0120, et al., Review of the Transmission System Code (TSC) and Related Matters, Detailed Submission to the Ontario Energy Board in Response To Phase I Questions Concerning the Transmission System Code and Related Matters, October 31, 2002, on behalf of TransAlta Corporation; and Reply Comments for same, November 21, 2002. Related direct and reply filings in response to the Ontario Energy Board's "Preliminary Propositions" on TSC issues in May and June, 2003.

Alberta Energy and Utilities Board. Testimony filed before the Alberta Energy and Utilities Board, in the Matter of the Transmission Administrator's 2001 Phase I and Phase II General Rate Application, no. 2000135, pertaining to Supply Transmission Service charge proposals. Joint testimony filed with Dr. Richard D. Tabors. March 28, 2001. Testimony filed on behalf of the Alberta Buyers Coalition.

Ontario Energy Board. Testimony filed before the Ontario Energy Board, RP-1999-0044, Critique of Ontario Hydro Networks Company's Transmission Tariff Proposal and Proposal for Alternative Rate Design, January 17, 2000. Testimony filed on behalf of the Independent Power Producer's Society of Ontario.

MAJOR PROJECT WORK – BY CATEGORY

Electric Utility Industry Regulatory and Legislative Proceedings

For Pollution Probe, analysis of need for a proposed 500 kV transmission line in Ontario. (2008)

For the Iowa Office of Consumer Advocate, testimony in the case against the proposed Marshalltown coal plant expansion, addressing the ability of wind resources to help eliminate the need for the plant. (2007-2008)

For the Minnesota Center for Environmental Advocacy, preparation of expert testimony on wind energy and DSM in Minnesota and the upper Midwest in the case against the proposed Big Stone II coal plant. (2006-2008)

For the New Jersey Department of the Ratepayer advocate, ongoing analysis of myriad issues affecting New Jersey electricity consumers, including: review of BGS supply structures, participation in working group designing demand side response pilot programs, analysis of PSE&G solar PV initiatives, review of ongoing FERC proceedings on PJM transmission planning and impacts on New Jersey. (2007-2008)

For the Citizens Action Coalition of Indiana, analyzed the potential for increased wind penetration as an alternative to a proposed new coal-fired power plant. (2007)

For the Maine Office of Public Advocate, technical review of issues pertaining to potential withdrawal of Maine utilities from the ISO NE RTO. Also, technical review and expert testimony preparation on energy efficiency and demand side response resource impact on sub-transmission supply needs in the Saco Bay area. (2006-2007)

For the staff of the Nova Scotia Utility and Review Board, conducted an economic analysis of the proposed installation of flue gas desulphurization equipment by Nova Scotia Power, Inc., and alternatives to the installation, to conform to Nova Scotia provincial emission regulations. (2005-2006)

For the staff of the Nova Scotia Utility and Review Board, analyzed a proposed Open Access Transmission Tariff by Nova Scotia Power, Inc. (2005)

For the Maine Office of Public Advocate, analyzed multiple aspects of the proposed installation of a second 345 kV tie line between Maine and New Brunswick. The analyses focused on the impacts to Northern Maine electric consumers. (2005)

Electric Utility Industry Restructuring

For the Citizens Action Coalition of Indiana, analyzed the proposed merger between Duke and Cinergy, with a focus on global protections available for PSI ratepayers and the allocation of projected merger cost and savings. (2005)

For the Citizens Action Coalition of Indiana, analyzed the termination of the Joint Generation Dispatch Agreement between Cincinnati Gas and Electric and PSI with a focus on PSI ratepayer impacts. (2005)

For TransAlta Energy Corporation, developed an issues and information paper on recent Ontario and Alberta market development efforts, focusing on the likely high-level impacts associated with day-ahead and capacity market mechanisms considered in each of those regions. (2004)

For a wholesale energy market stakeholder, participate in New England and PJM RTO markets and market implementation committee meetings, review and summarize material, and advocate on behalf of client on selected market design issues. (2004) Performed similar activities for separate client in New England. (2001)

