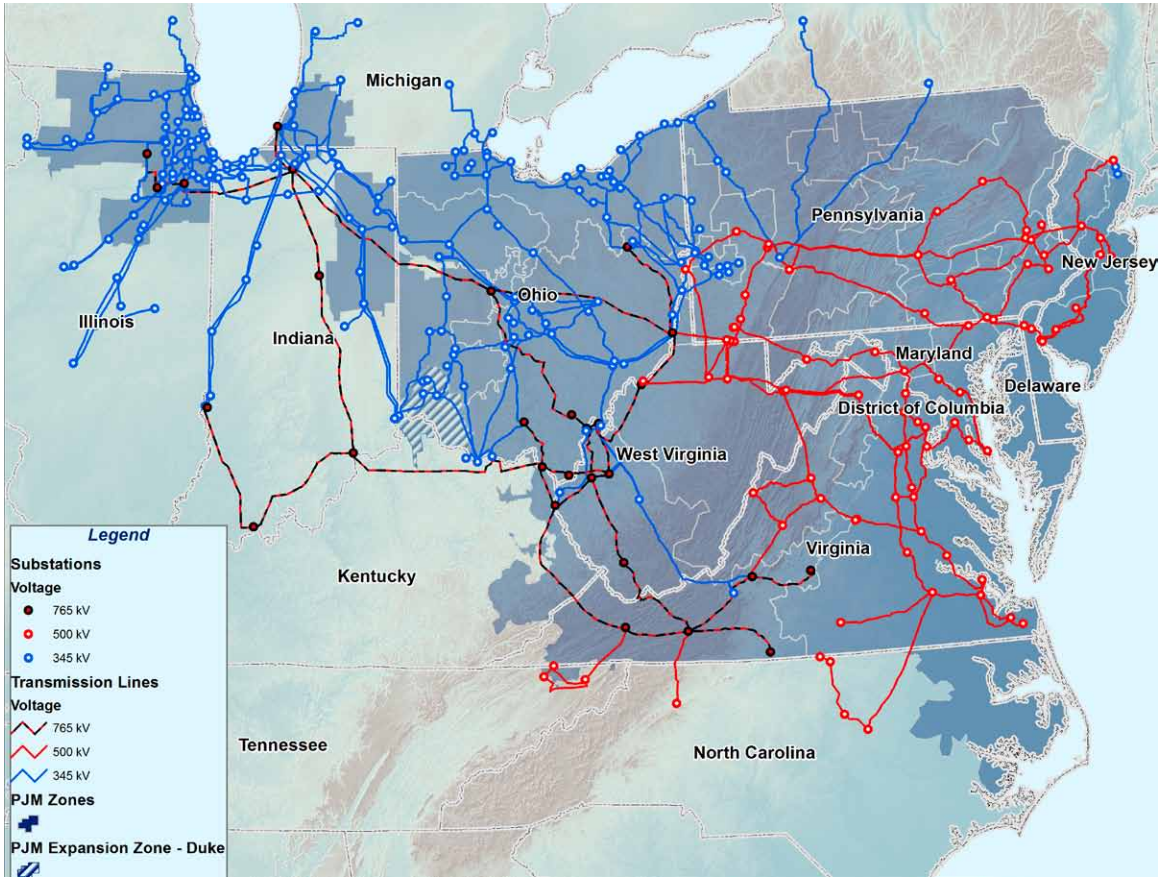
Section 14: State RTEP Overviews

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

14.0: 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 14.1 shows PJM's footprint and high voltage backbone electrical transmission system.

