Section 12: State RTEP Overviews

PJM | DE | DC | IL | IN | KY | MD | MI | NJ | NC | OH | PA | TN | VA | WV

12.0 - PJM Overview

PJM Interconnection is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia. Map 12.1 shows PJM's footprint and high voltage backbone electrical transmission system.

12.0.1 The PJM System

Serving approximately 51 million people, PJM encompasses major U.S. load centers from the Illinois western border to the Atlantic coast including the metropolitan areas in and around Baltimore, Chicago, Columbus, Dayton, Newark and northern New Jersey, Norfolk, Philadelphia, Pittsburgh, Richmond and the District of Columbia Collaborating with more than 500 members, PJM dispatches more than 165,000 megawatts of generation capacity over 56,000 miles of transmission lines – a system that serves nearly 20 percent of the U.S. economy. PJM's footprint includes many key transmission arteries of the U.S. Eastern Interconnection, as Map 12.1 shows. PJM's unique interstate geography and electrical topography provide its members access not only to PJM's regional power markets but to those of adjoining systems west, northeast and south of PJM's borders as well.

Map 12.1: PJM Backbone Transmission

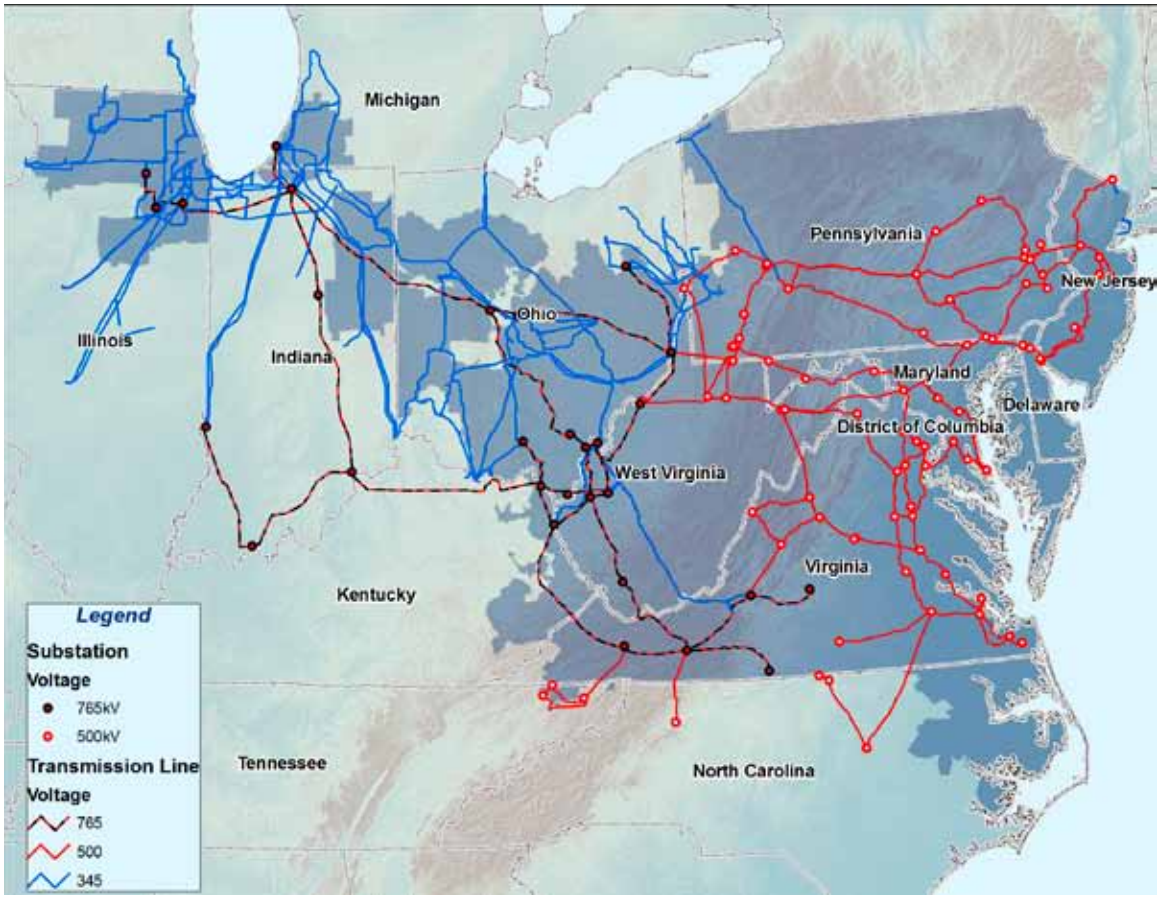
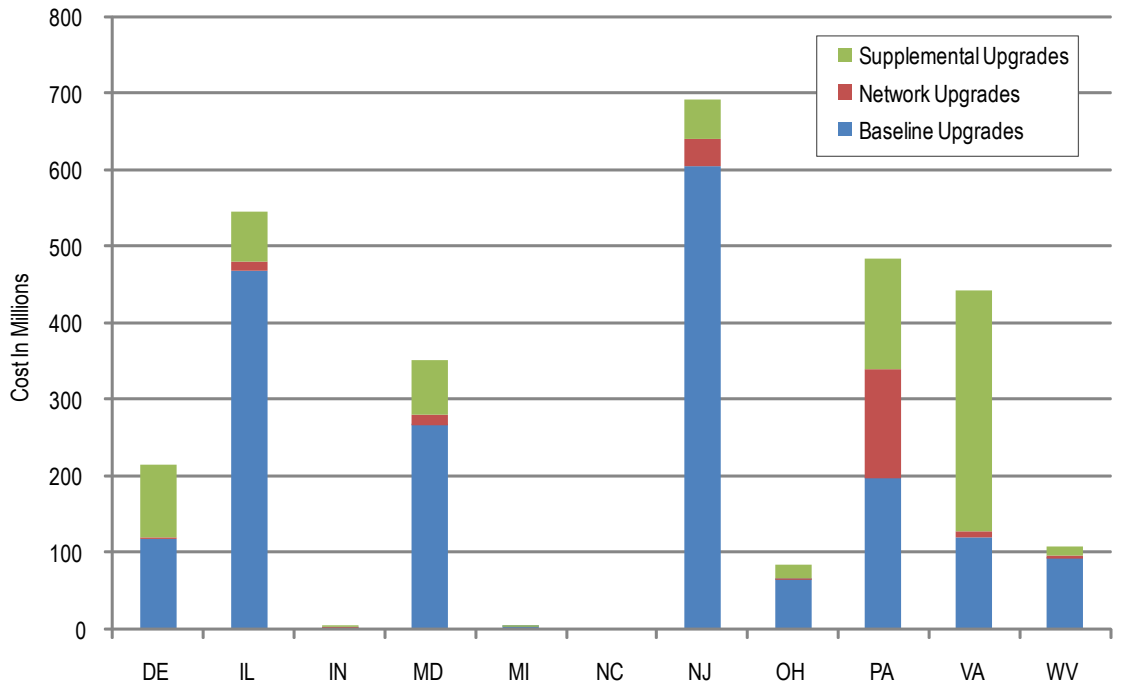


