U.S. Department of Energy Workshop on 2009 Congestion Study
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PJM Interconnection, L.L.C. ("PJM") is pleased to provide these preliminary comments for consideration as the Department prepares to commence its next triennial congestion study.

In 2005 and 2006, PJM submitted a great deal of information for the public record concerning the reliability and congestion issues faced within the PJM footprint, comprising 13-states and the District of Columbia. As noted, there were a number of factors that led to the levels of congestion as well as impending reliability violations detailed in those submittals. Specifically, increased load growth, generator retirements, additional west-to-east flows caused by greater market activity and transmission siting difficulties, all combined to trigger future reliability violations and growing congestion requiring proactive resolution. The Department's independent analysis reached similar conclusions and ultimately led the Department to designate the Mid-Atlantic Area Corridor as one of two national interest transmission corridors.

As detailed below, the underlying circumstances which gave rise to the Department's initial corridor designation remain, and their resolution is integrally tied to certain key transmission projects coming to fruition over the next several years. As a result, PJM believes there is a sound basis for the Department continuing the present designation and reinforcing in its upcoming 2009 congestion study the conclusions that led to that designation . Through this testimony, PJM will provide empirical evidence updating the reliability and congestion challenges the region faces since preparation of the last DOE congestion study.

<u>The Appropriate Scope of the Department's Analysis:</u>

Section 1221of the Energy Policy Act of 2005 calls for the Department to undertake a triennial study of congestion. Under the law, after consultation with affected states and interested parties, the Department is required to issue a report, based on the study, which designates "any geographic area experiencing electric energy transmission capacity constraints or congestion that adversely affects consumers" as a national interest electric transmission corridor.

In reaching its designation decision, the Secretary may consider:

- Whether the economic vitality and development of the corridor, or the end markets served by the corridor, may be constrained by the lack of adequate or reasonably priced electricity;
- Whether economic growth in the corridor or the end markets served by the corridor, may be jeopardized by reliance on limited sources of energy;
- Whether a diversification of supply is warranted; and
- Whether energy independence, national energy policy and national defense and homeland security would be enhanced with the designation.

As a threshold matter, the Department should ensure that its study undertakes a holistic look at the region, including its reliability needs, as well as the impact of the level of congestion on prices. PJM recommends that the Department view "congestion" encompassing *both* reliability violations which, if not corrected, will affect the national interest criteria set forth in EPACT 2005, and a key cause of increased prices for

wholesale and ultimately retail customers. An analysis of economic congestion alone would ignore the need for infrastructure development (be it new generation, transmission or demand response) needed to ensure that reliability is maintained consistent with NERC criteria.

Operating a grid within reliability limits is integral to managing congestion on the grid. In essence, curtailing load due to a reliability violation represents the most drastic form of congestion relief. For the overwhelming number of hours over the year, congestion in an RTO with an organized market is addressed through redispatch of generation. Curtailment of load is required when there simply is no more generation to redispatch or additional demand response available to clear the constraint. Thus, the Department's analysis should not ignore an analysis of present and future reliability violations when analyzing congestion. By integrating the two, the Department's analysis would track the RTO planning process, which does not view congestion and reliability violations in a vacuum but rather as joint indicators of the need for infrastructure upgrades.

Changes to Congestion Patterns in the PJM Footprint Since 2005

Within the PJM footprint there has not been any significant change in congestion patterns between 2005 and 2007. The main congestion pattern in PJM continues to be driven by west-to-east transfers across the PJM system. Although congestion may shift among different constraints as a result of certain reinforcements undertaken during this time period, the incidents of congestion is a manifestation of an overall lack of sufficient west-to-east transmission capability across the corridor. Both the TRAIL and PATH transmission lines will provide significant relief and reduce congestion in this corridor. The constraints are not likely to change until major backbone facilities are added.

The recent run-up in fuel prices has increased the east-to-west generation price difference with a resulting impact of perpetuating congestion across our west--to-east interfaces. Even with the same number of hours, the overall cost of congestion increases due to fuel price differences in different parts of PJM. For example, eastern coal prices increases have exceeded those in the western part of PJM principally due to increased transportation costs, and when coupled with increases in oil and natural gas prices, have worked to increase congestion.

Attached as an Excel spreadsheet is a breakdown of the relevant congestion data from the year 2005 through July 2008.

