The Coal Institute

2014 Summer Trade Seminar

July 13 – 15, 2014

Coal Procurement Today and in 2019

or

“Coal Buying for Future Dummies”

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Electric generation at AEP - yesterday and today?

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5.2 million

customers in 11 states

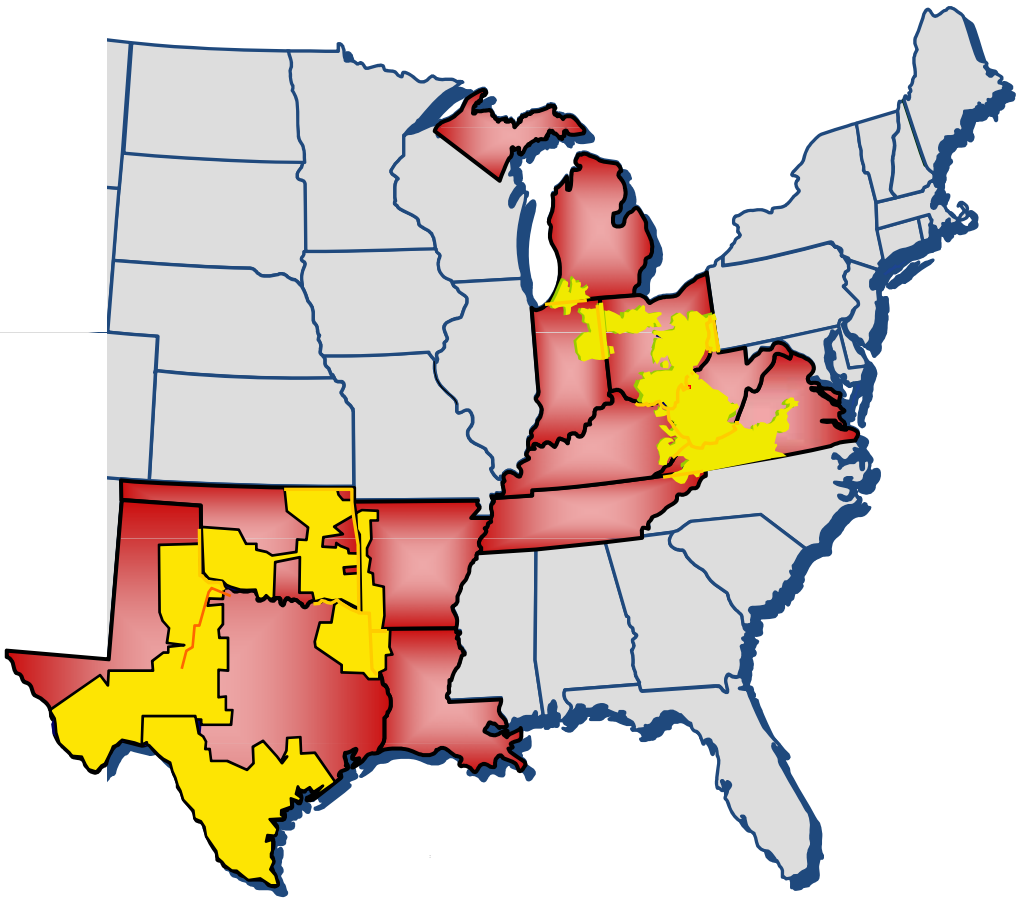
AEP AMERICAN ELECTRIC POWER

