

# **Transmission Expansion Advisory Committee Meeting**

## **2011 Market Efficiency Analysis Input Assumptions**

**May 11, 2011**

- Study years: 2011, 2014, 2017, 2020, 2025
- PROMOD IV model from Ventyx
- Underlying input data contained in PROMOD Powerbase (February 2011 update)
  - Release contains updates to generation, emissions and fuels
- Power flow Cases
  - 2011 power flow case to represent today’s “as-is” system
    - (ERAG MMWG 2010 Series for 2011 Peak)
  - 2015 RTEP power flow case to represent future system

- Major Backbone Projects modeled in appropriate years

Backbone project modeling for Market Efficiency					
	Study Year				
	2011	2014	2017	2020	2025
System Topology	2011 As-Is	2015 topology	2015 topology	2015 topology	2015 topology
Susquehanna-Roseland	No	No	Yes	Yes	Yes
MAPP	No	No	No	No	No
Mount Storm - Doubs	No	No	Yes	Yes	Yes
Jacks Mountain	No	Yes	Yes	Yes	Yes
PATH	No	No	No	No	No

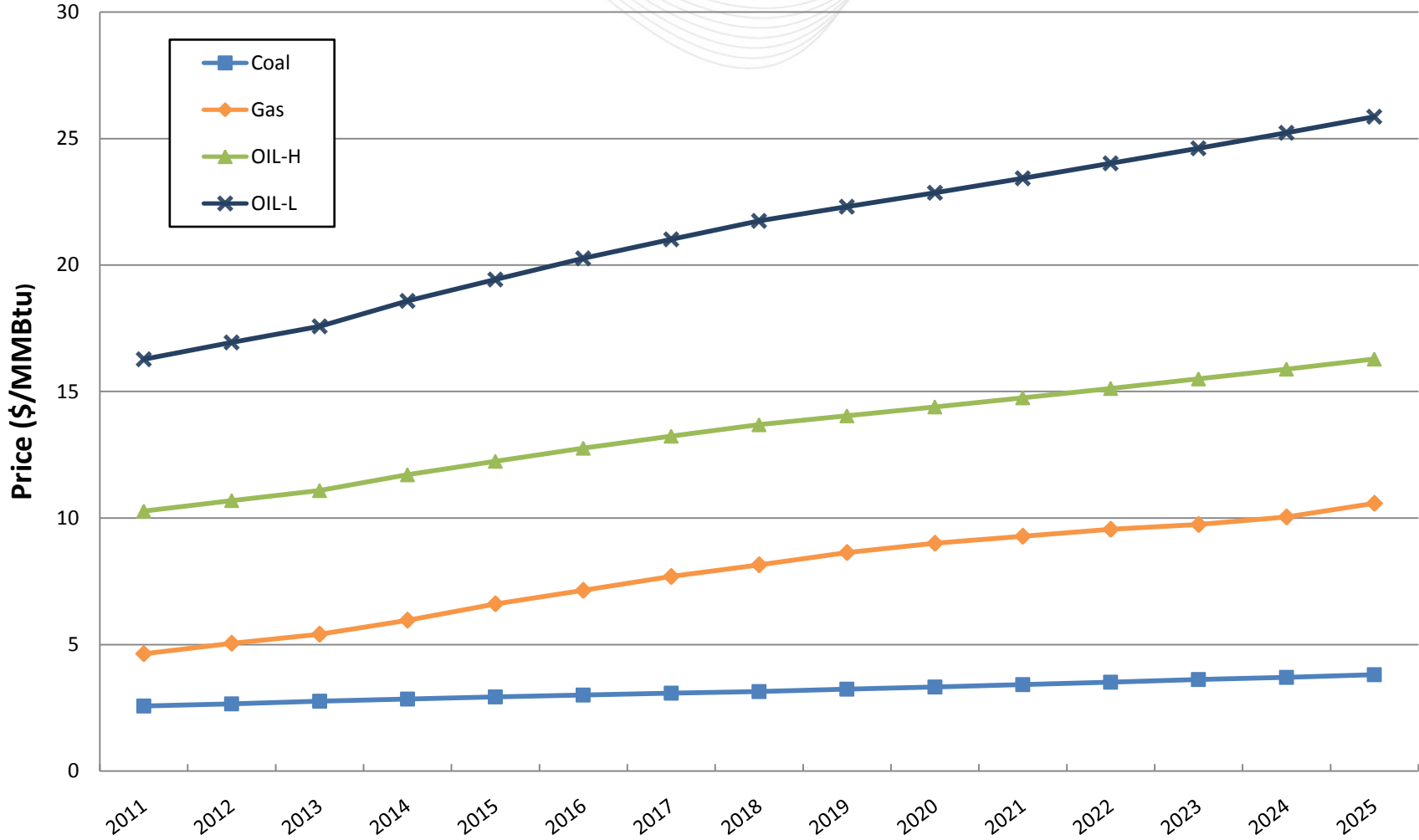
\*If appropriate, sensitivities will be run on different configurations to model impacts