Completed Projects and Their Impact on Congestion Patterns

Although the overall patterns and levels of congestion have not changed significantly since 2005, upgrades on the grid undertaken since that time have helped to reduce or even eliminate congestion on some of the constraints previously identified in our 2005 submittal. Rather than reducing the overall level of congestion, however, these improvements can lead to other constraints manifesting themselves once the congestion on a given facility is cleared. In short, although congestion at certain nodes has been significantly reduced, that does not translate into a reduction in overall congestion. There is no one "magic bullet," since curing one congestion point on the system works to increase power flows which then exposes congestion at a second point. In short, it is customer demand for more low-cost supplies that drives the power flows and

congestion on the grid. It will take a concentrated effort, coupled with significant demand response and energy efficiency initiatives, to upgrade the entire network to meet future customer needs.

As to specific projects in service since 2005, a significant reactive/voltage reinforcement at Black Oak was implemented that all but eliminated the Bedington-Black Oak interface as a constraint. As noted above, although reducing Bedington-Black Oak congestion, the reinforcement made more apparent continued weakness across the Mid-Atlantic Corridor so that the PJM AP South interface and other interfaces now are constrained with greater frequency.

A special purpose system is scheduled to be installed in the first quarter of 2009 that should reduce or eliminate occurrences of the oft-constrained Cloverdale-Lexington 500 kV line in western Virginia. This project has the potential to trip two pumps at the Bath County pumped storage hydro-electric facility, which would effectively raise the capability of the limiting facility by a few hundred MW. The result could lead to a reduction in the number of congestion occurrences. There was about $200 million of congestion on the Cloverdale-Lexington facility in 2007, $63 million M in 2006 and $25 million in 2005. This congestion will be reduced but certainly not limited as a result of this project.

New transformers at Bedington and Meadowbrook substations will reduce or eliminate congestion at those locations, which had some $120M and $150M of congestion over the 2005-2007 period.

Appropriate indicators of congestion:

Congestion by causal constraint and by location are the two key indicators that provide a full picture of the impacts of congestion. Further breaking down congestion into that incurred by demand (load) and supply (generators) provides a useful, additional layer of detail.

Available Data for Analyzing Historic Congestion Patterns

PJM has historical congestion data going back to October, 2004. This data has been provided in the attached spreadsheet.

The Drivers Behind Changing Patterns of Congestion:

Differences in fuel-price, demand growth, generator additions and retirements, and transmission reinforcements all are drivers of changes in congestion patterns. However, on a highly-networked system like PJM's, the absolute change in congestion due to a particular driver is not necessarily readily or accurately isolated and separately quantified. This is demonstrated by the recent Bedington-Black Oak reinforcement. Although the reinforcement reduced Bedington-Black Oak congestion, other congestion which had always existed but was masked by the prior congestion at that facility suddenly became apparent. As there are many drivers of congestion based on system topology at any given moment in time, calculating the incremental change due to a specific driver, while isolating others, is a difficult and potentially misleading exercise.

Recent or Forthcoming Studies, Analyses, that DOE should examine or take into account in preparing its study:

PJM has undertaken a recent market efficiency analysis which examined the major historic and projected sources congestion on the PJM system so as to analyze existing congestion patterns and identify future

sources of congestion. Once those future congestion points are identified, the planning process will examine potential future solutions to that congestion. The presentation prepared by PJM and presented to its stakeholders can be found at: http://www.pjm.com/committees/teac/downloads/20080820-market-efficiency-analysis-update.pdf. PJM is undertaking additional modeling work in this area which it will provide to its stakeholders and is available to the Department through postings on the PJM website www.pjm.com.

PJM stands ready to serve as a resource to the Department, the states in the region and interested stakeholders as the Department begins to undertake its 2009 congestion study. I am happy to answer any questions that you may have and pledge PJM's cooperation as a resource which the Department can utilize to obtain necessary.