66% Coal/Lignite

22% Nat.gas/oil

6% Nuclear

6% Wind/Hydro



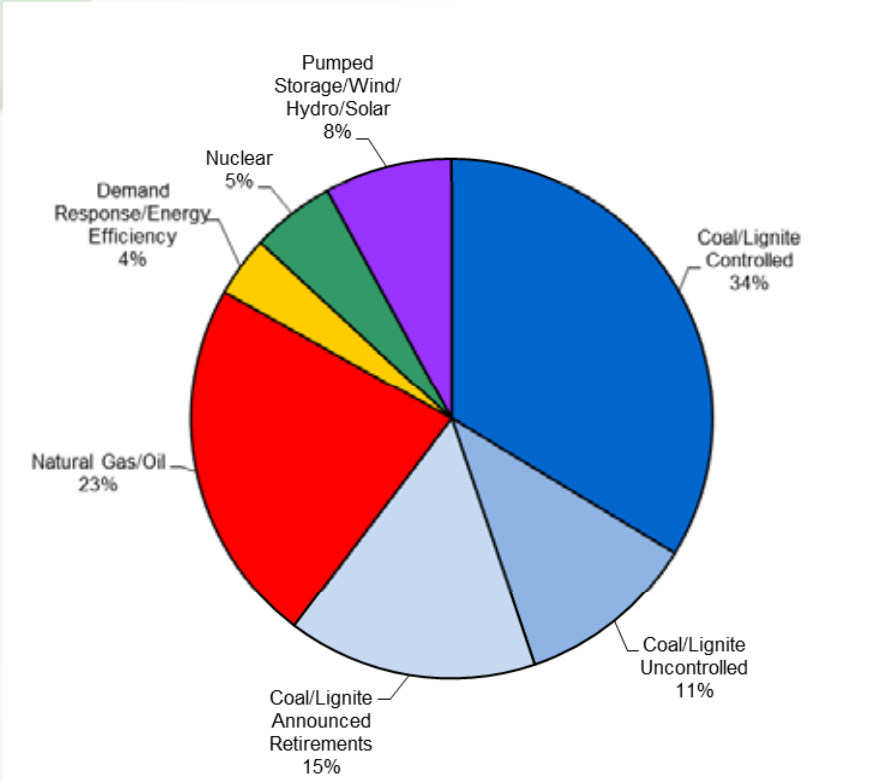
Domestic

Generation 2nd
38,000+ MW

Transmission 1st
40,000+ mi

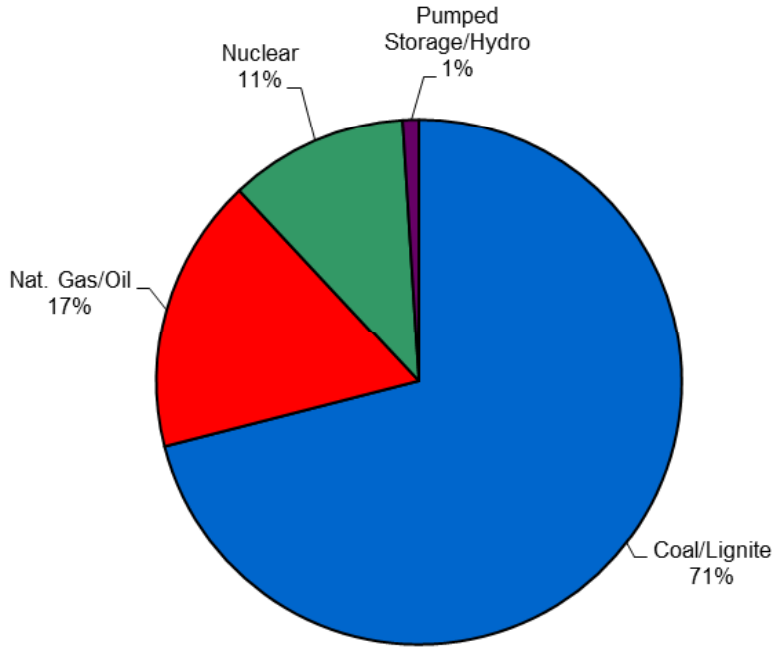
Distribution 1st
213,000+ mi

2013 Generation Fleet



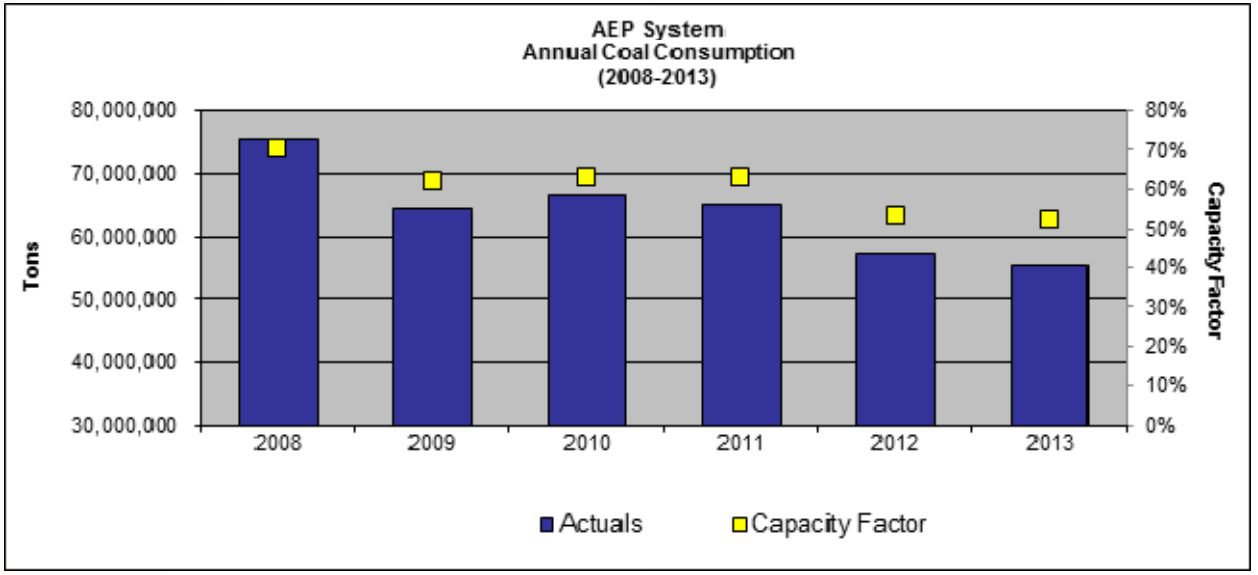
2013 Generation Capacity by Fuel Type (Including PPAs) Based on 42,535 MW

