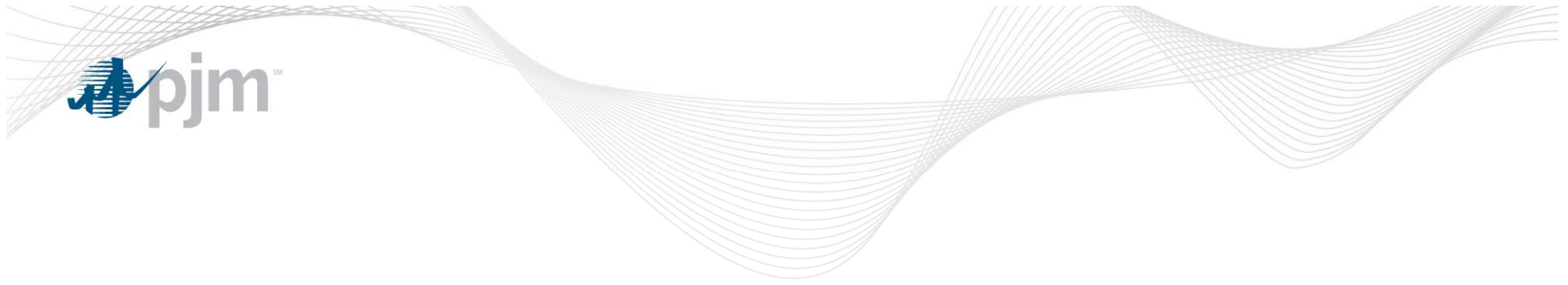


# 2009 RTEP Assumptions

Subregional RTEP Committee  
March 2009



## 2009 RTEP Reliability Analysis Assumptions

- Power flow models for world load, capacity and topology will be based on the most recent ERAG MMWG power flow base case.
- PJM topology will be based on the ERAG MMWG Series Summer base cases – updated with RTEP upgrades approved as part of the RTEP.
  - 2014 case from the 2008 series ERAG case
  - 2013 case from the 2007 series ERAG case
  - 2012 case from the 2006 series ERAG case
  - 2011 case from the 2008 series ERAG case
  - 2010 case from the 2008 series ERAG case
- Long term firm transmission service will be consistent with operations.
- Generation outage rates will be based on the most recent Reserve Requirement Study performed by PJM.
- Generation outage rates for future PJM units will be estimated based on class average rates.

- Load will be modeled consistent with the 2009 PJM Load Forecast Report.
- PJM RTO Peak (for 2014): 155,498 MW
  - PJM South Peak: 21,518 MW
  - PJM West Peak: 67,989 MW
  - PJM Mid-Atlantic: 65,991 MW

\*Note – All loads are Non Coincident Peaks
- Load Management will be modeled consistent with the 2009 Load Forecast Report
  - Used in LDA under study in load deliverability analysis

- All existing generation expected to be in service for the year being studied will be modeled.
- Future generation with a signed Interconnection Service Agreement (ISA) will be modeled along with any associated upgrades.
- Generation with a signed ISA will contribute to and be allowed to back-off problems.
- Generation with a signed Facility Study Agreement (FSA) will be modeled along with any associated network upgrades.
- Generation with a signed FSA will be modeled off-line except for generation deliverability testing to contribute to problems.
- Generation with a signed FSA, but not an ISA, will not be allowed to back-off problems.
- If the PJM load and interchange exceeds the sum of the available generation and generation with an executed ISA then queued generation that has an executed FSA will be turned on to meet firm interchange.
- Additional generation information will be posted to the TEAC page.

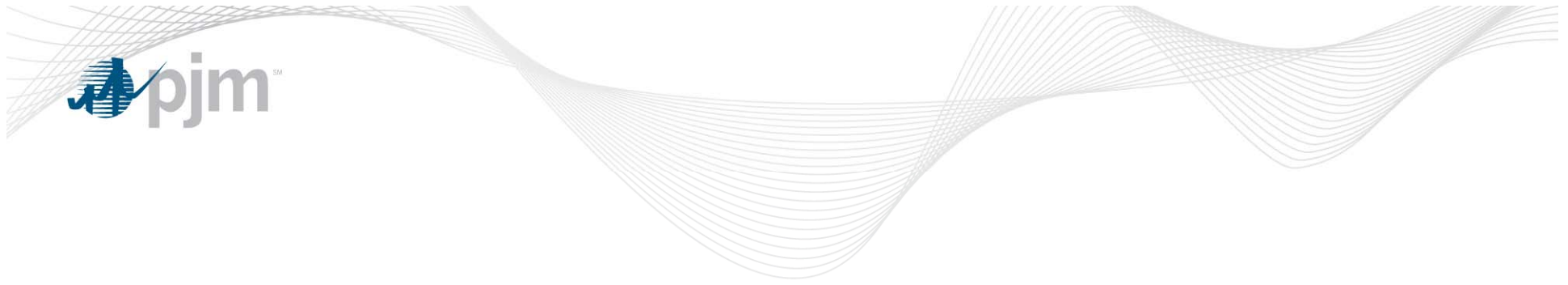
- **Mid-Atlantic**
  - New generation with a signed ISA – 500 MW
  - New generation with a signed FSA – 3500 MW
- **Southern**
  - New generation with a signed ISA – 500 MW
  - New generation with a signed FSA – 650 MW
- **West**
  - New generation with a signed ISA – 1000 MW
  - New generation with a signed FSA – 900 MW