Map 14.1: PJM Backbone Transmission

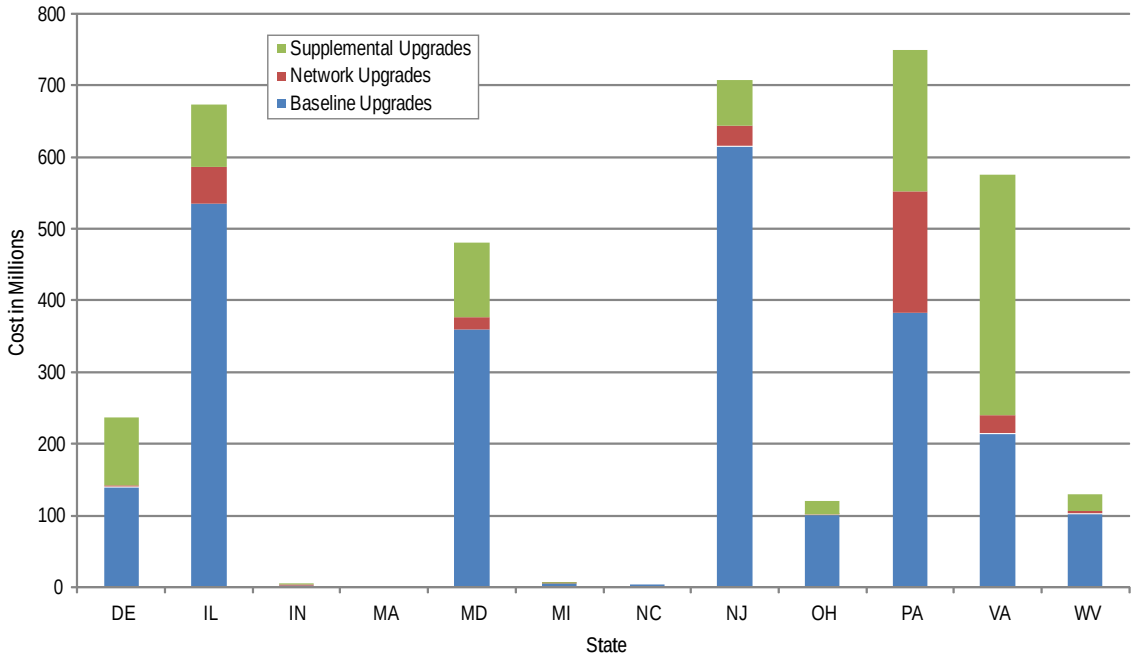


14.0.1 – The PJM System

Serving approximately 54 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 176,000 megawatts of generation capacity over 61,000 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 14.1 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 as well.

To date, more than $19 billion of transmission expansions have been planned. Figure 14.1 contains a summary of the cost of in-service system reinforcements by state. These upgrades meet the challenges of many system drivers, including load forecasts, generation and merchant transmission interconnection requests, congestion, generator deactivations, operational performance, Demand Resource and Energy Efficiency programs, and others, as shown in Figure 14.2.

Figure 14.1: Cost of In-Service System Reinforcements by State



Since the inception of its open, nondiscriminatory planning process in 1997, PJM has received more than 309,000 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 14.3 contains a status summary of in-service generating projects by state.

Preliminary 2011 PJM RTEP process analysis suggests that the need for the PATH line has moved several years beyond 2015. The outlook for a slower economic recovery – reflected in the reduced load growth rates in PJM's January 2011 published forecast – has led the PJM Board to direct transmission owners to suspend efforts on the PATH line pending a more complete analysis in 2011 of all RTEP upgrades, including MAPP. **Section 5** of this report discusses the PATH suspension.