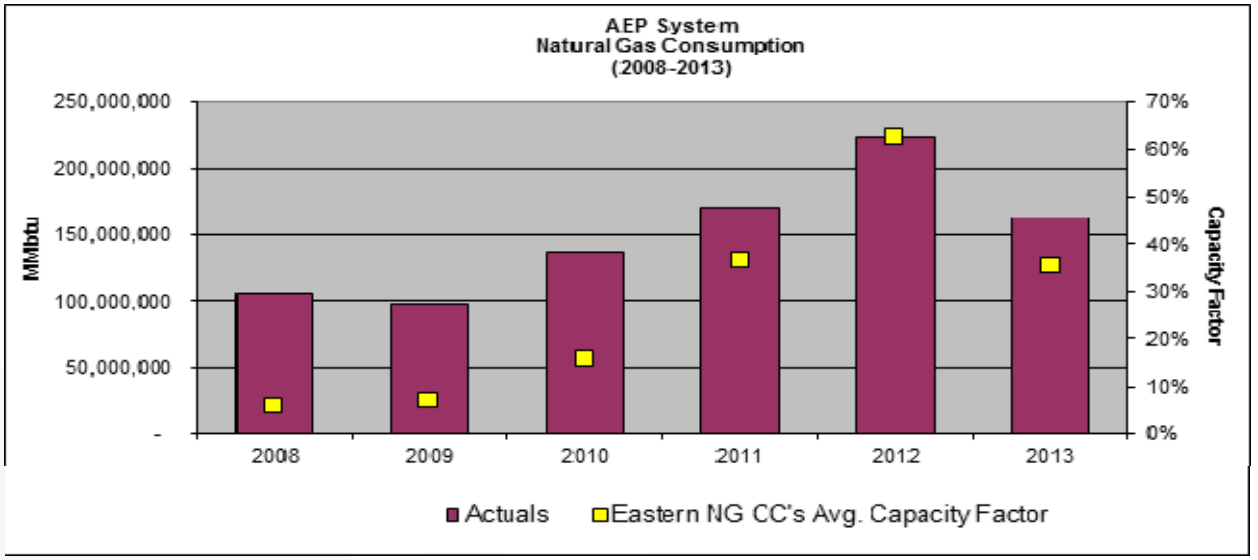
Note: Includes 1,590MW Demand Response/Energy Efficiency



2012 Generation Production by Fuel Type (Owned Assets) Based on 159,921,676 MWh

AEP System Coal/Gas Consumption





AEP Corporate Separation of Ohio Power

On December 31, 2013, the Ohio Power Company Generating assets (excluding renewable PPAs and OVEC interest) were transferred to AEP Generation Resources Inc., a competitive generation company. Also, Appalachian Power Company became owner of Amos Unit 3, and Kentucky Power became 50% owner of Mitchell.

2013 Generation

Generation Capacity*

Company	MW Capacity
AEP Generating Co	2,496
Appalachian Power Co	7,018
Indiana Michigan Power Co	4,518
Kentucky Power Co	1,078
Ohio Power Co (To be AEP Generation Resources at 01/01/2014)**	11,652
Public Service Company of Oklahoma	4,436
Southwestern Electric Power Co	5,730
Texas North Co	355
OVEC Capacity ***	980
Domestic IPPs	311
Long Term Renewable Purchase Power Agreements****	2,371
	40,945

* Capacity amounts represent the maximum capacity

** After transfer of Amos 3 to APCo and 50% of Mitchell plant to KPCo, 10,005MW will transfer to AEP Generation Resources

*** Represents AEP's 43.5% interest in Ohio Valley Electric Corporation (OVEC)

**** Excludes agreements pending regulatory approval

AEP Total System

Coal/Lignite #	25,531	63%
Natural Gas/Oil	9,670	24%
Nuclear	2,191	5%
Wind/Hydro/Pumped Storage	3,553	9%
Total Generating Capacity	40,945	100%

Includes AEP's 43.5% ownership of OVEC

Vertically Integrated Utilities - PJM

Coal/Lignite #	12,413	71%
Natural Gas/Oil	1,124	6%
Nuclear	2,191	12%
Wind/Hydro/Pumped Storage	1,857	11%
Total Generating Capacity	17,585	100%