# 2014 RTEP Interchange

2014 RTEP IINTERCHANGE		
FROM	TO	MW
PJM	AMIL/AMRN	-148
PJM	CIN	580
PJM	EKPC	0
PJM	FE	368
PJM	IP	0
PJM	LGEE	-154
PJM	OVEC	-2316
PJM	ALTW	264
PJM	ALTE	155
PJM	CPLE	198
PJM	CPLW	250
PJM	DUKE	63
PJM	MEC	1370
PJM	MECS	574
PJM	NIPS	0
PJM	NYIS	1957
PJM	WEC	930
PJM	TVA	918
<b>TOTAL</b>		<b>5009</b>

- All PJM bulk electric system facilities 100 kV and greater, all tie lines to neighboring systems and all lower voltage facilities operated by PJM will be monitored.
- Contingency analysis will include all bulk electric system facilities 100 kV and greater, all tie lines to neighboring systems and all lower voltage facilities operated by PJM.
- Thermal and voltage limits will be consistent with those used in operations.

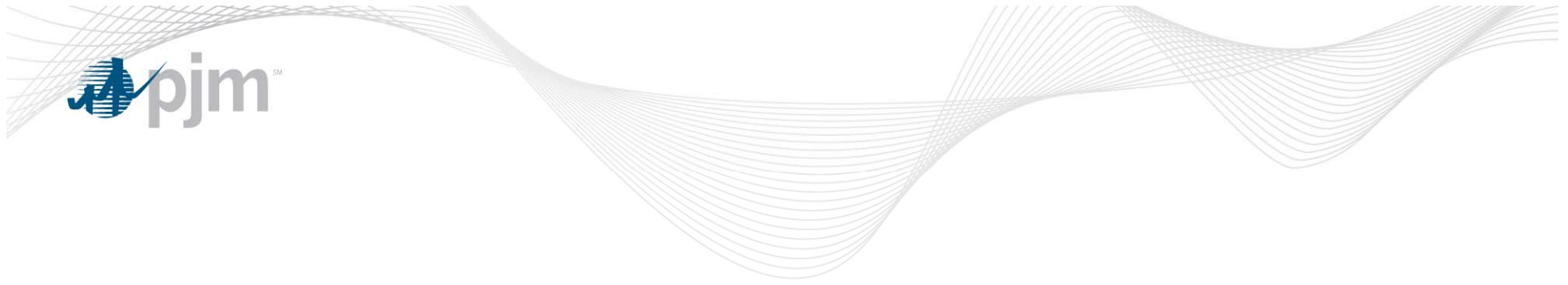


# 2013 Analysis Assumptions

AREA	Area's Full Title	CETO
AE	Atlantic Electric	TBD
AEP	American Electric Power	TBD
APS	Allegheny Power	TBD
BGE	Baltimore Gas & Electric	TBD
ComEd	Commonwealth Edison	TBD
Day	Dayton	TBD
DLCO	Duquesne Light Company	TBD
DOM VP	Dominion Virginia Power	2120

<b>AREA</b>	<b>Area's Full Title</b>	<b>CETO</b>
DPL	Delmarva Power & Light	<b>1490</b>
DPLS	Delmarva Power & Light South	1580
JCPL	Jersey Central Power & Light	<b>4520</b>
MetEd	Metropolitan Edison	TBD
PECO	PECO Energy Company	<b>TBD</b>
PEPCO	Potomac Electric Power Company	TBD
PLGRP	Pennsylvania Power & Light & UGI	<b>TBD</b>
PN	Pennsylvania Electric Company	TBD