For a group of potential generation investors in Ontario, analyzed the government's proposed wholesale and retail market design changes and produced an advocacy report for submission to the Ontario Ministry of Energy. The report emphasized, among other things, the importance of retaining a competitive wholesale market structure. (2004)

For a large midwestern utility, supported multiple rounds of direct and rebuttal testimony to the US FERC by Dr. Richard Tabors on the proposed start-up of LMP markets in the Midwest ISO utility service territories. Testimony substance included PJM-MISO seams concerns, FTR allocation options, grandfathered transactions incorporation, FTR and energy market efficiency impacts, and other wholesale market and MISO transmission tariff design issues. Testimony also included quantitative analysis using GE MAPS security-constrained dispatch model runs. (2003-2004)

For the Independent Power Producers Society of Ontario, with TCA Director Seabron Adamson, developed a position paper on resource adequacy mechanisms for the Ontario electricity market. (2003)

For TransAlta Energy Corp., provided direct and reply testimony to the Ontario Energy Board on the Transmission System Code review process. Analyzed and reported on transmission "bypass" and network cost responsibility issues. (2002-2003)

For a commercial electricity marketer in Ontario, with TCA staff, analyzed Ontario market rules for interregional transactions, focusing primarily on the Michigan and New York interties, and assessed the current Ontario electricity market policy related to "failed intertie transactions". (2002)

For ESBI Alberta Ltd., then Transmission Administrator (TA) of Alberta, served as a key member of the TCA team exploring congestion management issues in the Province, and providing guidance to the TA in presenting congestion management options to Alberta stakeholders, with a particular focus on new transmission expansion pricing and cost allocation issues. (2001)

For a coalition of power producers and marketers in Alberta, filed joint expert witness testimony with Dr. Tabors on the nature of certain transmission access charges associated with supply transmission service. (2001)

For a prospective market participant, served as a core member of the project team that developed summary reports on the New York, New England and PJM wholesale electricity spot market structures. The reports focused on market structure fundamentals, historical transmission flow patterns, forecasted transmission congestion and costs, transmission availability and FTR valuation and market results. (2001)

For the ERCOT ISO, served as a key TCA team member helping to develop and assemble a set of protocols to guide the principles, operation and settlement of the forthcoming Texas competitive wholesale electricity market. (2000)

For the Independent Power Producer's Society of Ontario, served as expert witness and filed evidence with the Ontario Energy Board supporting an alternative transmission tariff design, and critiquing Ontario Hydro Networks Company's (OHNC) proposed rate structure. Also a member of OHNC's Advisory Team on net versus gross billing issues and a leading proponent of a progressive, embedded-generation-friendly tariff structure. (1999-2000)

For a large midwestern utility, designed transmission tariff and wholesale market structures consistent with the proposed establishment of an Independent Transmission Company paradigm for transmission operations. (1999-2000)

For a coalition of independent power producers and marketers in Alberta, helped develop evidence submitted by Dr. Tabors and Dr. Steven Stoft with the Alberta Energy and Utilities Board supporting an alternative to ESBI's proposed transmission tariff. The evidence critiqued the fairness and efficiency of ESBI's proposed tariff, and offered a simple alternative to deal with Alberta's near-term southern supply shortage. (1999)

For Enron Canada Corp., provided ongoing technical support and policy advice during the tenure of the Ontario Market Design Committee (MDC). Presented material on congestion pricing before the committee, and submitted technical assessments of most wholesale market development issues. (1998-1999)

Member of the Ontario Wholesale Market Design Technical Panel. The panel's responsibilities included refinement of the wholesale market design as specified by the Market Design Committee, and specification of the market's initial operating requirements. Also served on two sub-panels: bidding and scheduling; and ancillary services. (1998-1999)