Figure 12.1: Cost of In-Service System Reinforcements by State



To date, more than $15 billion of transmission expansions have been planned to meet the challenges of many system drivers: load growth, generation and merchant transmission interconnection requests, congestion, generator deactivations, operational performance and others. Figure 12.1 contains a summary of the cost of in-service system reinforcements by state.

Since the inception of its open, non-discriminatory planning process in 1997, PJM has received more than 291,000 MW of new generation interconnection requests. To date, system enhancements planned by PJM will support more than 50,000 MW of new in-service generation. This generation enhances system reliability, supply adequacy and competitive markets for PJM's market participants and the customers they serve. Importantly, the generation additions represent various fuel types, including natural gas, wind and coal. Figure 12.2 contains a status summary of in-service projects by state.

For the sake of reporting, generating resources that are fully in-service (designated "IS") are included in summary tabulation.

A status code of "IS-NC" (in-service, no capacity) indicates a generator that is in-service for energy only. Such units have not requested consideration for capacity status.

A status code of "ISP" (in-service, partial) denotes a generating resource that is only partially in-service and has not reached full capacity status.

A generating unit is ineligible for capacity status until all transmission upgrades needed to ensure deliverability are completed. Only then will PJM grant capacity status designation.

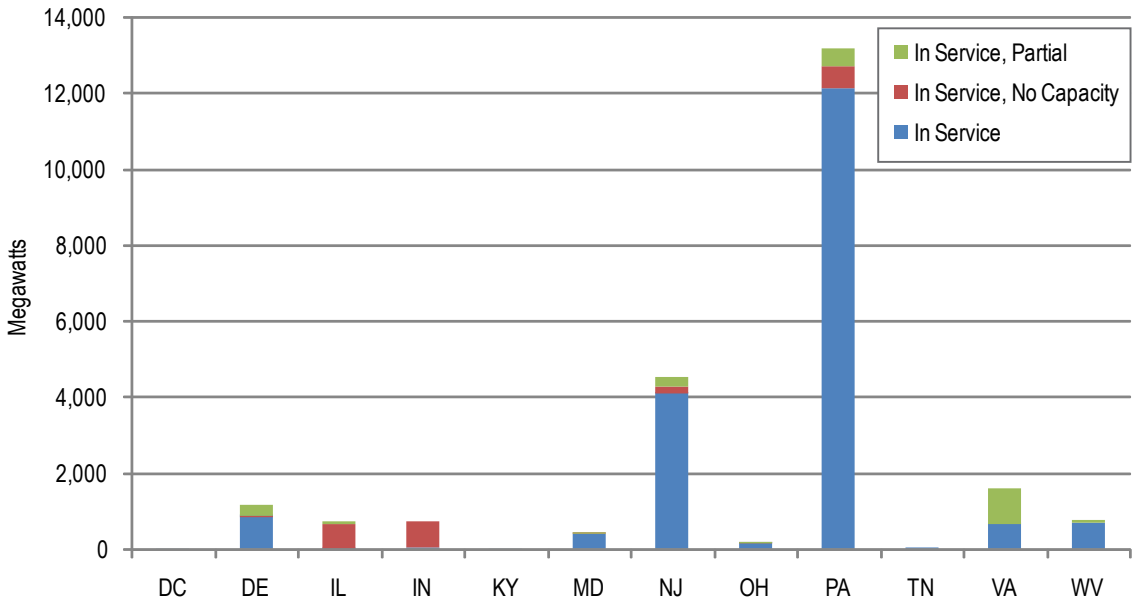
Relationship between reliability criteria violation and location of upgrade

The PJM RTEP process assesses system reliability issues and viable solutions from a regional perspective, essentially ignoring internal TO zonal and state boundaries within the PJM footprint. Consequently, PJM is able to analyze and discern the true electrical nature of reliability criteria violations and the optimal solutions within PJM to resolve them. The relationship between reliability criteria violation and upgrade location generally takes the form of one of the following scenarios.

1. Reliability criteria violations in a given TO zone may be driven by a local issue in that same zone. For example, local load growth may drive local transformer loadings and, thus be the potential cause of a future overload on that facility.

2. Reliability criteria violations in one or more TO zones may be driven by or contributed to by some combination of system factors in another, potentially more distant, part of the PJM system. For example, voltage criteria violations in western portions of the PJM system may not be caused by a local problem but rather caused by some set of compounding factors contributing to heavier west-to-east transfers to more distant eastern load centers.

Figure 12.2: In-Service Generating Resource Projects by State



From a regional perspective, PJM can identify more economical and optimal global solutions that consider all reliability criteria violations and congestion constraints that could be mitigated by one comprehensive set of expansion plans. Otherwise, consideration of reliability criteria violations individually, mutually exclusive of one another, can lead to economically inefficient resolution of those violations. Further, as scenario two above would imply, specific upgrades, especially, new backbone upgrades, are justified not only to meet local reliability requirements but, regionally, to mitigate the reliability issues of delivering needed power to more distant load centers as well. That is the regional nature of PJM planning.

This concept is key to understanding the nature of each PJM reliability issue and its relationship to the location and type of upgrade required to resolve that issue.

First, though, before describing specific upgrades, each section summarizes key load growth, generation deactivation and generation and merchant transmission system information.

12.0.2 – Load Growth

Load forecasts are a key component of power flow modeling in transmission expansion studies, including studies associated load deliverability analyses. Accurate zonal load forecasts are essential if transmission expansion studies are to yield plans that will continue to ensure reliable and economic system operations. This is described more fully in PJM Manual 14B, accessible from PJM's Web site via the following URL link: http://www.pjm.com/documents/manuals.aspx.

