Generation and Transmission Planning

Overview

Planned Generation and Retirements

- **Planned Generation.** At March 31, 2013, 73,156 MW of capacity were in generation request queues for construction through 2020, compared to an average installed capacity of 197,000 MW in the first three months of 2013. Wind projects account for approximately 19,079 MW of nameplate capacity, 26.1 percent of the MW in the queues, and combined-cycle projects account for 42,217 MW, 57.7 percent of the MW in the queues.

- **Generation Retirements.** As shown in Table 11-11, 11,844.2 MW are planning to deactivate by the end of calendar year 2019. A total of 7,130.9 MW of generation capacity retired from January 1, 2012 through March 31, 2013, and it is expected that a total of 20,297.4 MW will have retired from 2011 through 2019, with most of this capacity retiring by the end of 2015. Retirements from January 1, 2011 through March 31, 2013, account for 8,453.2 MW, or 39.6 percent of retirements during this period. Units planning to retire in 2013 account for 237.4 MW, or 1.2 percent of retirements during this period. Overall, 3,508.1 MW, or 29.6 percent of all MW planned for deactivation from 2013 through 2019, are expected in the AEP zone.

- **Generation Mix.** A potentially significant change in the distribution of unit types within the PJM footprint is likely as a combined result of the location of generation resources in the queue and the location of units likely to retire. In both the EMAAC and SWMAAC LDAs, the capacity mix is likely to shift to more natural gas-fired combined cycle (CC) and combustion turbine (CT) capacity. Elsewhere in the PJM footprint, continued reliance on steam (mainly coal) seems likely, despite retirements of coal units.

Generation and Transmission Interconnection Planning Process

- Any entity that requests interconnection of a generating facility, including increases to the capacity of an existing generating unit, or that requests interconnection of a merchant transmission facility, must follow the process defined in the PJM tariff to obtain interconnection service.[1] The process is complex and time consuming as a result of the nature of the required analyses. The cost, time and uncertainty associated with interconnecting to the grid may create barriers to entry for potential entrants.

- The queue contains a substantial number of projects that are not likely to be built, including 7,584.2 MW that should already be in service based on the original queue date, but that is not yet even under construction. These projects may also create barriers to entry for projects that would otherwise be completed by taking up queue positions, increasing interconnection costs and creating uncertainty.

Key Backbone Facilities

- PJM baseline transmission projects are implemented to resolve reliability criteria violations. PJM backbone transmission projects are a subset of significant baseline projects. The backbone projects are intended to resolve a wide range of reliability criteria violations and congestion issues and have substantial impacts on energy and capacity markets. The current backbone projects are: Mount Storm – Doubs; Jacks Mountain; and Susquehanna – Roseland.

Economic Planning Process

- **Transmission and Markets.** As a general matter, transmission investments have not been fully incorporated into competitive markets. The construction of new transmission facilities can have significant impacts on energy and capacity markets, but there is no market mechanism in place that would require direct competition between transmission and generation to meet loads in an area. PJM has taken a first step towards

1 OATT Parts IV & VI.

integrating transmission investments into the market through the use of economic evaluation metrics.[2] The goal of transmission planning should be the incorporation of transmission investment decisions into market driven processes as much as possible.

Conclusion

The goal of PJM market design should be to enhance competition and to ensure that competition is the driver for all the key elements of PJM markets. But transmission investments have not been fully incorporated into competitive markets. The construction of new transmission facilities has significant impacts on energy and capacity markets. But when generating units retire, there is no market mechanism in place that would require direct competition between transmission and generation to meet loads in that area. In addition, despite Order 1000, there is not yet a robust mechanism to permit competition between transmission developers to build transmission projects. The addition of a planned transmission project changes the parameters of the capacity auction for the area, changes the amount of capacity needed in the area, changes the capacity market supply and demand fundamentals in the area and effectively forestalls the ability of generation to compete. There is no mechanism to permit a direct comparison, let alone competition, between transmission and generation alternatives. There is no evaluation of whether the generation or transmission alternative is less costly or who bears the risks associated with each alternative. Creating such a mechanism should be a goal of PJM market design.

Planned Generation and Retirements

Planned Generation Additions

Net revenues provide incentives to build new generation to serve PJM markets. While these incentives operate with a significant lag time and are based on expectations of future net revenue, the amount of planned new generation in PJM reflects investors' perception of the incentives provided by the combination of revenues from the PJM Energy, Capacity and Ancillary Service Markets. At March 31, 2013, 73,156 MW of capacity were in generation request queues for construction through 2020, compared to an average installed capacity of 197,000 MW in 2013. Although it is clear that not all generation in the queues will be built, PJM has added capacity annually since 2000 (Table 11-1).[3] Overall, 362 MW of nameplate capacity were added in PJM in the first three months of 2013.