For Enron Canada Corp, assessed the generation markets in Ontario and Alberta and recommended policies for maximizing competitive market mechanisms and minimizing stranded cost burdens. Authored reports on stranded costs in Ontario, and on the legislated hedges structure in Alberta. (1997 - 1998)

For an independent power producer, assessed New England markets for electricity and assisted in valuation of generation assets for sale. (1997)

In support of testimony filed by CCEM (Coalition for Competitive Electric Markets) with the FERC, assessed alternative transmission pricing and wholesale market structures proposed for the NY, NE and PJM regions. The filings proposed market mechanisms to produce competitive wholesale electric energy markets and zonal-based transmission pricing structures. (1996-1997)

Electric Utility Mergers and Market Power Analysis

For the New Jersey Ratepayer Advocate, provided jointly sponsored expert testimony (with Bruce Biewald and David Schlissel) on the potential market power effects of the proposed Exelon-PSEG merger. (2005-2006)

For the Citizens Utility Board (Illinois), provided direct and rebuttal testimony on potential market power and transmission impacts and other issues associated with ComEd's proposal to procure standard offer power through a market-based auction process. (2005)

For the Citizens Utility Board and other clients (Illinois), provided direct and rebuttal testimony on issues associated with Ameren's proposal to procure standard offer power through a market-based auction process. (2005)

In support of FERC-filed testimony by Dr. Richard Tabors, conducted a detailed examination of the accessibility of transmission service for wholesale energy market participants on the American Electric Power and Central and Southwest transmission systems. This included evaluating all transmission service requests made over the OASIS for the first six months of 1998 for the two utility systems, and a subsequent, more detailed assessment of AEP's transmission system use during all of 1998. (1998-1999)

For a US western electric utility, served as a member of the team that conducted detailed production cost modeling and strategic market assessment to determine the extent or absence of market power held by the client. (1998)

For an independent power producer, supported FERC-filed testimony on market power issues in the New York State energy and capacity markets. This included detailed supply-curve assessment of existing generation assets within the New York Power Pool. (1997)

Worked with a local economic consulting firm for a Western State public agency in conducting an analysis of the projected savings of a series of proposed electric and gas utility mergers. (1997)

For a southwestern utility company, supported CRA in conducting an analysis of the competitive effects of a proposed electric utility merger. For a northwestern utility company, analyzed the competitive effects of a proposed electric utility merger. (1995-1996)

For the Massachusetts Attorney General's Office, conducted a study of the potential for market power abuse by generators in the NEPOOL market area. (1996)

Energy Efficiency and Demand Side Management

For the Pennsylvania Office of Consumer Advocate, analysis of the ability of demand-side management efforts to reduce peak loading and affect the need for the 502 Junction – Prexy 500 kV line proposed by Allegheny Power. (2007 – 2008)

For the New Jersey Division of Rate Counsel, Department of Public Advocate, participation in demand response working group and assessment of proposal for state-sponsored demand response program. (2007)

For the Rhode Island Division of the Public Utilities Commission, ongoing technical support and participation in the statewide DSM collaborative process. (2007)

For the Maine Office of the Public Advocate, evaluated the ability of DSM and distributed generation to affect the need for transmission and distribution system reinforcement in the Saco Bay area of Central Maine Power's service territory. (2007)

For the Natural Resources Council of Maine, analyzed the costs and benefits of increasing the system benefits charge (SBC) in Maine to increase efficiency installations by Efficiency Maine. Testimony before the Maine Joint Legislative Committee on Energy and Utilities. (2006)

For Southern California Edison (SCE), working as a sub-contractor to Sargent and Lundy, analyzed the potential for an interstate transfer of a DSM resource between the desert southwest and California. For the same project, also analyzed transmission impacts of various alternatives to replace power supply from the currently closed Mohave generation station for SCE. (2005)

For two separate large New England utilities, conducted impact evaluations of large commercial and industrial sector DSM programs. (1994-1996)