- Values used for as-is 2011 system model based on historical averages adjusted for TrAIL project
- Historical Averages increased by anticipated affect of RTEP reinforcements to develop future 2015 system values

	2011 Market Efficiency As-Is 2011 System	2011 Market Efficiency future 2015 System
Eastern Interface	6600	6700
Central Interface	4450	4700
Western Interface	6300	6550
APSouth Interface	5250	5250
APSouth Contingency	6300	6300
Black Oak - Bedington Interface	2050	2050
Black Oak - Bedington Contingency	2550	2550
50045005 Contingency	3500	3750
AEP-DOM Contingency	4350	4350

- Fuel prices
- Load and energy
- Demand Response
- Future generation scenario
- Emissions prices
- Transmission topology
  - Duke Energy Ohio and Duke Energy Kentucky included in PJM
- Carrying charge rate and discount rate

Figure 1 - Fuel Price Assumptions



- PJM zonal peak and zonal energy forecast from PJM 2011 Load Forecast Report
- Historical zonal hourly loads used to develop zonal hourly load shape

Table 1 – Forecast PJM Peak Load and Energy\*

	2011	2014	2017	2020	2025
Peak (MW)	154,213	164,209	168,880	173,895	180,880
Energy (GWh)	818,639	869,212	894,481	923,339	957,304

\*ATSI & DEOK Load included in all years and values reduced by cleared Energy Efficiency from RPM

- Model zonal demand response consistent with Table B-7 of the 2011 Load Forecast Report with the addition of any cleared FRR resources

Table 2 – Forecast PJM Demand Response

	2011	2014	2017	2020	2025
Demand Response (MW)	7,238	9,452	9,452	9,452	9,452

- Generation model includes all existing in-service generation plus actively queued generation with an executed ISA less planned generator deactivations
- Installed reserve requirement is met through study year 2019
- To meet installed reserve requirement for study years 2020 and 2025, 900 MW and 9,000 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 planned generation projects in Generation Interconnection Queues through Queue W