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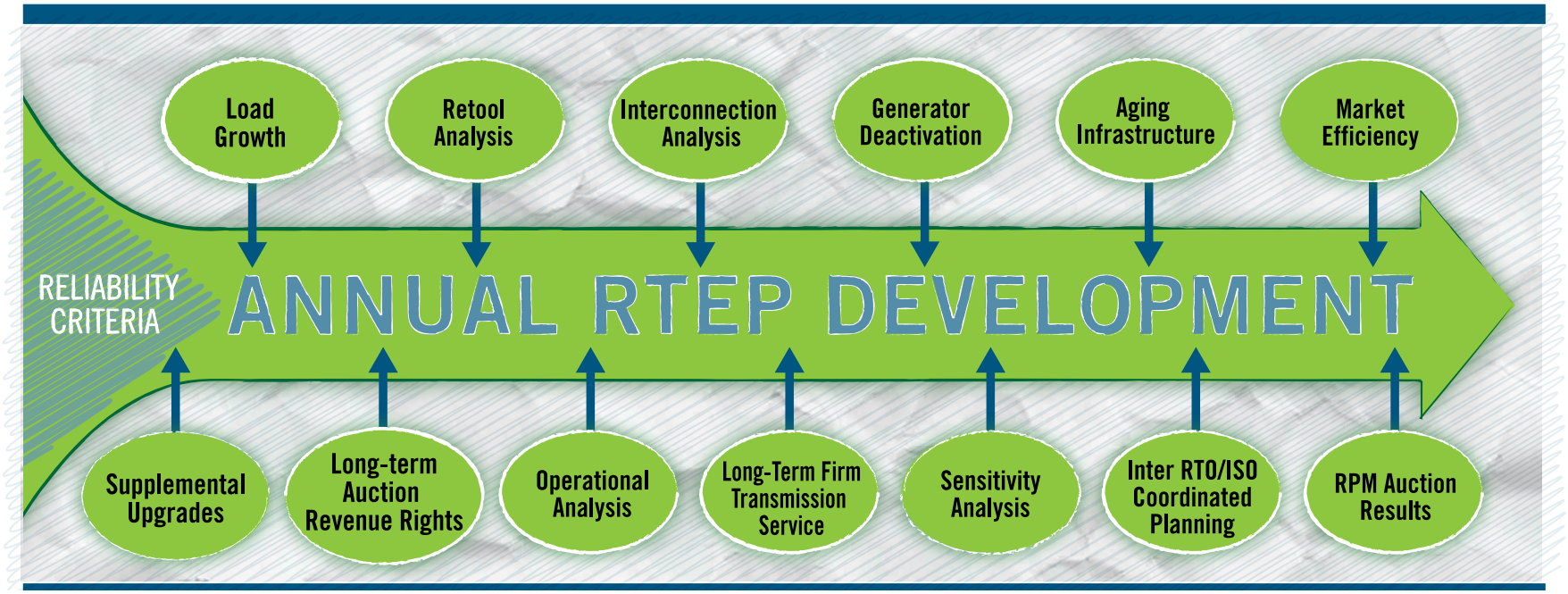
Figure 14.2: RTEP Development Drivers



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.

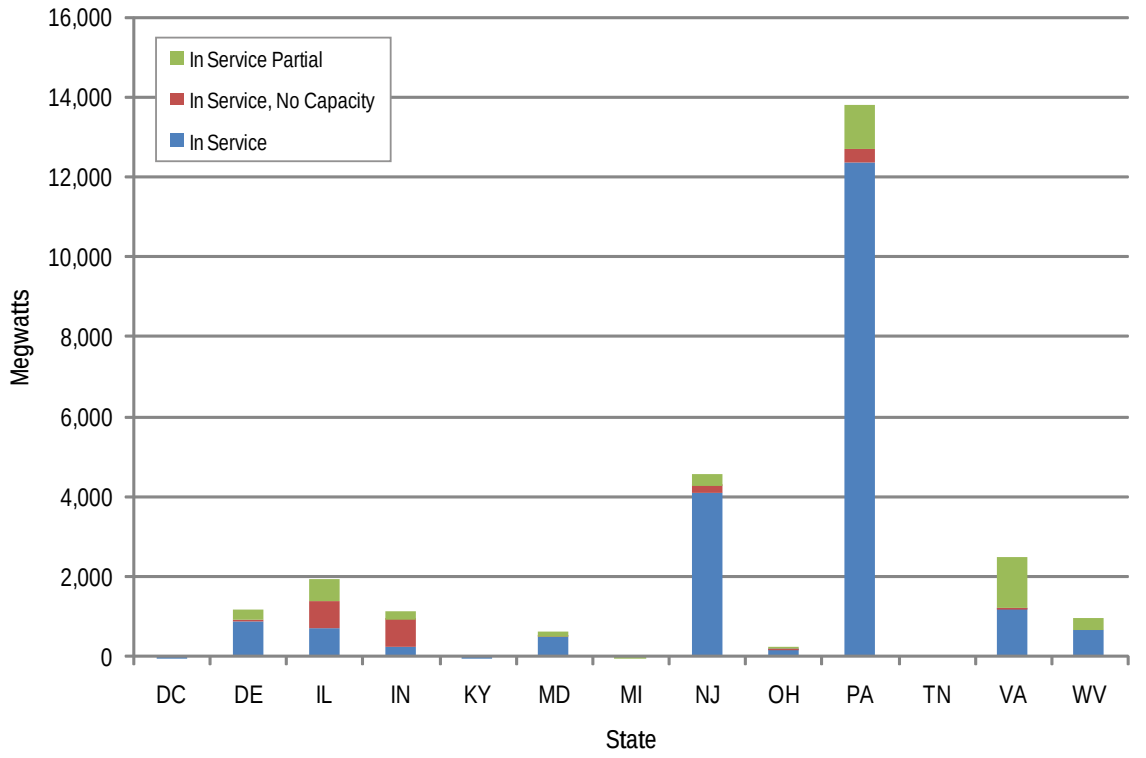
Relationship between reliability criteria violation and location of upgrade