Table 11-1 Year-to-year capacity additions from PJM generation queue: Calendar years 2000 through the first three months of 2013[4]

	MW
2000	505
2001	872
2002	3,841
2003	3,524
2004	1,935
2005	819
2006	471
2007	1,265
2008	2,777
2009	2,516
2010	2,097
2011	5,008
2012	2,669
2013	362

PJM Generation Queues

Generation request queues are groups of proposed projects. Queue A was open from February 1997 through January 1998; Queue B was open from February 1998 through January 1999; Queue C was open from February 1999 through July 1999 and Queue D opened in August 1999. After Queue D, a new queue was opened every six months until Queue T, when new queues began to open annually. Queue Y was active through March 31, 2013.

Capacity in generation request queues for the eight year period beginning in 2013 and ending in 2020 decreased by 3,231 MW from 76,387 MW in 2012 to

2 *See* 126 FERC ¶ 61,152 (2009) (final approval for an approach with predefined formulas for determining whether a transmission investment passes the cost-benefit test including explicit accounting for changes in production costs, the costs of complying with environmental regulations, generation availability trends and demand-response trends), *order on reh'g*, 123 FERC ¶ 61,051 (2008).

3 The capacity additions are new MW by year, including full nameplate capacity of solar and wind facilities and are not net of retirements or deratings.

4 The capacity described in this table refers to all installed capacity in PJM, regardless of whether the capacity entered the RPM auction.

73,156 MW on March 31, 2013, or 4.2 percent (Table 11-2).[5] Queued capacity scheduled for service in 2013 decreased from 22,120 MW to 17,889 MW, or 19.1 percent. Queued capacity scheduled for service in 2014 decreased from 8,086 MW to 7,143 MW, or 5.6 percent. The 73,156 MW include generation with scheduled in-service dates in 2013 and units still active in the queue with in-service dates scheduled before 2013, listed at nameplate capacity, although these units are not yet in service.

Table 11-2 Queue comparison (MW): March 31, 2013 vs. December 31, 2012

	MW in the Queue 2012	MW in the Queue 2013	Year-to-Year Change (MW)	Year-to-Year Change
2013	22,120	17,889	(4,231)	(19.1%)
2014	8,086	7,143	(944)	(11.7%)
2015	22,295	21,052	(1,244)	(5.6%)
2016	11,788	13,397	1,609	13.7%
2017	8,932	10,165	1,233	13.8%
2018	3,165	3,165	0	0.0%
2019	0	0	0	NA
2020	0	346	346	NA
Total	76,387	73,156	(3,231)	(4.2%)

Table 11-3 shows the amount of capacity active, in-service, under construction or withdrawn for each queue since the beginning of the Regional Transmission Expansion Plan (RTEP) Process and the total amount of capacity that had been included in each queue.[6]

Table 11-3 Capacity in PJM queues (MW): At March 31, 2013[7,8]

Queue	Active	In-Service	Under Construction	Withdrawn	Total
A Expired 31-Jan-98	0	8,103	0	17,347	25,450
B Expired 31-Jan-99	0	4,646	0	14,957	19,602
C Expired 31-Jul-99	0	531	0	3,471	4,002
D Expired 31-Jan-00	0	851	0	7,182	8,033
E Expired 31-Jul-00	0	795	0	8,022	8,817
F Expired 31-Jan-01	0	52	0	3,093	3,145
G Expired 31-Jul-01	0	1,116	0	17,934	19,050
H Expired 31-Jan-02	0	703	0	8,422	9,124
I Expired 31-Jul-02	0	103	0	3,728	3,831
J Expired 31-Jan-03	0	40	0	846	886
K Expired 31-Jul-03	0	218	80	2,345	2,643
L Expired 31-Jan-04	0	257	0	4,034	4,290
M Expired 31-Jul-04	0	505	422	3,556	4,482
N Expired 31-Jan-05	0	2,399	38	8,090	10,527
O Expired 31-Jul-05	10	1,691	825	5,066	7,592
P Expired 31-Jan-06	393	3,065	253	4,928	8,638
Q Expired 31-Jul-06	120	2,248	2,694	9,472	14,534
R Expired 31-Jan-07	1,296	1,216	728	19,514	22,755
S Expired 31-Jul-07	1,778	3,243	370	11,751	17,142
T Expired 31-Jan-08	3,724	1,275	631	21,916	27,546
U Expired 31-Jan-09	3,114	733	132	29,378	33,357
V Expired 31-Jan-10	4,870	264	1,597	10,275	17,005
W Expired 31-Jan-11	8,055	322	1,709	14,160	24,245
X Expired 31-Jan-12	16,955	123	1,964	11,331	30,373
Y Through 31-Mar-13	21,254	5	146	1,537	22,941
Total	61,567	34,502	11,589	242,352	350,010

Data presented in Table 11-4 show that through the first three months of 2013, 36.9 percent of total in-service capacity from all the queues was from Queues A and B and an additional 6.3 percent was from Queues C, D and E.[9] As of March 31, 2013, 9.9 percent of all queued capacity has been placed in service, and 13.2 percent of all queued capacity is either complete or under construction.