## Figure 2 - PJM Market Efficiency Reserve Margin

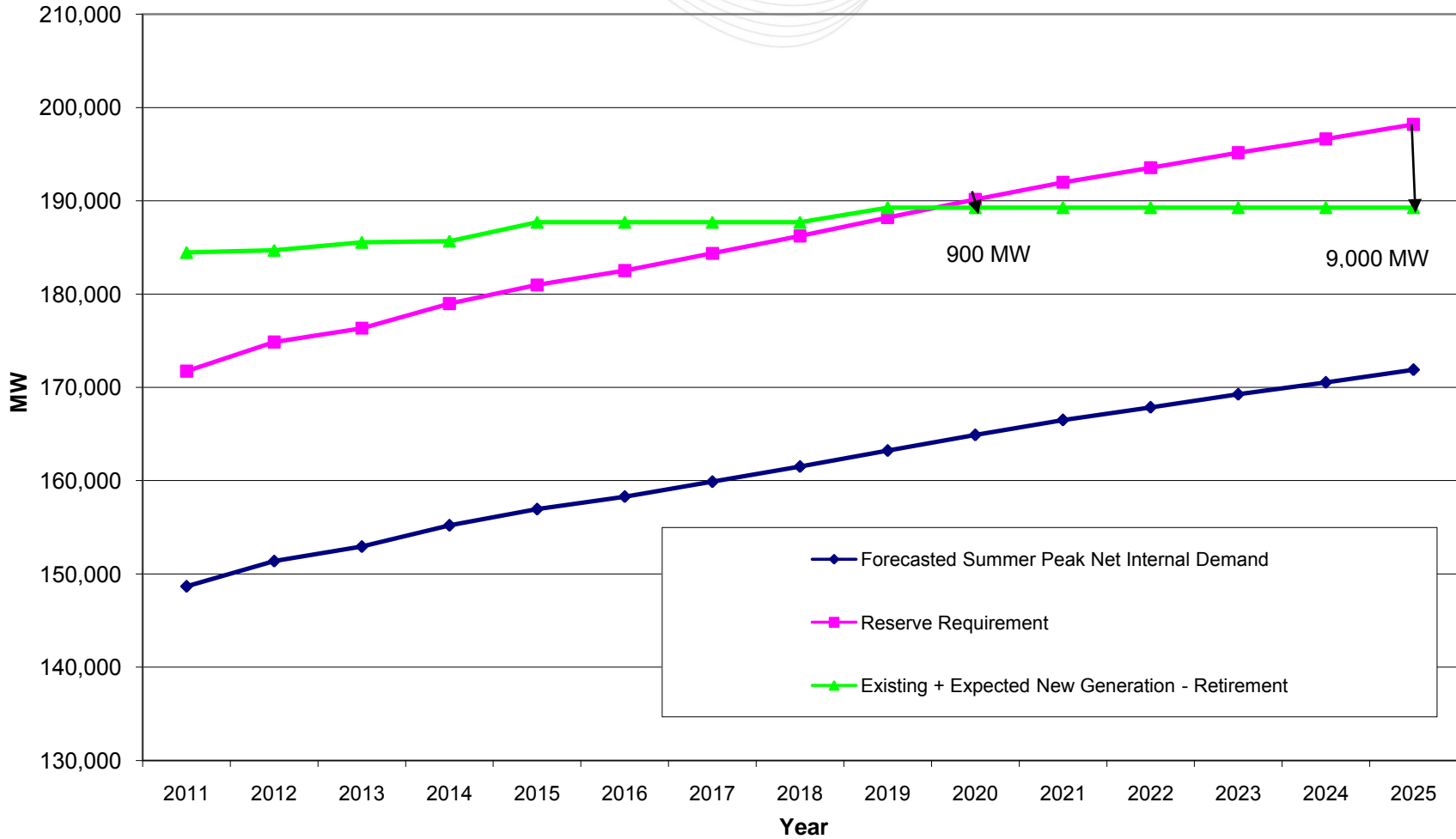


Table 3 – Location and Generator Type to Maintain Reserve Margin

Region	Nuclear	Coal	Gas	Oil	Wind	Other Renewables	Total Region
AECO/DPL/JCPL/PECO/PSEG	1.30%	0.19%	27.49%	0.06%	0.81%	3.32%	33.16%
AEP/APS/COM/DAY/DUQ/ATSI/DOEK	1.57%	5.44%	14.46%	0.00%	16.38%	3.14%	40.98%
BGE/PEP	5.09%	0.00%	7.63%	0.02%	0.00%	0.03%	12.77%
DOM	0.00%	0.00%	3.09%	0.00%	0.69%	0.35%	4.13%
ME/PN/PPL	4.97%	0.16%	2.07%	0.01%	1.13%	0.63%	8.96%
Total Region	12.93%	5.78%	54.74%	0.08%	19.01%	7.46%	100.00%

- **NOx emission price allowance assumptions will be set to zero for all study years.**
  - Forecasts reflect the Federal Clean Air Transportation Rule (CATR) and not the Federal Clean Air Interstate Rule (CAIR) due to courts vacating CAIR and EPAs response of CATR
  - Higher NOx emission targets using CATR resulted in targets already being met and thus there is no emission penalty.
- **CO2 emission price assumptions set to zero for all study years**
  - Reflects the stalled federal legislation regarding greenhouse gases and CO2
- **SO2 emission price allowance assumptions will be set to zero for all study years.**
  - Forecasts reflect the Federal Clean Air Transportation Rule (CATR) and not the Federal Clean Air Interstate Rule (CAIR) due to courts vacating CAIR and EPAs response of CATR

- Power flow Cases
  - 2011 power flow case to represent today’s “as-is” system
  - 2015 RTEP power flow case to represent future system
- Thermal Constraints
  - NERC Book of Flowgates
  - Planning study results for monitored facilities and monitored/contingency pair facilities
  - 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 RTEP case years

- Discount rate and levelized carrying charge rate developed using information contained in TO Formula Rate sheets posted on PJM web site
- Discount rate based on weighted average after-tax embedded cost of capital (average weighted by TO total capitalization)

Discount rate = 7.7%

- Levelized annual carrying charge rate based on weighted average net plant carrying charge (average weighted by TO total capitalization) levelized over an assumed 45 year life of project

Levelized Annual Carrying Charge Rate = 17.9%

- PJM Board approval of input assumptions
- Begin analysis with regular updates to TEAC