The PJM Regional Transmission Expansion Plan (RTEP) process assesses system reliability issues and viable solutions from a regional perspective, essentially ignoring internal Transmission Owner (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.

Figure 14.3: In-Service Generating Resource Projects by State



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.

From a regional perspective, PJM can identify more economical and optimal global solutions that consider all reliability criteria violations and congestion constraints to 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 indicates, specific upgrades, especially new 765 kV and 500 kV backbone upgrades, are justified not only to meet local reliability requirements but, regionally, also mitigate reliability issues associated with delivering power to more distant load centers. 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 solve reliability criteria violations.

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14.0.2 – Load Growth

Load forecasts are a key component of power flow modeling in transmission expansion studies, particularly deliverability studies. Accurate zonal load forecasts are essential if transmission expansion studies are to yield plans that will continue to ensure reliable system operations. This is described more fully in PJM Manual 14B, accessible from PJM's website 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 2015 RTO Summer Peak was modeled at 165,402 MW, including ATSI load. For the existing RTO, the 2010 forecast of the 2015 peak was

***NOTE**

** Note: The 2010 Report Western and PJM RTO numbers include ATSI.

Table 14.1: PJM TO Zone Load Forecasts

2010 Load Forecast Report						
	Summer Peak (MW)			Winter Peak (MW)		
TO	2010	2020	Growth Rate (%)	2009/10	2019/20	Growth Rate (%)
Atlantic City Electric Company	2,734	3,443	2.3	1,773	2,142	1.9
Baltimore Gas and Electric Company	7,456	8,919	1.8	6,022	6,714	1.1
Delmarva Power and Light	4,023	4,601	1.4	3,301	3,663	1.0
Jersey Central Power and Light	6,440	7,611	1.7	3,986	4,606	1.5
Metropolitan Edison Company	2,920	3,444	1.7	2,571	3,000	1.6
PECO Energy Company	8,528	9,821	1.4	6,503	7,389	1.3
Pennsylvania Electric Company	2,843	3,420	1.9	2,796	3,390	1.9
PPL Electric Utilities Corporation	7,161	8,213	1.4	7,169	7,980	1.1
Potomac Electric Power Company	7,048	7,909	1.2	5,481	6,171	1.2
Public Service Electric and Gas Company	10,921	12,428	1.3	6,982	7,818	1.1
Rockland Electric Company	435	493	1.3	235	254	0.8
UGI	190	210	1.0	194	210	0.8
Diversity - Mid-Atlantic	-530	-385		-603	-563	
Mid-Atlantic	**60,169**	**70,127**	**1.5**	**46,410**	**52,774**	**1.3**
American Electric Power Company	23,287	26,631	1.4	22,310	24,410	0.9
Allegheny Power	8,661	9,909	1.4	8,449	9,639	1.3
American Transmission Systems, Inc.	13,040	14,888	1.3	10,518	11,651	1.0
Commonwealth Edison Company	22,536	27,965	2.2	15,588	18,851	1.9
Dayton Power and Light	3,368	3,835	1.3	2,918	3,147	0.8
Duquesne Light Company	2,883	3,318	1.4	2,137	2,305	0.8
Diversity - Western **	-1,684	-2,192		-1,279	-1,390	
Western **	**72,091**	**84,354**	**1.6**	**60,641**	**68,613**	**1.2**
Dominion Virginia Power	19,779	25,387	2.5	17,169	21,104	2.1
Southern	**19,779**	**25,387**	**2.5**	**17,169**	**21,104**	**2.1**
Diversity - RTO **	-4,248	-5,144		-1,091	-1,419	
PJM RTO **	**147,791**	**174,724**	**1.7**	**123,129**	**141,072**	**1.4**