Includes 43.5% ownership of OVEC

Vertically Integrated Utilities - SPP

Coal/Lignite	4,156	37%
Natural Gas/Oil	6,010	53%
Wind/Hydro/Pumped Storage	1,160	7%
Total Generating Capacity	11,326	100%

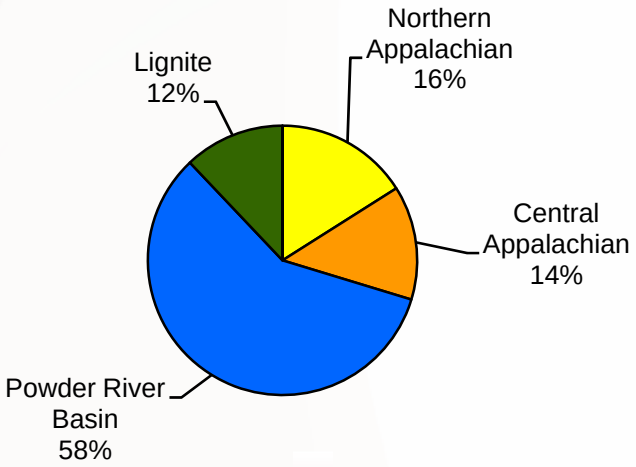
AEP Generation Resources^ as of 01/01/2014

Coal	8,962	74%
Natural Gas/Oil	2,536	21%
Wind/Hydro/Solar	536	4%
Total Generating Capacity	12,034	100%

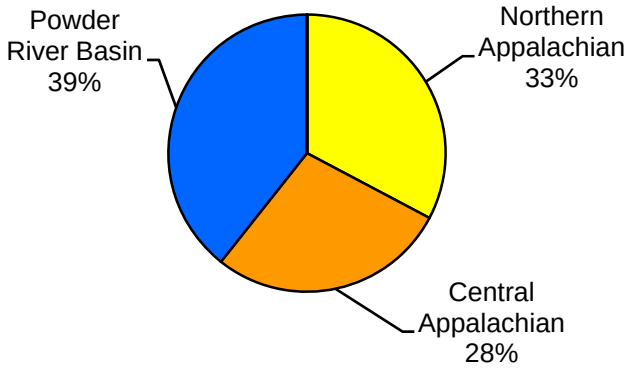
^ Includes all PJM, and ERCOT capacity including Lawrenceburg PPA, Renewable PPAs and plants slated for retirement.

Regulated Coal Procurement
2014 Projected

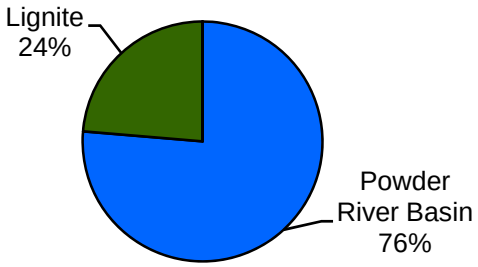
Total AEP System - Regulated



AEP East - Regulated



AEP West - Regulated



Coal Stats:

- Expected 2014 coal burn: approx. 40M tons
- 76% contracted for 2014 and 51% contracted for 2015
- Avg. 2013 YTD regulated system delivered price ~ $48/ton*
  - East ~ $59/ton* West ~ $37/ton*
- Projected regulated system price in 2014 ~ $45/ton*
  - East ~ $54/ton*, West ~ $37/ton