<b>AREA</b>	<b>Area's Full Title</b>	<b>CETO</b>
PS	Public Service Electric & Gas	<b>6500</b>
PSN	Public Service Electric & Gas North	2810
Southern MA	Southern Mid-Atlantic(BGE, PEPCO)	<b>6280</b>
Western MA	Western Mid-Atlantic (PLGRP, MetEd, PN)	<b>TBD</b>
Eastern MA	Eastern Mid-Atlantic (AE, DPL, PECO, JCPL, PS, RECO)	<b>8240</b>
MAAC	Mid-Atlantic (AE, BGE, DPL, JCPL, MetEd, PECO, PEPCO, PLGRP, PN, PS, RECO)	<b>6860</b>
PJMW	PJM West (AEP, APS, ComEd, DLCO, Day)	<b>TBD</b>



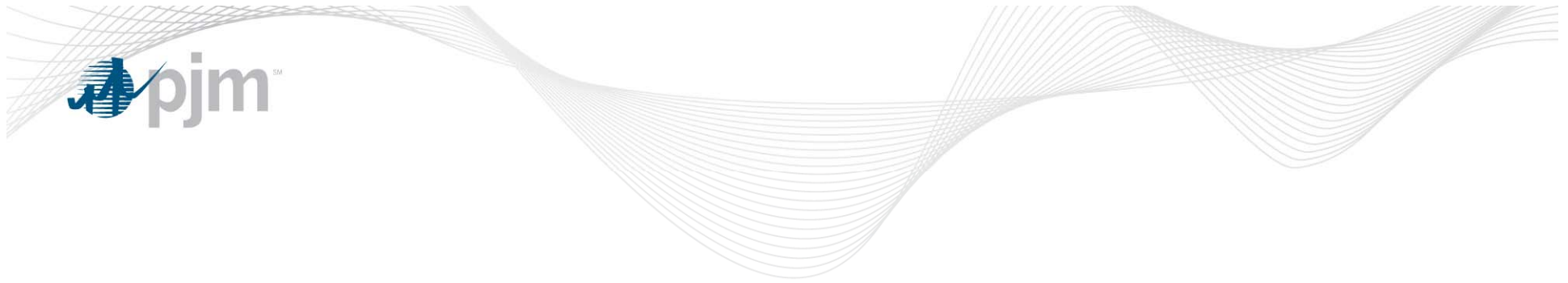
# 2012 Analysis Assumptions

<b>AREA</b>	<b>Area's Full Title</b>	<b>CETO</b>
AE	Atlantic Electric	<b>1850</b>
AEP	American Electric Power	-1910
APS	Allegheny Power	<b>890</b>
BGE	Baltimore Gas & Electric	4480
ComEd	Commonwealth Edison	<b>3580</b>
Day	Dayton	820
DLCO	Duquesne Light Company	<b>960</b>
DOM VP	Dominion Virginia Power	1570

AREA	Area's Full Title	CETO
DPL	Delmarva Power & Light	1360
DPLS	Delmarva Power & Light South	1520
JCPL	Jersey Central Power & Light	4350
MetEd	Metropolitan Edison	620
PECO	PECO Energy Company	2020
PEPCO	Potomac Electric Power Company	3770
PLGRP	Pennsylvania Power & Light & UGI	670
PN	Pennsylvania Electric Company	510

<b>AREA</b>	<b>Area's Full Title</b>	<b>CETO</b>
PS	Public Service Electric & Gas	<b>6290</b>
PSN	Public Service Electric & Gas North	2720
Southern MA	Southern Mid-Atlantic(BGE, PEPCO)	<b>5990</b>
Western MA	Western Mid-Atlantic (PLGRP, MetEd, PN)	-6180
Eastern MA	Eastern Mid-Atlantic (AE, DPL, PECO, JCPL, PS, RECO)	<b>7440</b>
MAAC	Mid-Atlantic (AE, BGE, DPL, JCPL, MetEd, PECO, PEPCO, PLGRP, PN, PS, RECO)	<b>5600</b>
PJMW	PJM West (AEP, APS, ComEd, DLCO, Day)	<b>-1830</b>

- 2010, 2012, 2013 and 2014 analysis is in-progress
- 2011 base case is under development
- Initial focus for the analysis related to backbone and other significant projects
  
- Are there other local issues that we need to address?