The data presented in Table 11-4 show that for successful projects there is an average time of 840 days between entering a queue and the in-service date,

5 See the *2012 State of the Market Report for PJM*: Volume II, Section 11, pp. 318-323, for the queues in 2012.

6 Projects listed as active have been entered in the queue and the next phase can be under construction, in-service or withdrawn. At any time, the total number of projects in the queues is the sum of active projects and under-construction projects.

7 The *2013 Quarterly State of the Market Report for PJM: January through March* contains all projects in the queue including reratings of existing generating units and energy only resources.

8 Projects listed as partially in-service are counted as in-service for the purposes of this analysis.

9 The data for Queue Y include projects through March 31, 2013.

an increase of 9 days over the 2012 average. The data also show that for withdrawn projects, there is an average time of 577 days between entering a queue and completion or exiting. For each status, there is substantial variability around the average results.

Table 11-4 Average project queue times (days): At March 31, 2013

Status	Average (Days)	Standard Deviation	Minimum	Maximum
Active	922	696	0	4,636
In-Service	840	718	0	3,964
Suspended	2,061	894	704	3,849
Under Construction	1,416	754	0	4,370
Withdrawn	564	577	0	4,249

Table 11-5 shows active queued capacity that was planned to be in service by April 1, 2013. This indicates there is a substantial amount of queued capacity, 7,955.2 MW, that should already be in service based on the original queue date but that is not yet even under construction. The MMU recommends that a review process be created to ensure that projects are removed from the queue, if they are no longer viable and no longer planning to complete the project.

Table 11-5 Active capacity queued to be in service prior to April 1, 2013

	MW
2007	27.0
2008	190.0
2009	294.0
2010	1,199.8
2011	2,532.4
2012	3,471.4
2013	240.6
Total	7,955.2

Distribution of Units in the Queues

A more detailed examination of the queue data permits some additional conclusions. The geographic distribution of generation in the queues shows that new capacity is being added disproportionately in the west, and includes a substantial amount of wind capacity. At March 31, 2013, 73,156 MW of capacity were in generation request queues for construction through 2020, compared to an average installed capacity of 197,000 MW in 2013. Wind projects account for 19,079 MW of nameplate capacity or 26.1 percent of the capacity in the queues and combined-cycle projects account for 42,792 MW of capacity or 58.5 percent of the capacity in the queues.[10] On March 31, 2013, there were 42,792 MW of capacity from combined cycle units in the queue, compared to 42,724 MW in 2012, an increase of 0.2 percent. At March 31, 2013, there was queued combined cycle capacity in nearly every zone in PJM, and after accounting for the derating of wind and solar resources, combined cycle capacity comprises 77.5 percent of the MW in the queue able to offer into RPM auctions.

Table 11-6 shows the projects under construction or active as of March 31, 2013, by unit type and control zone. Most of the steam projects (99.4 percent of the MW) and most of the wind projects (92.6 percent of the MW) are outside the Eastern MAAC (EMAAC)[11] and Southwestern MAAC (SWMAAC)[12] locational deliverability areas (LDAs).[13] Of the total capacity additions, only 16,142 MW, or 22.1 percent, are projected to be in EMAAC, while 4,225 MW or 5.7 percent are projected to be constructed in SWMAAC. Of total capacity additions, 29,392 MW, or 40.1 percent of capacity, is being added inside MAAC zones. Overall, 72.2 percent of capacity is being added outside EMAAC and SWMAAC, and 59.8 percent of capacity is being added outside MAAC zones, not accounting for the planned integration of the EKPC zone in 2013. Wind projects account for 2,602 MW of capacity in MAAC LDAs, or 8.9 percent. While there are no wind projects in the SWMAAC LDA, in the EMAAC LDA wind projects account for 1,407 MW of capacity, or 8.7 percent.

10 Since wind resources cannot be dispatched on demand, PJM rules previously required that the unforced capacity of wind resources be derated to 20 percent of installed capacity until actual generation data are available. Beginning with Queue U, PJM derates wind resources to 13 percent of installed capacity. PJM derates solar resources to 38 percent of installed capacity. Based on the derating of 19,079 MW of wind resources and 2,154 MW of solar resources, the 73,156 MW currently active in the queue would be reduced to 55,222 MW.