The PJM Load Forecast Model incorporates three classes of variables: 1) calendar effects such as day of the week, month, and holidays 2) a forecast of baseline economic conditions and 3) weather conditions across the RTO.

Specifically, PJM uses Gross Metropolitan Product (GMP) in the econometric component of its forecast model, which allows for a localized treatment of economic effects within a zone. PJM has contracted with an outside economic services vendor to provide economic forecasts for all areas within the PJM footprint on an ongoing basis. To account for weather conditions across the RTO, PJM calculates a weighted average of temperature, humidity and wind speed as the weather drivers. PJM has access to weather data from 30 weather stations across the PJM footprint.

PJM's 2014 Baseline model incorporated PJM's 2009 load forecast for the planning horizon through 2014. PJM's 2014 RTO Summer Peak was modeled at 149,497 MW, less than the 2008 forecast for 2014 of 151,675 MW by 2,178 MW, or about 1.4 percent lower. The 2009 forecast reflects the impacts of the economic downturn in the US since the Fall of 2008. Just as important, however, is that over the 15 planning horizon, PJM's forecasted 15-year RTO load growth rate

increased from 1.5 percent per year in the 2008 Forecast to 1.7 percent per year in the 2009 Forecast. Table 12.1 depicts PJM load zone forecasts.

The existing PJM transmission system is currently planned to meet expected 2014 peak load conditions as discussed in **Section 3** and **Section 8** of this report. PJM's ongoing RTEP process continues to study anticipated needs for additional transmission expansion plans to meet load growth requirements beyond 2014 as well.

Table 12.1: PJM TO Zone Load Forecasts

	2009 Load Forecast Report					
	Summer Peak (MW)			Winter Peak (MW)		
T. O.	2009	2019	Growth Rate (%)	2008/09	2018/19	Growth Rate (%)
Atlantic City Electric Company	2,692	3,533	2.8%	1,799	2,280	2.4%
Baltimore Gas and Electric Company	7,303	8,745	1.8%	5,986	6,637	1.0%
Delmarva Power and Light	3,972	4,882	2.1%	3,307	3,825	1.5%
Jersey Central Power and Light	6,357	7,621	1.8%	3,978	4,645	1.6%
Metropolitan Edison Company	2,866	3,334	1.5%	2,560	2,898	1.2%
PECO Energy Company	8,455	9,538	1.2%	6,526	7,167	0.9%
Pennsylvania Electric Company	2,786	3,305	1.7%	2,790	3,269	1.6%
PPL Electric Utilities Corporation	7,106	7,985	1.2%	7,182	7,759	0.8%
Potomac Electric Power Company	6,960	7,823	1.2%	5,420	6,063	1.1%
Public Service Electric and Gas Company	10,858	12,470	1.4%	6,999	7,887	1.2%
Rockland Electric Company	435	496	1.3%	237	257	0.8%
UGI	190	207	0.9%	198	209	0.5%
Diversity - Mid-Atlantic	-359	-427		-538	-597	
Mid-Atlantic	**59,621**	**69,512**	**1.5%**	**46,444**	**52,299**	**1.2%**
American Electric Power Company	23,682	26,554	1.2%	22,974	24,729	0.7%
Allegheny Power	8,538	9,889	1.5%	8,258	9,372	1.3%
Commonwealth Edison Company	22,472	27,722	2.1%	15,617	18,621	1.8%
Dayton Power and Light	3,399	3,945	1.5%	2,930	3,249	1.0%
Duquesne Light Company	2,862	3,257	1.3%	2,138	2,302	0.7%
Diversity - Western	-1,252	-1,646		-1,098	-1,334	
Western	**59,701**	**69,721**	**1.6%**	**50,819**	**56,939**	**1.1%**
Dominion Virginia Power	18,982	23,603	2.2%	16,677	19,710	1.7%
Southern	**18,982**	**23,603**	**2.2%**	**16,677**	**19,710**	**1.7%**
Diversity - RTO	-3,876	-4,219		-1,377	-1,508	
PJM RTO	**134,428**	**158,617**	**1.7%**	**112,563**	**127,440**	**1.2%**

12.0.3 – New Generator Interconnection Requests

PJM has received interconnection requests for numerous new generation facilities throughout PJM, since 1999, summarized in the table below through the close of Queue V4 on January 31, 2010.