*excludes Ohio units moving to AEP Generation Resources- competitive

Polar Vortex – Winter 2014

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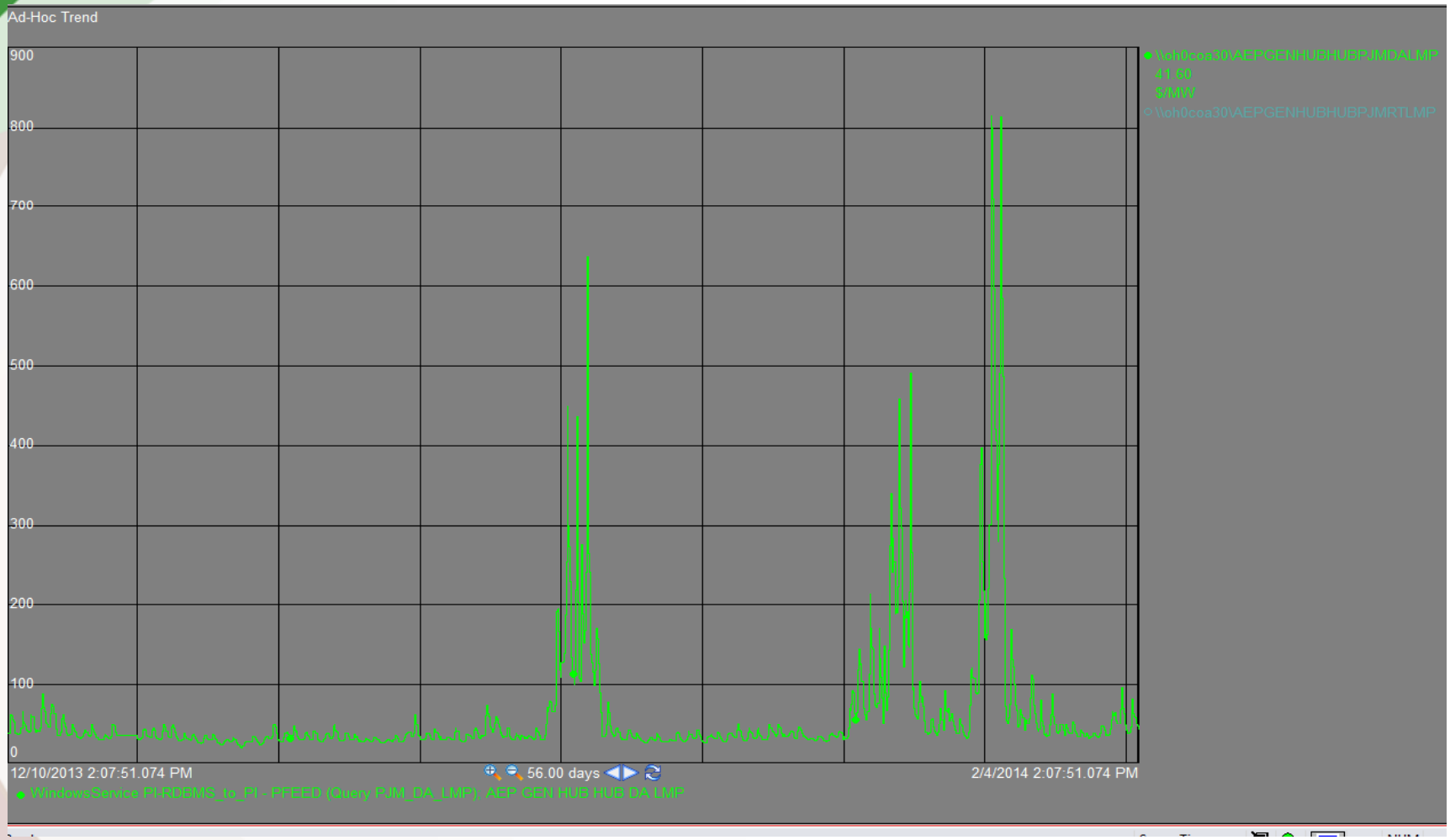