11 EMAAC consists of the AECO, DPL, JCPL, PECO and PSEG Control Zones.

12 SWMAAC consists of the BGE and Pepco Control Zones.

13 See the *2012 State of the Market Report for PJM*, Volume II, Appendix A, "PJM Geography" for a map of PJM LDAs.

Table 11-6 Capacity additions in active or under-construction queues by control zone (MW): At March 31, 2013

	CC	CT	Diesel	Hydro	Nuclear	Solar	Steam	Storage	Wind	Total
AECO	3,495	71	9	0	0	495	0	0	1,069	5,138
AEP	5,074	40	20	70	0	44	2,124	84	8,894	16,350
AP	2,048	0	33	75	0	143	341	0	547	3,186
ATSI	4,633	40	6	0	30	15	135	0	849	5,708
BGE	678	256	4	0	0	22	0	0	0	960
ComEd	1,530	361	52	23	473	64	0	42	4,837	7,381
DAY	0	0	2	112	0	23	12	12	845	1,006
DEOK	20	0	0	0	0	0	0	0	0	20
DLCO	40	0	0	0	91	0	460	0	0	591
Dominion	6,501	535	11	0	1,594	65	312	0	505	9,522
DPL	1,223	2	0	0	0	238	22	0	318	1,802
JCPL	2,550	0	30	0	0	802	0	0	0	3,382
Met-Ed	1,818	0	21	0	58	3	0	0	0	1,900
PECO	874	7	4	0	330	10	0	5	0	1,229
PENELEC	879	43	37	0	0	32	96	0	738	1,825
Pepco	3,245	0	20	0	0	0	0	0	0	3,265
PPL	4,683	0	8	3	100	29	0	20	458	5,301
PSEG	3,952	390	9	0	50	170	0	0	20	4,591
Total	43,241	1,744	266	283	2,726	2,154	3,501	162	19,079	73,156

There are potentially significant implications for future congestion, the role of firm and interruptible gas supply and natural gas supply infrastructure, if older steam units are replaced by units burning natural gas. (Table 11-7)

Table 11-7 Capacity additions in active or under-construction queues by LDA (MW): At March 31, 2013[14]

	CC	CT	Diesel	Hydro	Nuclear	Solar	Steam	Storage	Wind	Total
EMAAC	12,093	469	52	0	380	1,715	22	5	1,407	16,142
SWMAAC	3,923	256	24	0	0	22	0	0	0	4,225
WMAAC	7,380	43	66	3	158	64	96	20	1,195	9,025
Non-MAAC	19,396	1,425	124	280	2,188	353	3,383	138	16,477	43,765
Total	42,792	2,193	266	283	2,726	2,154	3,501	162	19,079	73,156

Table 11-8 shows existing generation by unit type and control zone. Existing steam (mainly coal and residual oil) and nuclear capacity is distributed across control zones.

A potentially significant change in the distribution of unit types within the PJM footprint is likely as a combined result of the location of generation resources in the queue (Table 11-6) and the location of units likely to retire. In both the EMAAC and SWMAAC LDAs, the capacity mix is likely to shift to more natural gas-fired combined cycle (CC) and combustion turbine (CT) capacity. The western part of the PJM footprint is also likely to see a shift to more natural gas-fired capacity due to changes in environmental regulations and natural gas costs, but likely will maintain a larger amount of coal steam capacity than eastern zones.

14 WMAAC consists of the Met-Ed, PENELEC, and PPL Control Zones.

Table 11-8 Existing PJM capacity: At March 31, 2013[15] (By zone and unit type (MW))

	CC	CT	Diesel	Fuel Cell	Hydroelectric	Nuclear	Solar	Steam	Storage	Wind	Total
AECO	164	706	21	0	0	0	40	1,087	0	8	2,025
AEP	4,900	3,682	63	0	1,072	2,071	0	21,527	0	1,753	35,068
AP	1,129	1,215	48	0	80	0	36	7,358	27	999	10,892
ATSI	685	1,661	74	0	0	2,134	0	6,540	0	0	11,094
BGE	0	835	11	0	0	1,716	0	3,007	0	0	5,569
ComEd	1,770	7,244	98	0	0	10,438	0	5,417	5	2,454	27,426
DAY	0	1,369	48	0	0	0	1	4,368	0	0	5,785
DEOK	0	842	0	0	0	0	0	2,646	0	0	3,488
DLCO	244	15	0	0	6	1,777	0	784	0	0	2,826
Dominion	4,030	3,762	174	0	3,589	3,581	3	8,356	0	0	23,494
DPL	1,125	1,820	96	30	0	0	4	1,800	0	0	4,876
External	974	990	0	0	66	439	0	6,238	0	185	8,892
JCPL	1,693	1,233	27	0	400	615	42	15	0	0	4,024
Met-Ed	2,051	408	41	0	20	805	0	844	0	0	4,168
PECO	3,209	836	3	0	1,642	4,547	3	979	1	0	11,220
PENELEC	0	344	46	0	513	0	0	6,831	0	931	8,663
Pepco	230	1,092	12	0	0	0	0	3,649	0	0	4,983
PPL	1,808	617	49	0	582	2,520	15	5,537	0	220	11,346
PSEG	3,091	2,838	12	0	5	3,493	105	2,050	2	0	11,597
Total	27,102	31,506	821	30	7,974	34,135	249	89,032	35	6,549	197,434

Table 11-9 shows the age of PJM generators by unit type.