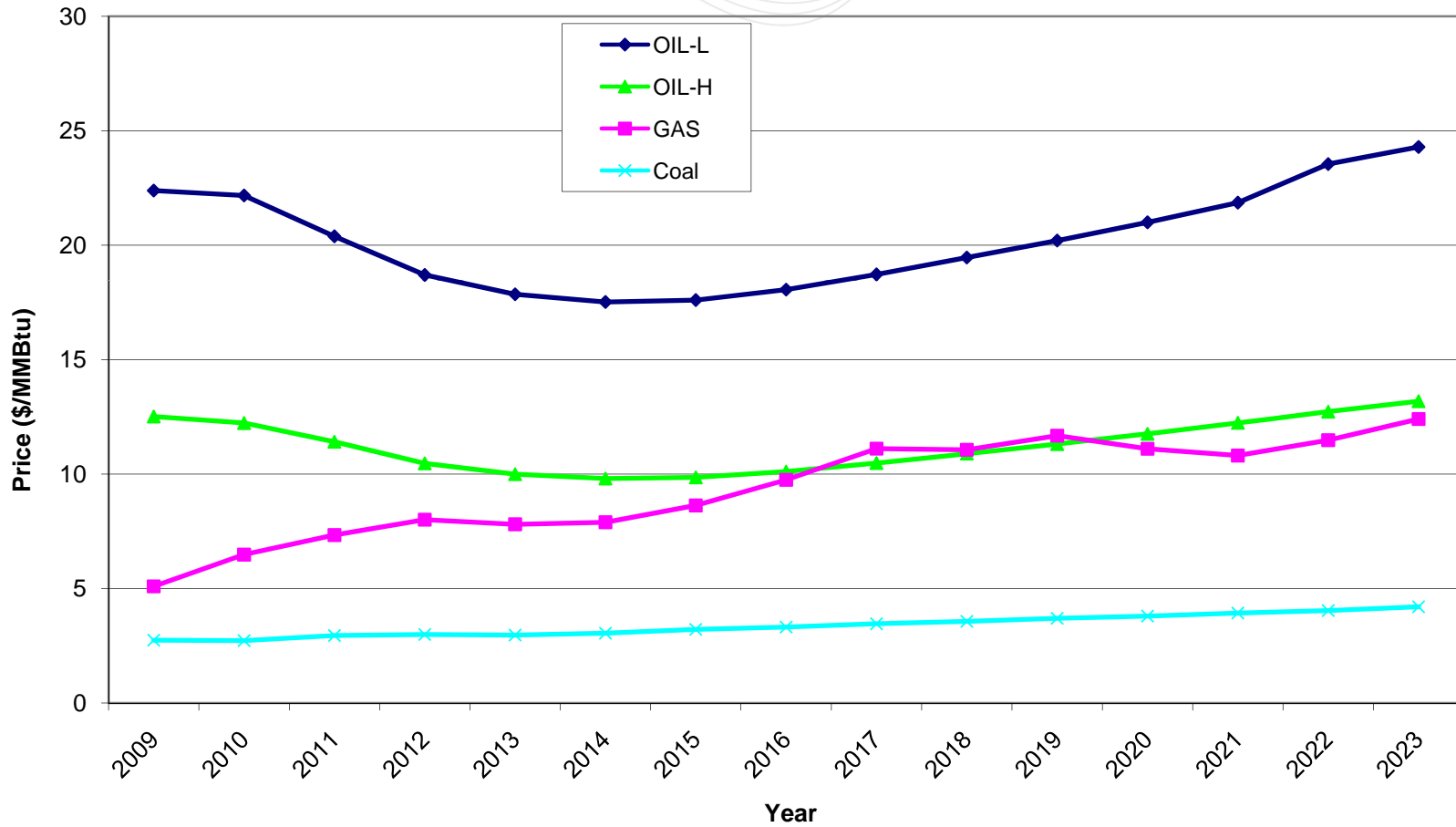


## 2009 RTEP Market Efficiency Analysis Assumptions

- Study years: 2009, 2012, 2015, 2018, 2023
- PROMOD IV model from Ventyx
- Underlying input data contained in PROMOD Powerbase (February 2009 update) including generating units and unit characteristics, fuel costs and emissions costs
- Powerflow Cases
  - 2009 power flow case to represent today's "as-is" system
  - 2013 RTEP power flow case to represent future system

- Fuel prices
- Load and energy
- Future generation scenario
- Emissions prices
- Transmission topology
- Carrying charge rate and discount rate

**Figure 1 - Fuel Price Assumptions**



- PJM zonal peak and zonal energy forecast from PJM 2009 Load Forecast Report
- Historical zonal hourly loads used to develop zonal hourly load shape