modeled at 152,119 MW, greater than the 2009 forecast for 2015 of 151,410 MW by 709 MW, or about 0.5 percent higher. The 2010 forecast reflects the impacts of the economic recovery in the U.S. that began in the Fall of 2009 Table 14.1 depicts PJM load zone forecasts.

American Transmission Systems, Inc. (ATSI)

Based on FirstEnergy's integration filing submitted to FERC on August 17, 2009, ATSI transmission assets will be integrated into PJM effective June 1, 2011. ATSI is a wholly owned subsidiary of FirstEnergy and owns the transmission assets of its electric utility operating companies - The Toledo Edison Company (Toledo Edison), The Cleveland Electric Illuminating Company (The Illuminating Company), Ohio Edison Company (Ohio Edison), and Pennsylvania Power Company (Penn Power). PJM has completed all required studies to incorporate ATSI into the Regional Transmission Expansion Plan (RTEP) process beginning in 2011, as discussed in **Section 11.1**.

As part of the 2010 RTEP, a number of baseline upgrades were identified in the ATSI zone. Given the ATSI zone will not formally be integrated into PJM until June 1, 2011, these upgrades have not been approved by the PJM Board. The PJM Board will be requested to approve the upgrades following the June 1, 2011 integration of ATSI.

14.0.3 – 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 W4 on January 31, 2011.

	MW	# of Projects
Active	64,698	623
In Service	27,158	315
Suspended	3,217	28
Under Construction	9,500	135
Withdrawn	204,701	744
Total	309,273	2,845

Each state RTEP overview in **Section 14.1** through **Section 14.13** summarize interconnection requests for that particular state.

14.0.4 – State Summaries of Generation Powered by Renewable Fuels

PJM's queues include over 48,000 MW of generation projects (that have not withdrawn) powered by renewable fuel technologies associated with interconnection requests. 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, methane and solar as summarized in Table 14.2.

Table 14.2: Interconnection Requests by Renewable Fuel Type

	Active		In-Service		Suspended		Under Construction		Withdrawn		Total	
	MW	# of projects	MW	# of projects	MW	# of projects	MW	# of projects	MW	# of projects	MW	# of projects
Biomass	294	10	124	6	198	3	82	3	208	9	905	31
Hydro	383	10	632	11			145	3	1,802	26	2,962	50
Methane	69	18	280	49	10	1	58	16	310	43	727	127
Solar	3,930	309	67	8			224	35	706	71	4,927	423
Wind	32,971	172	4,491	43	1,516	18	2,909	22	22,626	162	64,513	417
Wood			4	1			115	1	130	2	249	4
Total	37,647	519	5,597	118	1,724	22	3,533	80	25,781	313	74,282	1,052

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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 W4 on January 31, 2011, include nearly 42,000 MW of wind generation, 420 MW of methane, 700 MW of biomass, 1,160 MW of hydro and 4,200 MW of solar, associated with interconnection requests that have not withdrawn from PJM's process. **Section 14** of this report summarizes interconnection requests for generation powered by renewable fuels on a state-by-state basis.

Intermittent Resources

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. These are described in PJM Manuals M21 (http://pjm.com/~/media/documents/manuals/m21.ashx) and M14A (http://pjm.com/~/media/documents/manuals/m14a.ashx).