Table 11-9 PJM capacity (MW) by age: at March 31, 2013

Age (years)	Combined Cycle	Combustion Turbine	Diesel	Fuel Cell	Hydroelectric	Nuclear	Solar	Steam	Storage	Wind	Total
Less than 11	18,997	9,274	470	30	11	0	249	2,497	35	6,515	38,077
11 to 20	6,069	13,041	106	0	48	0	0	3,261	0	34	22,560
21 to 30	1,594	1,663	56	0	3,448	15,409	0	8,502	0	0	30,672
31 to 40	244	3,108	43	0	105	16,361	0	29,222	0	0	49,083
41 to 50	198	4,420	132	0	2,915	2,365	0	29,359	0	0	39,389
51 to 60	0	0	15	0	379	0	0	13,516	0	0	13,910
61 to 70	0	0	0	0	0	0	0	2,526	0	0	2,526
71 to 80	0	0	0	0	280	0	0	95	0	0	375
81 to 90	0	0	0	0	549	0	0	54	0	0	603
91 to 100	0	0	0	0	155	0	0	0	0	0	155
101 and over	0	0	0	0	84	0	0	0	0	0	84
Total	27,102	31,506	821	30	7,974	34,135	249	89,032	35	6,549	197,434

Table 11-10 shows the effect that the new generation in the queues would have on the existing generation mix, assuming that all non-hydroelectric generators in excess of 40 years of age retire by 2020. The expected role of gas-fired generation depends largely on projects in the queues and continued retirement of coal-fired generation. New gas-fired capability would represent 90.8 percent of all new capacity in EMAAC when the derating of wind and solar capacity is reflected.

In 2012, a planned addition of 1,640 MW of nuclear capacity to Calvert Cliffs in SWMAAC was withdrawn from the queue. Without the planned nuclear capability in SWMAAC, new gas-fired capability represents 98.9 percent of all new capability in the SWMAAC. In 2020, this would mean that CC and CT generators would comprise 55.0 percent of total capability in SWMAAC.

In Non-MAAC zones, if older units retire, a substantial amount of coal-fired generation would be replaced by wind generation if the units in the generation queues are constructed.[16] In these zones, 87.8 percent of all generation 40 years or older is steam (primarily coal). With the retirement of these units in 2020, wind farms would comprise 15.8 percent of total MW ICAP in Non-MAAC zones, if all queued MW are built.

15 The capacity described in this section refers to all installed capacity in PJM, regardless of whether the capacity entered the RPM auction.

16 Non-MAAC zones consist of the AEP, AP, ATSI, ComEd, DAY, DEOK, DLCO, and Dominion Control Zones.

Table 11-10 Comparison of generators 40 years and older with slated capacity additions (MW): Through 2020[17]