For a New England utility, worked on the project team developing a set of DSM evaluation master plans for incentive-type and third-party-contracting type DSM programs (1994)

For EPRI, wrote an overview of the status of DSM information systems and the potential effects of an increasingly competitive utility environment. (1993)

For two separate large New England utilities, helped to develop competitive procurement documents (DSM RFPs) for filing before the Massachusetts Department of Public Utilities. (1993, 1994)

For a midwestern utility, conducted a trade ally study designed to determine the influence of trade allies on the market for energy efficient lighting and motor equipment. (1992-1993)

DSM Implementation

Conducted detailed site visits and suggested efficiency improvement strategies for over 1,000 commercial, industrial and institutional buildings in Rhode Island. Performed end-use energy analysis and coordinated implementation of improvements. Worked with local utility DSM program personnel to educate building owners on DSM program opportunities. (1987-1992)

Energy Modeling

For Pollution Probe, development of simplified congestion (locked-in energy) model to estimate congestion quantity effects of an alternative to a proposed new 500 kV transmission line. (2008)

For various clientele, worked closely with the TCA GE MAPS modeling group on various facets of security-constrained dispatch modeling of electric power systems across the US and Canada. Specific tasks included assisting in designing MAPS model run parameters (e.g., base case and alternative scenarios specification); proposing modeling designs to clients; supporting input data gathering; interpreting model results; and writing summary reports, memos & testimony describing the results. (2002-2004)

For a group of potential electricity supply investors in Ontario, modeled the impact of proposed generation plant phaseout trajectories on investment requirements for new supply in Ontario. (2004)

For the Independent Power Producer's Society of Ontario, conducted a retrospective quantitative analysis of the Ontario market energy and ancillary service prices during the 15 months of the new wholesale market to determine the extent of infra-marginal rents available that could have supported entry for new generation. (2003)

In support of proposals to the US Dept. of Defense for military housing privatization, performed DOE-2 model runs using an online tool; and created a spreadsheet modeling tool to analyze the efficiency and cost effectiveness of new and renovated residential construction for base housing. Performed life-cycle utility cost analysis and prepared energy plans specifying building shell, equipment and appliance efficiency measures at 15 separate Army, Navy, and Air Force installations around the nation. (2001-2003)

For the Independent Power Producer's Society of Ontario, conducted a rate impact analysis of Ontario Hydro Networks Company proposed transmission tariff. (1999-2000)

For the University of Maryland at Baltimore, conducted a life-cycle cost analysis of alternative proposals for district-type thermal energy provision, comparing existing steam delivery systems to new hot-water systems. (1998)

For the UMass Medical Center (Worcester), conducted an energy use and cost allocation analysis of a large hospital complex to assist in choosing among electric and thermal energy supply options. (2000)

For an independent power producer, developed a spreadsheet-based tool to assess the rate impact of a "clean coal" facility compared to alternative gas-fired supply options. (1996-1997)

For a private consulting firm, examined electric end-use and generation capacity information in seven industry energy models and reported the sensitivities of each model to varying levels of input aggregation. (1995)

For a private industrial firm in Virginia, developed a Monte-Carlo simulation-based spreadsheet model to solve a capital budgeting problem involving long-term choice of industrial boiler equipment. (1995)

For a New England utility, developed a spreadsheet model to help determine economic decision-making processes used by energy service companies when delivering third-party procured DSM. (1995)

Petroleum and Natural Gas Industry Analysis

For a private independent power producer, conducted an analysis of the rate impacts of the Warrior Run clean coal (fluidized bed combustion) power plant in Maryland under various assumptions of natural gas prices and environmental regulation scenarios. (1996-1997)

For a British consulting firm, researched the current status of natural gas restructuring efforts in the US and their impact on regional US power generation markets. (1996)

For a Canadian law firm representing Native Canadian interests, conducted a detailed analysis of natural gas netback pricing for Alberta gas into US Midwest and West Coast markets over a thirty-year period. (1995)