Status	MW	# of Projects
In-Service	23,804	271
Under Construction	9,027	116
Active	66,112	383
Withdrawn	188,669	589
Suspended	3,478	24
Total	291,090	1,383

The state RTEP overviews which follow summarize interconnection requests on an individual state basis.

12.0.4 – PJM RTEP Summaries by Jurisdiction

The individual RTEP overview sections that follow are arranged in the sequence outlined below. Where appropriate, specific market integration dates have also been noted so that data and results throughout **Section 12** can be understood within appropriate time frames. Each section summarizes key aspects of PJM's RTEP for that particular jurisdiction.

Section 12.1: Delaware and the Delmarva Peninsula

Section 12.2: Northern Illinois (includes ComEd integration in 2004)

Section 12.3: Indiana (includes AEP integration in 2004)

Section 12.4: Eastern Kentucky (includes AEP integration in 2004)

Section 12.5: Maryland and the District of Columbia (includes AP integration in 2002)

Section 12.6: Southwestern Michigan (includes AEP integration in 2004)

Section 12.7: New Jersey

Section 12.8: Northeastern North Carolina (includes Dominion integration in 2005)

Section 12.9: Ohio (includes AP integration in 2002, AEP in 2004, and Dayton in 2004)

Section 12.10: Pennsylvania (includes AP integration in 2002, and DLCO in 2005)

Section 12.11: Northeastern Tennessee (includes AEP integration in 2004)

Section 12.12: Virginia (includes AP integration in 2002, and Dominion integration in 2005)

Section 12.13: West Virginia (includes AP integration in 2002, and AEP integration in 2004)

12.0.5 – State Summaries of Generation Powered by Renewable Fuels

PJM's queues include over 45,000 MW of generation powered by renewable fuel technologies associated with interconnection requests that are active, under construction or in-service. PJM's Interconnection process offers a structure that assures consistent opportunity for development across fuel types, while providing the flexibility to adapt to specific technical realities and market challenges. The state RTEP overviews which follow summarize renewable activity on a state basis.

Presently, PJM's queues include interconnection requests for plants fueled by wind, hydro, biomass, wood, waste and methane, as summarized in Table 12.2.

The non-discriminatory nature of PJM's RTEP process has permitted significant growth in renewables in recent years. Interconnection request queue activity totals through the close of Queue V4 on January 31, 2010, include nearly 43,000 MW of wind generation, 425 MW of methane, 450 MW of biomass and 1,125 MW of hydro, associated with interconnection requests that are active, under construction or in-service. **Section 12** of this report summarizes interconnection requests for generation powered by renewable fuels on a state-by-state basis.

While some renewable resources can operate in a manner similar to the traditional fossil fueled power plants, other renewable energy sources, such as wind, are recognized as intermittent resources. Their ability to generate power is directly determined by the immediate availability and/or magnitude of their specific fuel. For example, wind turbines can generate electricity only when wind speed is within a range consistent with the physical specifications of the related turbines. This presents challenges with respect to real-time operational dispatch and specific capacity value. To address the latter issue, PJM has established a set of business rules unique to intermittent resources that provides for the determination of credible capacity values.

Table 12.2: PJM Interconnection Requests by Renewable Fuel Type

	Active		Under Construction		In-Service		Withdrawn		Suspended		TOTAL	
Fuel Type	MW	# of projects	MW	# of projects	MW	# of projects	MW	# of projects	MW	# of projects	MW	# of projects
Biomass	246	9	82	3	124	6	56	4	198	3	705	25
Hydro	378	14	172	4	573	8	1,706	19			2,829	45
Methane	123	26	73	15	230	41	235	32	10	1	672	115
Solar	625	64	100	5	3	1	48	6			776	76
Wind	37,307	160	3,086	26	2,531	30	16,644	134	1,287	15	60,854	365
Wood	158	2			4	1	50	1			212	4
Total	**38,837**	**275**	**3,513**	**53**	**3,464**	**87**	**18,739**	**196**	**1,495**	**19**	**66,048**	**630**