Table 1 – Forecast PJM Peak and Energy

	<b>2009</b>	<b>2012</b>	<b>2015</b>	<b>2018</b>	<b>2023</b>
Peak (MW)	134,428	144,613	151,410	156,822	165,006
Energy (GWh)	712,236	766,257	800,420	829,620	871,619

- generation model includes all existing in-service generation plus active queue generation with executed ISA minus expected future deactivations
- installed reserve requirement is met through 2013
- To meet installed reserve requirement for study years 2015, 2018 and 2023, 3,900 MW, 10,200 MW and 18,100 MW of new generation will be added to model, respectively
- New generation will be added to PJM regions in proportion to the regional location and regional generation type of future generation projects in Generation Interconnection Queues through Queue U

**Figure 2 - PJM Market Efficiency Reserve Margin**

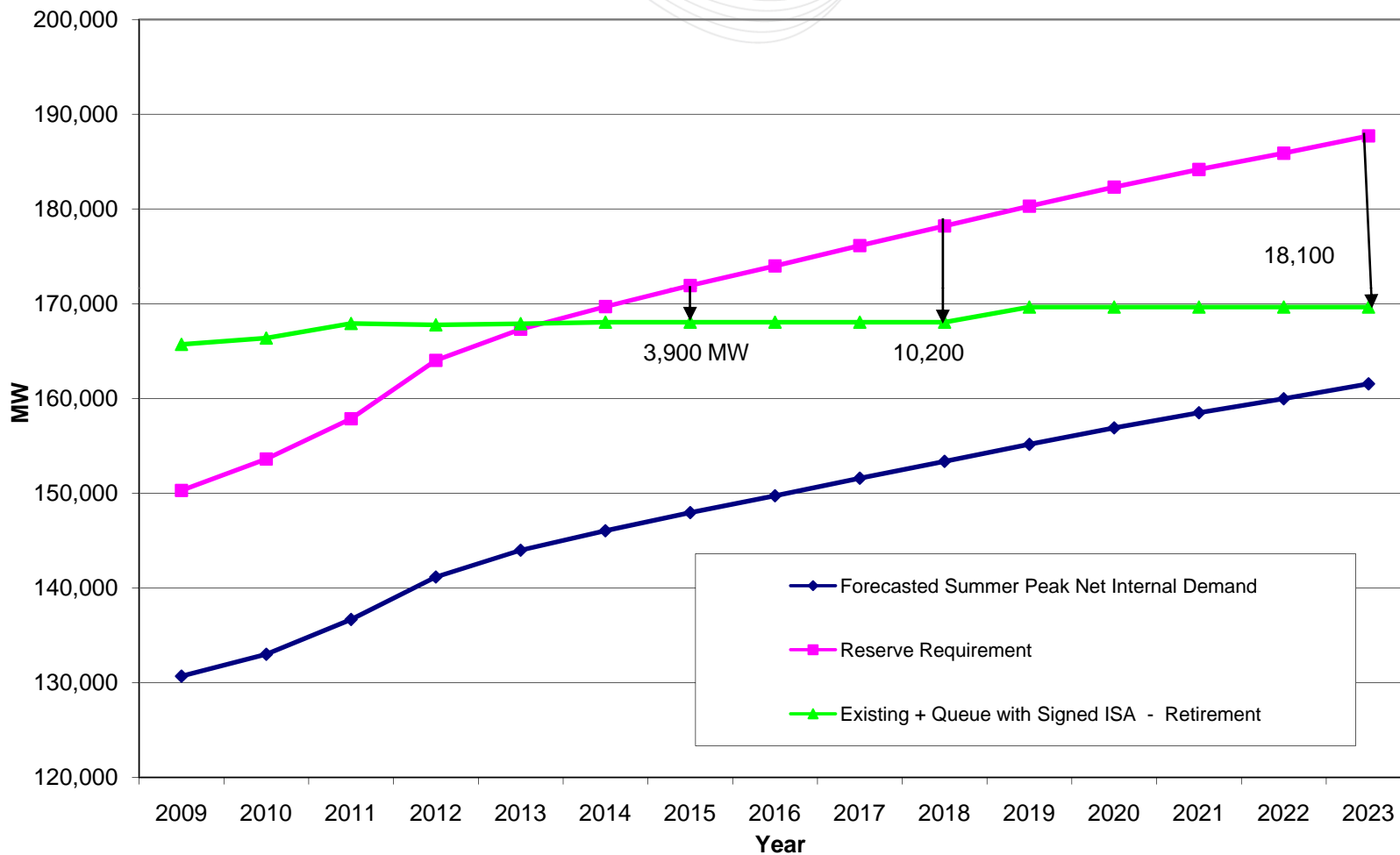


Table 2 – Location and Generator Type to Maintain Reserve Margin

Region	Nuclear	Coal	Gas	Oil	Wind	Other Renewable	Total Region
AECO/DPL/JCPL/PECO/PSEG	0.3%	0.0%	23.1%	0.6%	1.0%	2.3%	27.4%
AEP/APS/COM/DAY/DUQ	0.4%	10.6%	12.5%	0.0%	14.3%	1.0%	38.8%
BGE/PEP	3.6%	0.0%	4.0%	0.0%	0.0%	0.0%	7.6%
DOM	0.8%	0.0%	6.6%	0.0%	0.1%	0.6%	8.1%
ME/PN/PPL	3.5%	0.2%	10.7%	1.7%	1.2%	0.7%	18.1%