14.0.5 – PJM RTEP Summaries by Jurisdiction

Each individual state RTEP overview section that follows summarizes key load and generation information, status of approved backbone transmission projects and Bulk Electric System (BES) upgrades over $5 million in scope.

Section 14.1: Delaware and the Delmarva Peninsula

Section 14.2: northern Illinois (includes ComEd integration in 2004)

Section 14.3: Indiana (includes AEP integration in 2004)

Section 14.4: Eastern Kentucky (includes AEP integration in 2004)

Section 14.5: Maryland and the District of Columbia (includes AP integration in 2002)

Section 14.6: Southwestern Michigan (includes AEP integration in 2004)

Section 14.7: New Jersey

Section 14.8: Northeastern North Carolina (includes Dominion integration in 2005)

Section 14.9: Ohio (includes AP integration in 2002, AEP in 2004, Dayton in 2004 and ATSI in 2011)

Section 14.10: Pennsylvania (includes AP integration in 2002, DLCO in 2005 and ATSI in 2011)

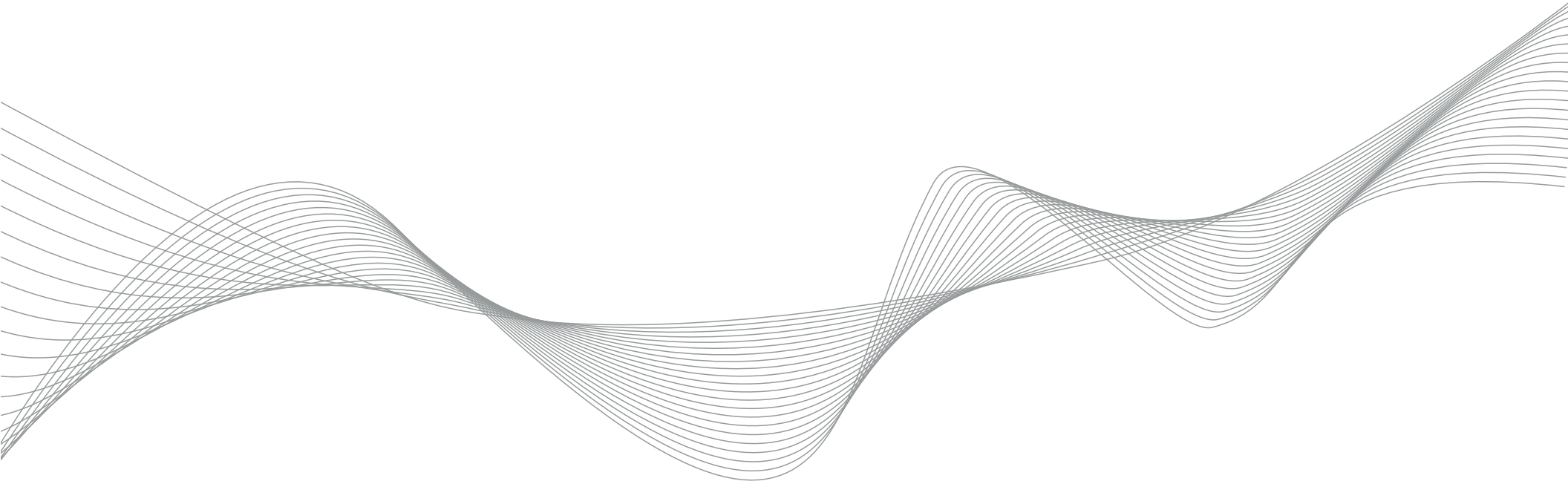
Section 14.11: Northeastern Tennessee (includes AEP integration in 2004)

Section 14.12: Virginia (includes AP integration in 2002, and Dominion integration in 2005)

Section 14.13: West Virginia (includes AP integration in 2002, and AEP integration in 2004)

No one state within the PJM footprint acts in isolation. Understanding system conditions throughout PJM is key to understanding impacts in any one state. Thus, while this report provides summaries on a state-by-state basis, RTEP analysis is based on the aggregate requirements of the entire PJM system.

Section 16 provides a topical index of RTEP results, issues and challenges discussed in this report.



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