For a US natural gas pipeline consortium, performed an econometric analysis of the demand for natural gas in the state of Florida. (1992-1993)

PAPERS, PUBLICATIONS AND PRESENTATIONS

Interstate Transfer of a DSM Resource: New Mexico DSM as an Alternative to Power from Mohave Generating Station. Jointly authored with Tim Woolf, Bill Steinhurst and Bruce Biewald. Presented at the 2006 ACEEE Summer Study on Energy Efficiency in Buildings and published in the proceedings. (2006)

SMD and RTO West: Where are the Benefits for Alberta? Keynote Paper prepared for the 9th Annual Conference of the Independent Power Producers Society of Alberta, with Dr. Richard D. Tabors, March 7, 2003.

A Progressive Transmission Tariff Regime: The Impact of Net Billing, presentation at the Independent Power Producer Society of Ontario annual conference, November 1999.

Tariff Structure for an Independent Transmission Company, with Richard D. Tabors, Assef Zobian, Narasimha Rao, and Rick Hornby, TCA Working Paper 101-1099-0241, November 1999.

Transmission Congestion Pricing Within and Around Ontario, presentation at the Canadian Transmission Restructuring Infocast Conference, Toronto, June 2-4, 1999.

The Restructured Ontario Electricity Generation Market and Stranded Costs. An internal company report presented to the Ontario Ministry of Energy and Environment on behalf of Enron Capital and Trade Resources Canada Corp., February 1998.

Alberta Legislated Hedges Briefing Note. An internal company report presented to the Alberta Department of Energy on behalf of Enron Capital and Trade Resources Canada, January 1998.

Generation Market Power in New England: Overall and on the Margin. Presentation at Infocast Conference: New Developments in Northeast and Mid-Atlantic Wholesale Power Markets, Boston, June 1997.

The Market for Power in New England: The Competitive Implications of Restructuring. Prepared for the Office of the Attorney General, Commonwealth of Massachusetts, by Tabors Caramanis & Associates with Charles River Associates, April 1996. R. Fagan was a key member of the team that produced the report.

Estimating DSM Impacts for Large Commercial and Industrial Electricity Users. Lead investigator and author, with M. Gokhale, D.S. Levy, P.J. Spinney, G.C. Watkins. Presented at The Seventh International Energy Program Evaluation Conference, Chicago, Illinois, August 1995, and published in the Conference Proceedings.

Sampling Issues in Estimating DSM Savings: An Issue Paper for Commonwealth Electric. Prepared with G.C. Watkins, Charles River Associates. Report for COM/Electric System, filed with the MA Dept. of Public Utilities (MDPU), April 28, 1995, Docket # DPU 95-2/3-CC-l.

Demand-side Management Information Systems (DSMIS) Overview. Electric Power Research Institute Technical Report TR-104707. Robert M. Fagan and Peter S. Spinney, principal investigators, prepared by Charles River Associates for EPRI, January 1995.

Impact Evaluation of Commonwealth Electric's Customized Rebate Program. With P.J. Spinney and G.C. Watkins. Charles River Associates, Initial and Updated Reports, April 1994, April 1995, and April 1996.1995 updated report filed with the MDPU, April28, 1995, Docket # DPU 95-2/3-CC-I. The initial report filed with the MDPU, April 1, 1994.

Northeast Utilities Energy Conscious Construction Program (Comprehensive Area): Level I and Level II Impact Evaluation Reports. With Peter S. Spinney (CRA) and Abbe Bjorklund (Energy Investments). Charles River Associates Reports prepared for Northeast Utilities, June and July 1994.

The Role of Trade Allies in C&I DSM Programs: A New Focus for Program Evaluation, Paper authored by Peter J. Spinney (Charles River Associates) and John Peloza (Wisconsin Electric Power Corp.). Presented by Bob Fagan at the Sixth International Energy Evaluation Conference, Chicago, Illinois, August 1993.

Resume dated June 2009.

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