Figure 3 - SO2 Emission Allowance Price Assumptions

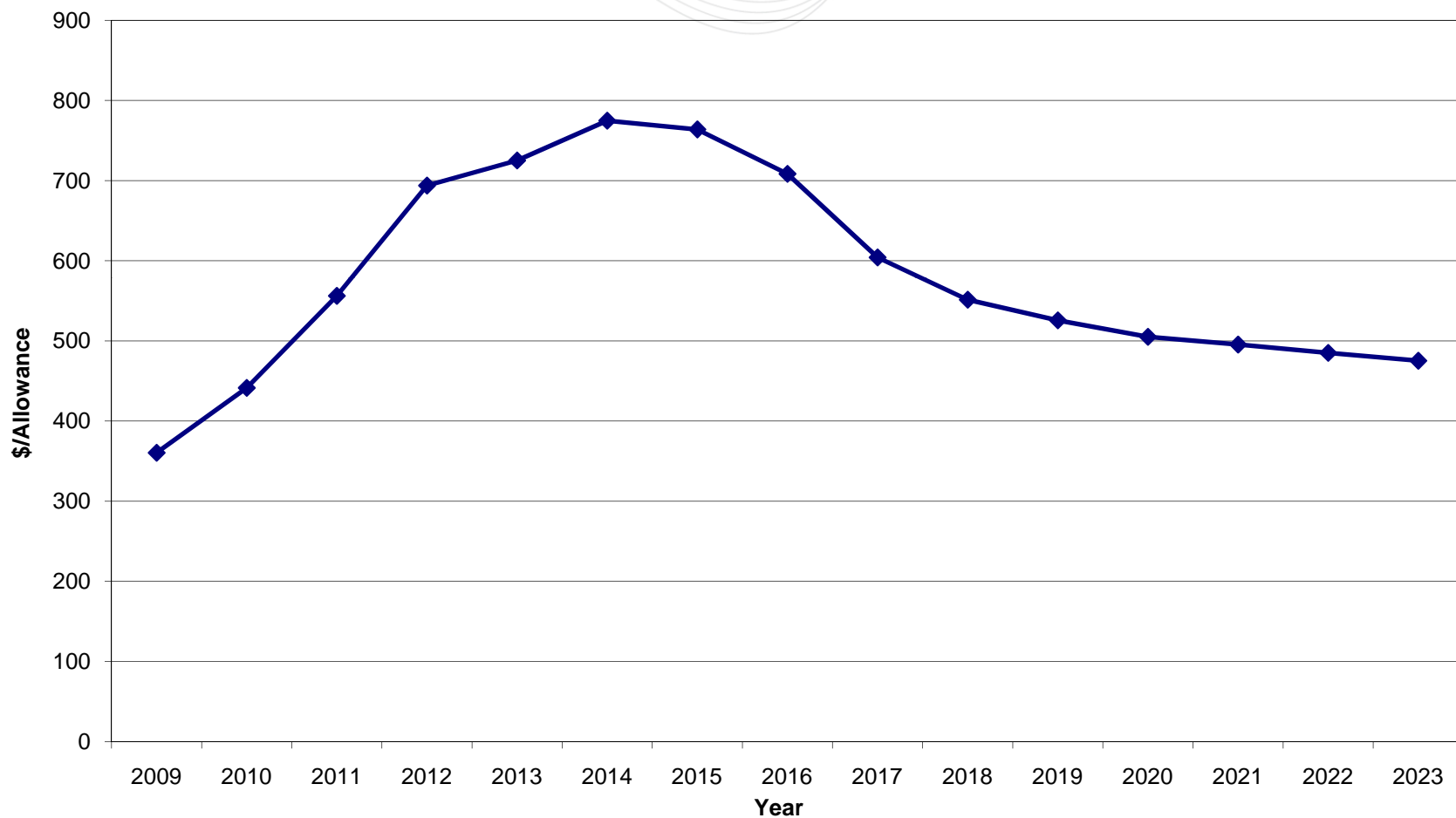


Figure 4 - NOx Emission Allowance Price Assumptions

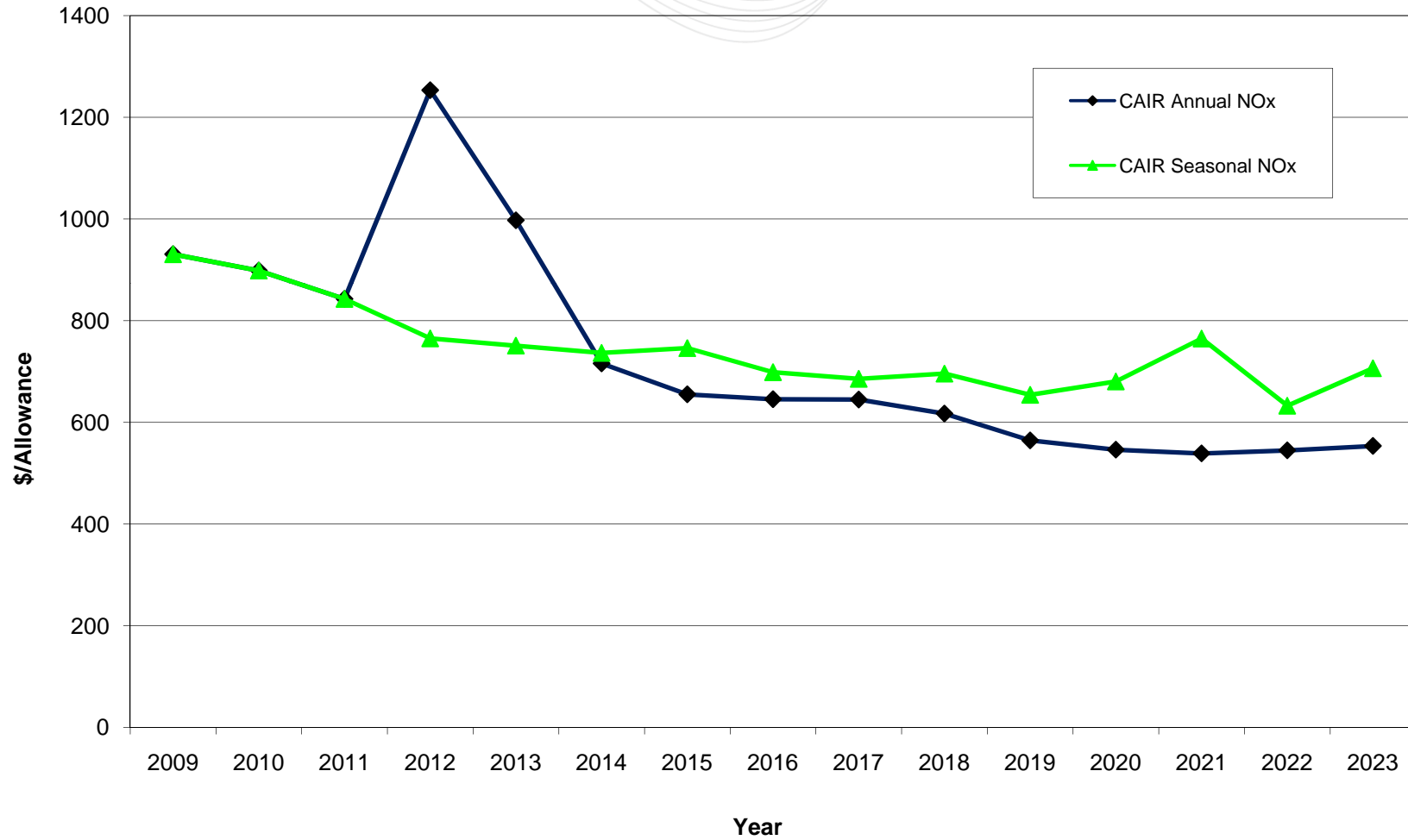
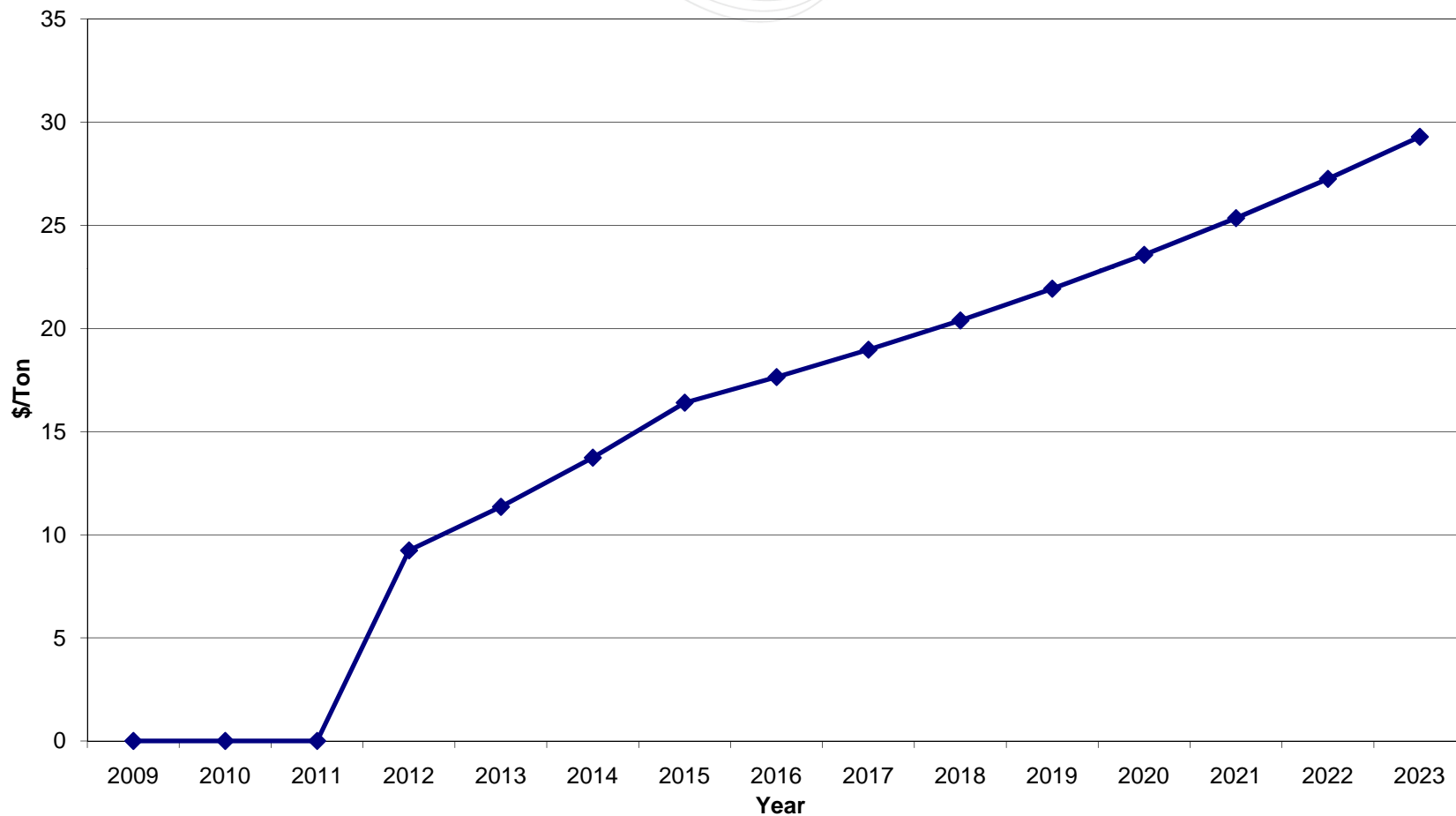


Figure 5 - CO2 Emission Assumptions



- Powerflow Cases
  - 2009 power flow case to represent today's "as-is" system
  - 2013 RTEP power flow case to represent future system
- Thermal Constraints
  - monitor/contingency pairs
  - NERC Book of Flowgates
  - Planning study results
  - Historical PJM congestion events
- Voltage Constraints
  - PJM reactive interface limits
  - MW limits based on historical values for "as-is" case adjusted for future upgrade impacts in 2012 case



## Carrying Charge Rate and Discount Rate

- Discount rate and revenue requirement assumptions require input from PJM TOs
  - most recent after-tax embedded cost of capital, total transmission capitalization, and levelized carrying charge rate, including the recovery period. The recovery period shall be consistent with recovery periods allowed by the Commission for comparable facilities
  - discount rate shall be based on the TOs' most recent after-tax embedded cost of capital weighted by each TO's total transmission capitalization

- Continued development of input assumptions
- PJM Board approval of input assumptions in June
- Begin analysis with regular updates to TEAC