Annual Congestion Costs at PJM's 25 Most Constrained Lines
2005 to 2008

2005				2006			
Constraint	Type	Congestion $m	% of Total	Constraint	Type	Congestion $m	% of Total
Bedington - Black Oak	Interface	581.9	28%	Bedington - Black Oak	Interface	491.6	31%
5004/5005 Interface	Interface	198.7	9%	5004/5005 Interface	Interface	106.0	7%
Doubs	Transformer	145.7	7%	Mount Storm - Pruntytown	Line	98.4	6%
Kammer	Transformer	139.1	7%	Kanawha - Matt Funk	Line	84.4	5%
Doubs - Mount Storm	Line	125.6	6%	AP South	Interface	80.8	5%
East	Interface	94.5	5%	Cloverdale - Lexington	Line	63.0	4%
AP South	Interface	56.5	3%	West	Interface	56.4	4%
Meadow Brook	Transformer	50.4	2%	Meadow Brook	Transformer	55.2	3%
West	Interface	44.4	2%	Kammer	Transformer	47.4	3%
Central	Interface	43.8	2%	Bedington	Transformer	42.9	3%
Whitpain	Transformer	27.4	1%	Doubs - Mount Storm	Line	38.5	2%
Mount Storm - Pruntytown	Line	25.8	1%	Doubs	Transformer	32.8	2%
Cloverdale - Lexington	Line	24.9	1%	Axton	Transformer	23.1	1%
Kanawha - Matt Funk	Line	18.7	1%	Whitpain	Transformer	19.1	1%
Bedington	Transformer	15.6	1%	Aqueduct - Doubs	Line	18.5	1%
Wylie Ridge	Transformer	15.6	1%	Lauel - Woodstown	Line	17.2	1%
Unclassified	Unclassified	11.6	1%	Cedar Grove - Roseland	Line	16.2	1%
Lauel - Woodstown	Line	9.0	0%	Central	Interface	15.7	1%
Cloverdale	Transformer	7.3	0%	Unclassified	Unclassified	14.9	1%
Hunterstown	Transformer	4.9	0%	East	Interface	13.1	1%
Axton - Jacksons Ferry	Line	2.1	0%	Wylie Ridge	Transformer	13.1	1%
Dooms	Transformer	1.4	0%	Axton - Jacksons Ferry	Line	12.5	1%
Cedar Grove - Roseland	Line	(1.2)	0%	Dooms	Transformer	11.8	1%
Axton	Transformer	0.5	0%	Cloverdale	Transformer	11.5	1%
Aqueduct - Doubs	Line	0.1	0%	Hunterstown	Transformer	9.5	1%
Total	2005	1,644.3			2006	1,393.6	

Sources: SoM 2006 p 279, SoM 2007 p 315.

Annual Congestion Costs at PJM's 25 Most Constrained Lines
2005 to 2008

2007				2008 (YTD July)		
Constraint	Type	Congestion $m	% of Total	Constraint	Congestion $m	% of Total
Bedington - Black Oak	Interface	714.0	39%	AP South interface	365	23%
Cloverdale - Lexington	Line	227.1	12%	Cloverdale–Lexington 500	154	10%
5004/5005 Interface	Interface	116.5	6%	Bedington–Black Oak interface	124	8%
AP South	Interface	101.5	6%	Mount Storm-Pruntytown 500	99	6%
Kammer	Transformer	64.3	3%	West Interface	76	5%
Branchburg - Readington	Line	63.1	3%	Kammer 765/500 transformer	51	3%
Bedington	Transformer	59.7	3%	Atlantic-Larrabee 230	51	3%
Meadow Brook	Transformer	44.9	2%	Mount Storm 500 CB	41	3%
Central	Interface	32.4	2%	Bedington 500/138 transformer	41	3%
Atlantic - Larrabee	Line	23.1	1%	Branchburg-Readington 230	38	2%
Branchburg - Flagtown	Line	19.5	1%			
Wylie Ridge	Transformer	18.9	1%			
Brunner Island - Yorkana	Line	18.6	1%			
East	Interface	17.4	1%			
Amos	Transformer	17.0	1%			
Conastone	Transformer	14.8	1%			
Kanawha - Matt Funk	Line	14.7	1%			
Doubs	Transformer	14.7	1%			
Beckett - Paulsboro	Line	14.2	1%			
Bedington - Nipetown	Line	13.9	1%			
Cloverdale	Transformer	13.5	1%			
Darwin - Eugene	Line	(12.6)	-1%			
Unclassified	Unclassified	12.4	1%			
West	Interface	11.0	1%			
Axton	Transformer	10.5	1%			
	2007	1,645.1			2008	1,040.0