Area	Unit Type	Capacity of Generators 40 Years or Older	Percent of Area Total	Capacity of Generators of All Ages	Percent of Area Total	Additional Capacity through 2020	Estimated Capacity 2020	Percent of Area Total
EMAAC	Combined Cycle	198	2.4%	9,282	27.5%	12,093	21,177	50.0%
	Combustion Turbine	2,229	27.5%	7,433	22.0%	469	5,674	13.4%
	Diesel	48	0.6%	159	0.5%	52	163	0.4%
	Fuel Cell	0	0.0%	30	1.6%	0	30	1.8%
	Hydroelectric	2,042	25.2%	2,047	6.1%	0	620	1.5%
	Nuclear	615	7.6%	8,654	25.6%	380	8,420	19.9%
	Solar	0	0.0%	194	0.6%	1,715	1,909	4.5%
	Steam	2,981	36.7%	5,931	17.6%	22	2,972	7.0%
	Storage	0	0.0%	3	0.0%	5	8	0.0%
	Wind	0	0.0%	8	0.0%	1,407	1,415	3.3%
	EMAAC Total	8,112	100.0%	33,741	100.0%	16,142	42,385	100.0%
SWMAAC	Combined Cycle	0	0.0%	230	2.2%	3,923	4,153	39.4%
	Combustion Turbine	542	12.8%	1,927	18.3%	256	1,640	15.6%
	Diesel	0	0.0%	23	0.2%	24	47	0.4%
	Nuclear	0	0.0%	1,716	16.3%	0	1,716	16.3%
	Solar	0	0.0%	0	0.0%	22	22	0.2%
	Steam	3,702	87.2%	6,656	63.1%	0	2,954	28.0%
	SWMAAC Total	4,244	100.0%	10,552	100.0%	4,225	10,533	100.0%
WMAAC	Combined Cycle	0	0.0%	3,859	16.0%	7,380	11,239	45.1%
	Combustion Turbine	558	6.1%	1,368	5.7%	43	854	3.4%
	Diesel	46	0.5%	136	0.6%	66	156	0.6%
	Hydroelectric	887	9.7%	1,114	4.6%	3	1,117	4.5%
	Nuclear	0	0.0%	3,325	13.8%	158	3,483	14.0%
	Solar	0	0.0%	15	0.1%	64	79	0.3%
	Steam	7,702	83.8%	13,211	54.6%	96	5,606	22.5%
	Storage	0	0.0%	0	0.0%	20	20	0.1%
	Wind	0	0.0%	1,151	4.8%	1,195	2,346	9.4%
	WMAAC Total	9,193	100.0%	24,178	100.0%	9,025	24,898	100.0%
Non-MAAC	Combined Cycle	0	0.0%	13,732	10.6%	19,396	33,128	23.9%
	Combustion Turbine	1,092	3.1%	20,779	16.1%	1,425	21,112	15.2%
	Diesel	53	0.1%	504	0.4%	124	576	0.4%
	Hydroelectric	1,433	4.0%	4,814	3.7%	280	5,093	3.7%
	Nuclear	1,751	4.9%	20,440	15.8%	2,188	20,877	15.1%
	Solar	0	0.0%	40	0.0%	353	393	0.3%
	Steam	31,166	87.8%	63,233	49.0%	3,383	35,451	25.6%
	Storage	0	0.0%	32	0.0%	138	170	0.1%
	Wind	0	0.0%	5,391	4.2%	16,477	21,868	15.8%
	Non-MAAC Total	35,493	100.0%	128,964	100.0%	43,765	138,668	100.0%
All Areas	Total	57,042		197,434		73,156	216,484	

17 Percentages shown in Table 11-10 are based on unrounded, underlying data and may differ from calculations based on the rounded values in the tables.

Planned Deactivations

As shown in Table 11-11, 11,844.2 MW are planning to deactivate by the end of calendar year 2019. A total of 7,130.9 MW of generation capacity retired from January 1, 2012 through March 31, 2013, and it is expected that a total of 20,297.4 MW will have retired from 2011 through 2019, with most of this capacity retiring by the end of 2015. Retirements from January 1, 2011 through March 31, 2013, account for 8,453.2 MW, or 39.6 percent of retirements during this period. Units planning to retire in 2013 account for 237.4 MW, or 1.2 percent of retirements during this period. Overall, 3,508.1 MW, or 29.6 percent of all MW planned for deactivation from 2013 through 2019, are expected in the AEP zone. Since January 1, 2013, 1,340.5 MW that were scheduled to be deactivated have withdrawn their deactivation notices, and are planning to continue operating.

Table 11-11 Summary of PJM unit retirements (MW): 2011 through 2019

	MW
Retirements 2011	1,322.3
Retirements 2012	6,961.9
Retirements 2013	169.0
Planned Retirements 2013	237.4
Planned Retirements Post-2013	11,606.8
Total	20,297.4