PJM Day Ahead Prices
12/10/2013 – 2/4/2014

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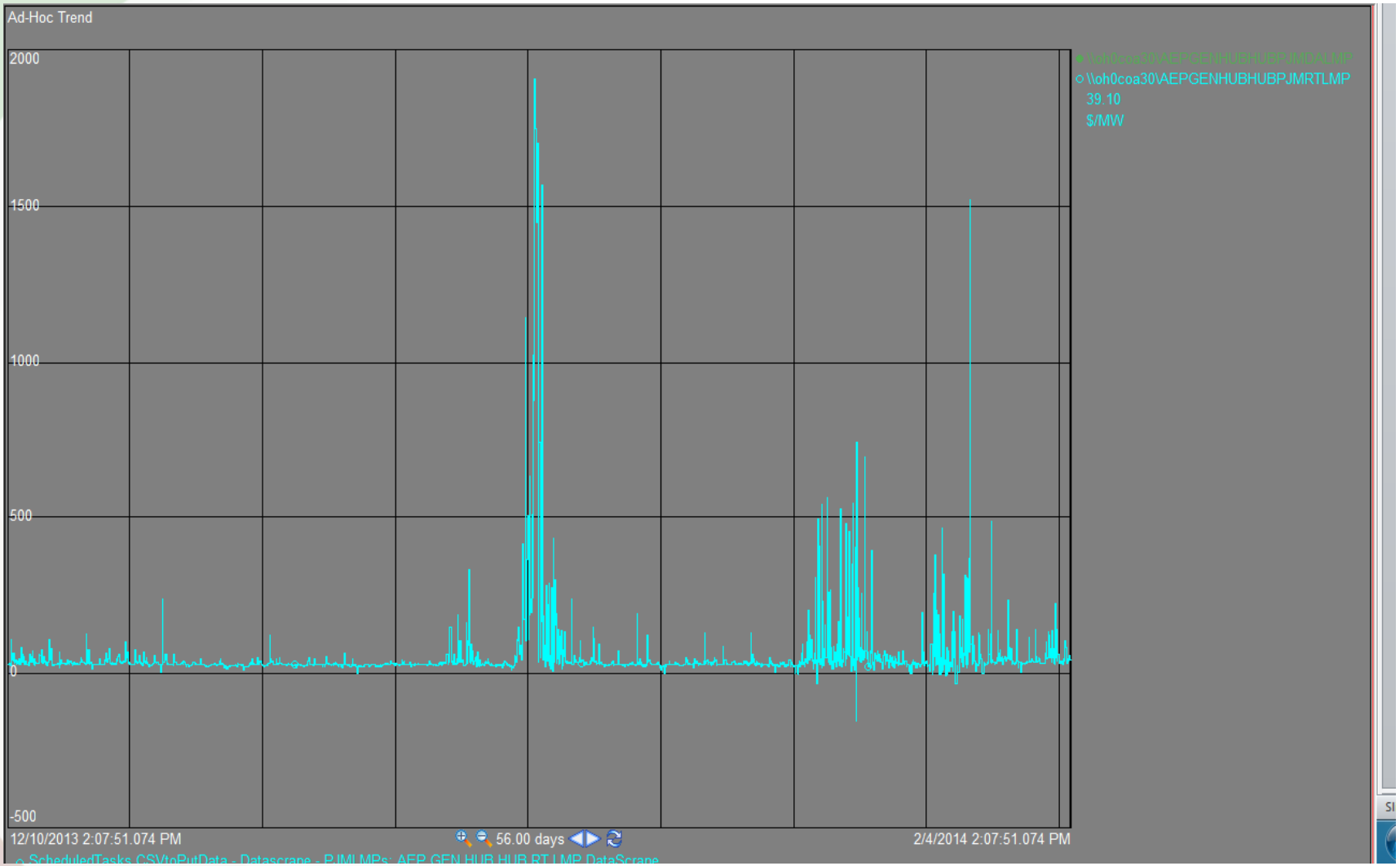
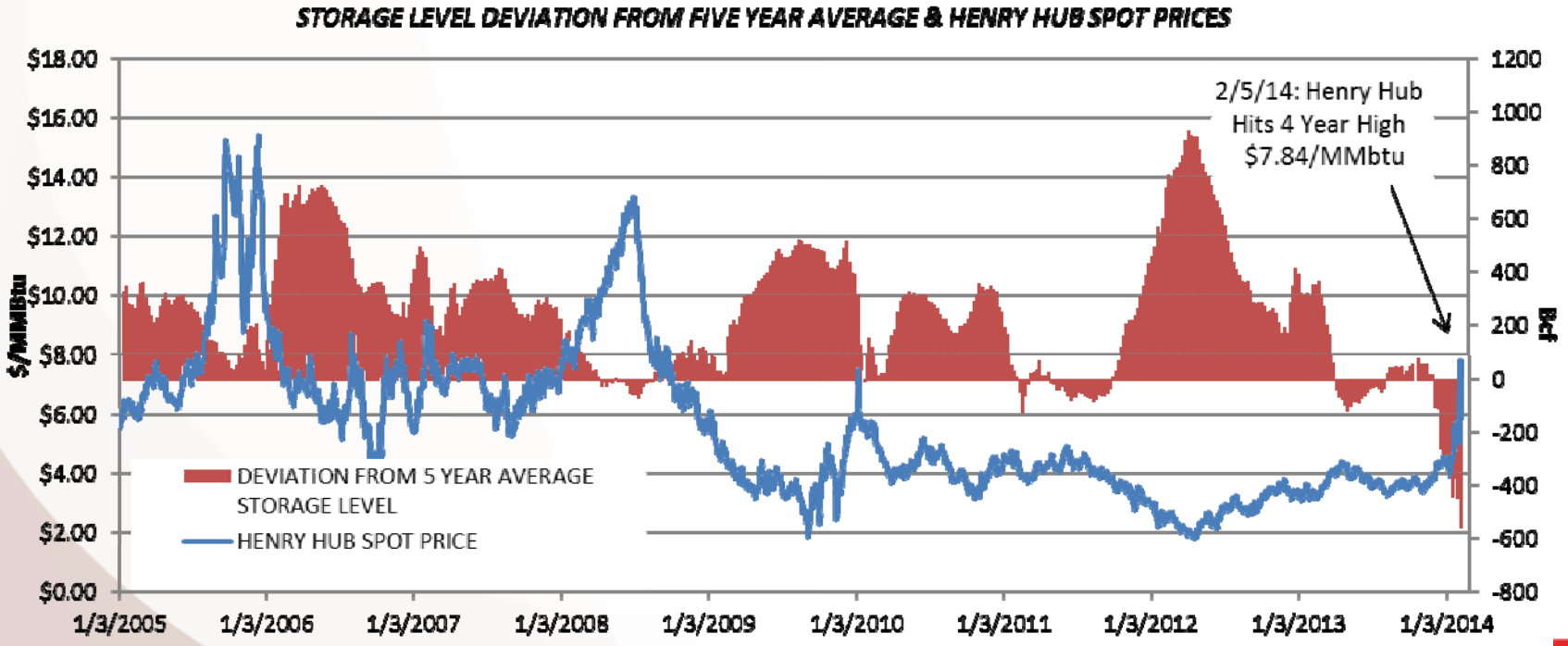


