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#### **The Future of Coal: Regulation, Reliability and the Power Markets**

Bruce H. Braine VP – Strategic Policy Analysis Platts Coal Conference March 18, 2014

#### **AEP - Background**



#### 5.3 million customers in 11 states Industry-leading size and scale of assets:

| <u>Asset</u>    | Size          | <u>Rank</u> |
|-----------------|---------------|-------------|
| Firm Generation | 40,740 MW     | # 4         |
| Transmission    | 40,000 miles  | # 1         |
| Distribution    | 221,000 miles | # 2         |



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Inductor

# **AEP Fleet Transformation**



- AEP has added approximately 5,000 MW of new natural gas generation and over 2,000 MW of renewable generation to its portfolio over last 12 years.
- AEP has reduced over 1,000MW of demand through energy efficiency & demand response programs over past 6 years.
- Gas refueling and new gas units will meet demands as coal units are retired.

\*System capacity shown here includes AEP's ownership interest in OVEC, purchased power agreements for wind energy and avoided capacity through energy efficiency and demand response.



#### AEP Coal Plant Retirements

- 615 MW of Coal Retired in Past 2 Years
- Another 6560 MW to Retire by 2016
- ~800 MW to Refuel with Gas in 2015
- Total 7900 MW Retire or Refuel with Gas
  - Almost 1/3 of AEP's Total Coal Capacity in 2010 will have retired or refueled by 2016



#### **AEP CO2 Emissions**



AEP's CO2 emissions have declined by ~21% since 2005 (~31% since 2000) and will likely decline by another 5+% by 2020 even absent CO2 regulations.



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# **EPA Regulating Electric Power Plants CO2**

- **Clean Air Act New Source Performance Standards**
- Sec. 111 (b) New Power Plants re-proposed Sept. 2013 – requires new coal to be built with CCS OR build efficient gas plant
- <u>Sec. 111 (d) Existing Power Plants</u> proposed by June 2014 and then to be finalized by June 2015
  ISSUES:
  - LEGAL with 111(b) ('commercially available' CCS?) and potentially with 111(d) ("inside the fence line")
  - ECONOMIC aggressive policy under 111(d) would be very expensive and force more coal retirements
  - POWER MARKETS emerging concerns with power markets due to retirements and flawed capacity markets could be seriously exacerbated by an aggressive 111(d) rule

## **The Polar Vortex of 2014**

Record low temps during several periods in Jan.-Feb. 2014 caused soaring demand for both electricity and natural gas for heating.

PJM - the electricity grid operator for more than 61 MM people in 13 Eastern States - was significantly affected. NCEP GFS 2-meter MINIMUM TEMPERATURE [°F] Init: 00Z02JAN2014 -- [132] hr --> Valid Tue 12Z07JAN2014 Domain Min/Max -30.4° - 82.3°F

130 125 120

115 110 105

60

5

-5 -10 -15 -20 -25

-30

-35 -40 -45

-50 -55 -60 -65

-70 -75

-80

-85 -90 -95

-100



2-meter temperature (shaded) -- 6-hourly Minimum NCEP GFS 1760x880 sflux Forecast Grid

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Image from Dr. Ryan Maue, WeatherBell



http://wattsupwiththat.com/2014/01/02/new-record-low-set-in-the-coldest-city-in-the-continental-usa-much-of-the-country-headed-for-a-deep-freeze/

W<sub>X</sub>Bell<sup>o</sup>

### **Polar Vortex and PJM**

- Early Warning Sign of Serious Electricity Supply and Reliability Issues UNLESS action is taken to ensure adequate power plant capacity, fuel diversity and grid investment AFTER the retirement of significant amounts of coal-fueled generation in mid-2015.
- During the event, PJM called on ALL available generation and ALL demand response (DR) to meet regional needs. The system held together, BUT real risk of rolling blackouts/ little room for error.
- Much of the 2014 winter demand was met by coal-fueled generation that will retire in 15 months. (89% of AEP's retiring coal capacity operated during January). These generators were still available to generate electricity this winter, but that won't be the case after May 2015.



# Many Retirements Will Happen in 2015

- Generation (mostly coal) is retiring. (Over 60,000 MW across the U.S. is retiring).
- In PJM alone, more than 11,000 MW of generation has already shut down, and another 11,000 MW will retire in the next two years. There is no bringing it back:
  - Budgets, staffing and maintenance at retiring plants have been adjusted to prepare for permanent closure.
  - Personnel levels reduced, fuel contracts curtailed, and maintenance schedules adjusted to support operation ONLY for the next 15 months.
  - Despite performance this winter, these plants cannot and will not continue to operate after mid-2015.



## "Steel In the Ground" Capacity Needed

- PJM increasingly reliant on demand response (DR) and electricity power imports to meet peak demands.
- **But NOT Sufficient to Ensure Year-Round Reliability:** 
  - Some DR not available in winter. Only 534 MW of DR response to emergency signal at Jan. 7 peak of 141,151 MW.
  - Demand response cannot provide the same "ancillary support" for the grid as power plants.
  - Power imports depend on transmission system handling increased power flows across regions. PJM experienced significant import curtailments from MISO and TVA during a high-temperature period in September.



#### **Better Gas-Electric Integration Required**

- Natural gas supply is plentiful, but additional infrastructure needed for high winter demand.
- Natural gas will be increasingly needed for both heating and electricity generation simultaneously.
- Gas and electric markets need to be synchronized to ensure fuel availability for generation. Mismatch in electricity and natural gas markets makes purchases of natural gas in real-time nearly impossible:
  - Nearly 15,500 MW of natural gas generation was NOT available Jan. 7 due to outages (9,105 MW) or gas supply curtailments (6,368 MW). Gas supply curtailments were even higher Jan. 8 (9,046 MW).



## What Needs to Be Done?

Fix capacity markets; keep fuel diversity; re-plan system.

- The real value of "steel-in-the-ground" capacity must be recognized in the competitive markets.
  - Market-based mechanisms not supporting capacity builds or upgrades; insufficient revenues from both capacity and energy markets means additional nuclear/ fossil fuel plants may be retired.
  - Greenhouse gas regulations being considered could result in additional coal plant retirements, beyond those already happening due to MATS.
    - Post-2015, the remaining coal-fueled power plants will have significant environmental controls and will be critical for maintaining reliability and supporting the electric grid. <u>It will be critical to ensure</u> <u>that CO2 regulations do not result in further retirements.</u>