Figure 11-1 Unit retirements in PJM: 2012 through 2019

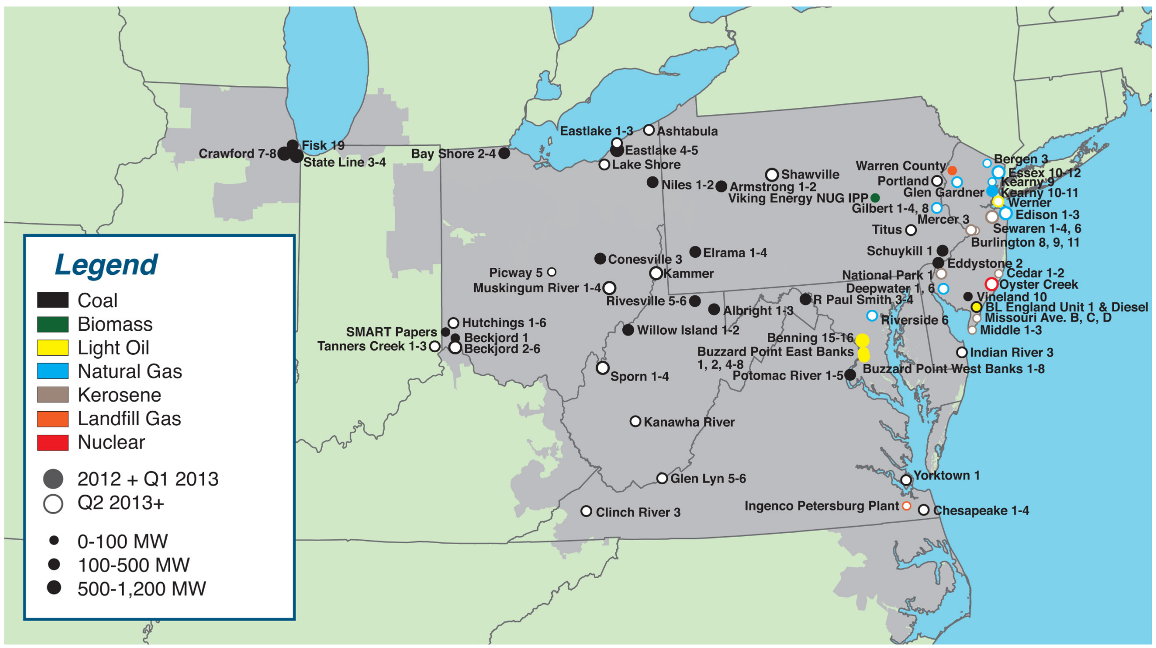

Table 11-12 Planned deactivations of PJM units, as of May 1, 2013

Unit	Zone	MW	Projected Deactivation Date
Warren County Landfill	JCPL	2.9	09-Jan-13
Ingenco Petersburg Plant	Dominion	2.9	31-May-13
Hutchings 4	DAY	61.9	01-Jun-13
Indian River 3	DPL	169.7	31-Dec-13
BL England 1	AECO	113.0	30-Apr-14
Riverside 6	BGE	115.0	01-Jun-14
Burlington 9	PSEG	184.0	01-Jun-14
Chesapeake 1-2	Dominion	222.0	31-Dec-14
Yorktown 1-2	Dominion	323.0	31-Dec-14
Portland	Met-Ed	401.0	07-Jan-15
Beckjord 2-6	DEOK	1,024.0	01-Apr-15
Titus	Met-Ed	243.0	16-Apr-15
Shawville	PENELEC	597.0	16-Apr-15
Gilbert 1-4, 8	JCPL	188.0	01-May-15
Glen Gardner	JCPL	160.0	01-May-15
Werner 1-4	JCPL	212.0	01-May-15
Kearny 9	PSEG	21.0	01-May-15
Cedar 1-2	AECO	67.7	31-May-15
Deepwater 1, 6	AECO	158.0	31-May-15
Middle 1-3	AECO	74.7	31-May-15
Missouri Ave B, C, D	AECO	60.0	31-May-15
Essex 12	PSEG	184.0	31-May-15
Clinch River 3	AEP	230.0	01-Jun-15
Glen Lyn 5-6	AEP	325.0	01-Jun-15
Kammer	AEP	600.0	01-Jun-15
Kanawha River	AEP	400.0	01-Jun-15
Muskingum River 1-4	AEP	790.0	01-Jun-15
Picway 5	AEP	95.0	01-Jun-15
Sporn	AEP	580.0	01-Jun-15
Tanners Creek 1-3	AEP	488.1	01-Jun-15
Ashtabula	ATSI	210.0	01-Jun-15
Eastlake 1-3	ATSI	327.0	01-Jun-15
Lake Shore	ATSI	190.0	01-Jun-15
Hutchings 1-3, 5-6	DAY	271.8	01-Jun-15
Bergen 3	PSEG	21.0	01-Jun-15
Burlington 8, 11	PSEG	205.0	01-Jun-15
Edison 1-3	PSEG	504.0	01-Jun-15
Essex 10-11	PSEG	352.0	01-Jun-15
Mercer 3	PSEG	115.0	01-Jun-15
National Park 1	PSEG	21.0	01-Jun-15
Sewaren 1-4, 6	PSEG	558.0	01-Jun-15
BL England Diesels	AECO	8.0	01-Oct-15
Chesapeake 3-4	Dominion	354.0	31-Dec-15
Oyster Creek	JCPL	614.5	31-Dec-19
Total		11,844.2	

Table 11-13 HEDD Units in PJM as of March 31, 2013[18]