PJM Real Time Prices
12/10/2013 – 2/4/2014

Natural Gas Market Update

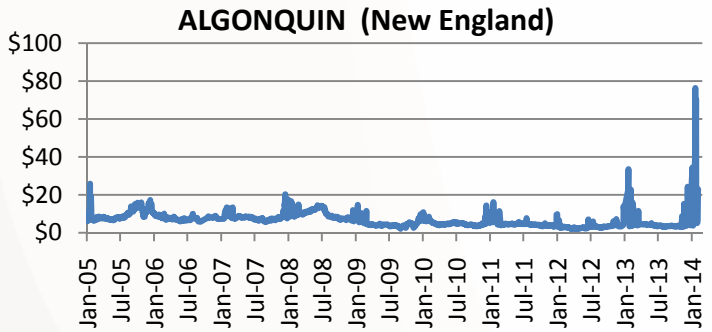
- **During the Polar Vortex on January 7, unprecedented natural gas prices in the northeast U.S. set record high power prices in PJM.**
- **Since January 7, sustained cold temperatures across the country resulted in record storage withdrawals leading to a ten year low in working gas storage of 1.348 Tcf.**
- **Additionally, increased winter demand for natural-gas fueled power generation along with the heating demand from residential and commercial consumers caused constraints on pipeline infrastructure.**

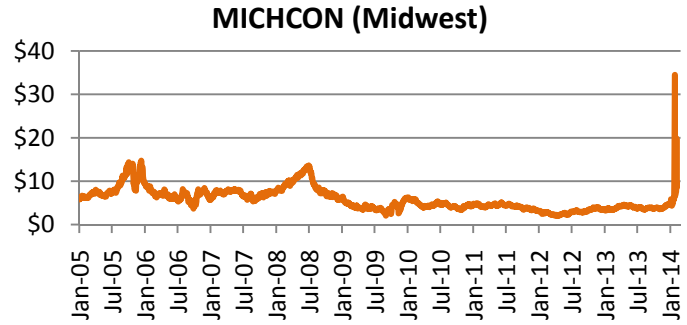


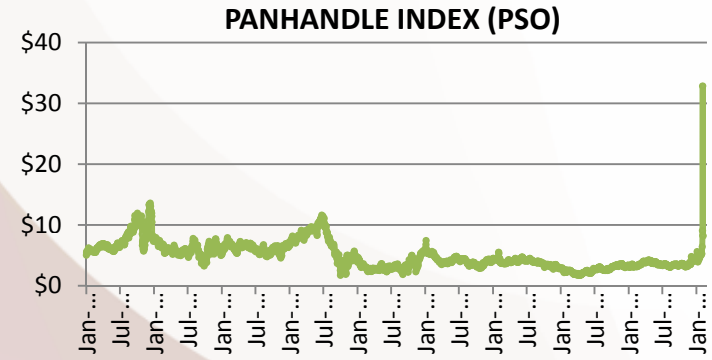
Record Index Prices

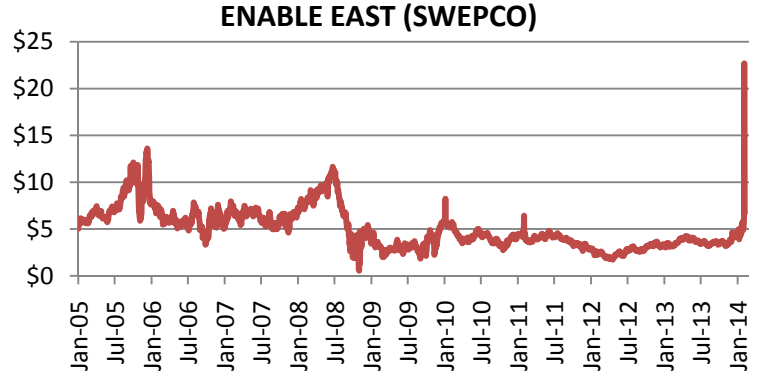
Low storage levels and pipeline constraints produced price spikes in many regions across the U.S. Moreover, price volatility has drastically increased in both the prompt month futures contract and in the cash markets.