Unit	Zone	MW	Deactivation Date
Carlls Corner 1-2	AECO	72.6	NA
Cedar Station 1-3	AECO	66.0	31-May-15
Cumberland 1	AECO	92.0	NA
Mickleton 1	AECO	72.0	NA
Middle Street 1-3	AECO	75.3	31-May-15
Missouri Ave. B,C,D	AECO	60.0	31-May-15
Sherman Ave.	AECO	92.0	NA
Vineland West CT	AECO	26.0	01-Sep-12
Forked River 1-2	JCPL	65.0	NA
Gilbert 4-7, 9, C1-C4	JCPL	446.0	01-May-15
Glen Gardner A1-A4, B1-B4	JCPL	160.0	01-May-15
Lakewood 1-2	JCPL	316.1	NA
Parlin NUG	JCPL	114.0	NA
Sayreville C1-C4	JCPL	224.0	NA
South River NUG	JCPL	299.0	NA
Werner C1-C4	JCPL	212.0	01-May-15
Bayonne	PSEG	118.5	NA
Bergen 3	PSEG	21.0	01-Jun-15
Burlington 111-114, 121-124, 91-94, 8	PSEG	557.0	01-Jun-15
Camden	PSEG	145.0	NA
Eagle Point 1-2	PSEG	127.1	NA
Edison 11-14, 21-24, 31-34	PSEG	504.0	01-Jun-15
Elmwood	PSEG	67.0	NA
Essex 101-104, 111-114, 121,124	PSEG	536.0	01-Jun-15
Kearny 9-11, 121-124	PSEG	446.0	01-May-15
Linden 1-2	PSEG	1,230.0	NA
Mercer 3	PSEG	115.0	01-Jun-15
National Park	PSEG	21.0	01-Jun-15
Newark Bay	PSEG	120.2	NA
Pedricktown	PSEG	120.3	NA
Salem 3	PSEG	38.4	NA
Sewaren 6	PSEG	105.0	01-Jun-15
Total		6,663.5	

18 See "Current New Jersey Turbines that are HEDD Units," <http://www.state.nj.us/dep/workgroups/docs/apcrule_20110909turbinelist.pdf> (Accessed April 1, 2013)

Actual Generation Deactivations in 2013

Table 11-14 shows unit deactivations for 2013 through March 31, 2013.[19] A total of 169.0 MW retired from January 1, 2013, through March 31, 2013.

Table 11-14 Unit deactivations: January 2013 through March 31, 2013

Company	Unit Name	ICAP	Primary Fuel	Zone Name	Age (Years)	Retirement Date
Exelon Corporation	Schuylkill 1	166.0	Heavy Oil	PECO	54	01-Jan-13
Exelon Corporation	Schuylkill Diesel	3.0	Diesel	PECO	45	01-Jan-13

Updates on Key Backbone Facilities

PJM baseline upgrade projects are implemented to resolve reliability criteria violations. PJM backbone projects are a subset of baseline upgrade projects that have been given the informal designation of backbone due to their relative significance. Backbone upgrades are on the EHV (Extra High Voltage) system and resolve a wide range of reliability criteria violations and market congestion issues. The current backbone projects are: Mount Storm – Doubs; Jacks Mountain; and Susquehanna – Roseland.

The Mount Storm – Doubs transmission line, that serves West Virginia, Virginia and Maryland, was originally built in 1966. The structures and equipment are approaching the end of their expected service life, and require replacement to ensure reliability in its service areas. "As of April, 2013, construction is proceeding ahead of schedule. All structure foundations are complete, approximately 70 percent of the structures have been erected, and more than 70 percent of the line is complete."[20]

The Jacks Mountain project is required to resolve voltage problems for load deliverability starting June 1, 2017. Jacks Mountain will be a new 500kV substation connected to the existing Conemaugh – Juniata and Keystone – Juniata 500kV circuits. The plans are for construction of the foundation in late 2013, construction in 2014 and completion in early 2015.

The Susquehanna – Roseland project is required to resolve reliability criteria violations starting June 1, 2012. Susquehanna – Roseland will be a new 500 kV transmission line connecting the Susquehanna – Lackawanna – Hopatcong – Roseland buses. On October 1, 2012, the Susquehanna – Roseland project received final approval from the National Park Service (NPS) for the project to be constructed on the route selected by PSEG and PPL.[21] The Susquehanna – Hopatcong portion of the project is currently expected to be in-service by June, 2014, with the remainder of the project to be completed by June, 2015.

19 "*PJM Generator Deactivations*," PJM.com <http://pjm.com/planning/generation-retirements/gr-summaries.aspx> (January 24, 2013).
20 "*Mt. Storm – Doubs 500kV Rebuild Project*," Dom.com <https://www.dom.com/about/electric-transmission/mtstorm/index.jsp> (May 7, 2013).
21 See PSEG.com. "Susquehanna-Roseland line receives final federal approval," <http://www.pseg.com/info/media/newsreleases/2012/2012-10-02.jsp> (Accessed November 1, 2012).