- **On February 5, the March NYMEX futures contract opened at $5.37/MMBtu, traded a low of $4.99 and a high of $5.74, a 14% intra-day price swing.**
- **In PSO territory, the cash market for the Panhandle index for gas flowing on February 5 averaged $9.07/MMBtu, on February 6 prices soared to $32.855/MMBtu, and then settled back to $8.28/MMBtu the following day. SWEPCo saw similar swings with prices trading as high as $22.68/MMBtu for Thursday then falling to $7.33/MMBtu the next day.**









Platts Gas Daily Settlement Prices ($/MMBtu)

Environmental Regulations and the resulting changes to coal fired generation.

EPA Regulations

Regional Haze Program

- Beginning in 1999 - States, in coordination with the EPA and other interested parties were required to develop and implement air quality protection plans to reduce the pollution that causes visibility impairment at 156 National parks and wilderness areas.

Cross State Air Pollution Rule – CSAPR

- July 6, 2011 – reduce SO2 and NOx – CSAPR was stayed in December 2011 and vacated by the DC Circuit Court in 2012. On April 29, 2014, the Supreme Court reversed and remanded the 2012 decision to vacate CSAPR.

Mercury and Air Toxics Standard – MATS

- December 16, 2011 – reduce emissions of mercury, arsenic, chromium, nickel, HCl and particulate

EPA Regulations – Greenhouse Gases

Carbon Pollution Standards for New Plants

- September 20, 2013 (Public Comment) - new coal fired power plants limited to 1,100 lbs of CO2 per MWh
- Typical pulverized coal unit emits 1,700 lbs of C02 per MWh

CO2 Standards for existing Plants

- On June 2, 2014, EPA released preliminary plan to reduce CO2 from existing plants which includes goals for each state.
- EPA assumptions for CO2 reduction:
  - 6% heat rate improvement on each plant at a cost of $100/kw
  - Natural Gas combined cycle units operate at 70% capacity factor with a resulting decrease in coal generation
  - 13% national RPS (renewable portfolio standard) by 2030 with states varying from 2 to 25%
  - Customer efficiency improves by 1.5% per year

Regulated Environmental Investment & Retirements

Operating Company	Plant	MW	Potential Type of retrofit
APCO	Clinch River 1[1,2]	242	Refuel with Natural Gas
	Clinch River 2[1,2]	242	Refuel with Natural Gas
I&M	Rockport[3]	2,620	DSI, SCR
KPCO	Big Sandy 1[4]	278	Refuel with Natural Gas
PSO	Oklaunion	102	ACI
	Northeastern 3	460	ACI, DSI, Baghouse
SWEPCO	Welsh 1	528	ACI, Baghouse
	Welsh 3	528	ACI, Baghouse
	Pirkey	580	ACI
	Dolet Hills	256	ACI, Baghouse
	Flint Creek	264	FGD, ACI
Total Regulated retrofits =		**6,100**	

[1] Existing Coal Plant 235MW

[2] Case on file, subject to regulatory and other approvals

[3] Pending approval of settlement on file with IURC

[4] Pending filing for CCN at KPSC

ACI – Activated Carbon Injection
DSI – Dry Sorbent Injection
FGD – Flue Gas Desulfurization
SCR – Selective Catalytic Reduction

Operating Company	Plant	MW	Expected Retirement
APCO	Glen Lyn 5	95	2015
	Glen Lyn 6	240	2015
	Clinch River 3	235	2015
	Sporn 1	150	2015
	Sporn 3	150	2015
	Kanawha River 1	200	2015
	Kanawha River 2	200	2015
	Total MW	**1,270**	
I&M	Tanners Creek 1 - 4	995	2015
	Total MW	**995**	
KPCo	Big Sandy 2	800	2015
	Total MW	**800**	
SWEPCO	Welsh 2	528	2016
	Total MW	**528**	
PSO	Northeastern 4	470	2016
	Total MW	**470**	
Total Regulated Retirements =		**4,063**	

I&M – Rockport Plant

I&M – Tanners Creek

I&M – Environmental Upgrades

Mercury and Air Toxics Standard – MATS

- **Original Consent Decree with EPA called for FGD for Rockport in 2016 & 2018**
- **Tanners Creek 4 originally scheduled for DSI - smaller Tanners Creek units were scheduled for retirement**
- **MATS required installation of FGD at both Rockport units by 2015 at a cost of $1.2 billion each**
- **Consent decree was modified to allow DSI at Rockport but all Tanners Creek units would be shut down**

- **I&M reduced CAPP use by 1.0 million tons and abandoned switch to ILB coal at Rockport**

PSO – Northeastern Power Station

PSO – Environmental Upgrades

Oklahoma – Regional Haze

- **Northeastern Station was found to contribute to Regional Haze affecting 3 Class I areas in AR as well as the Wichita Mountains in OK**
- **PSO worked with ODEQ to develop a State Implementation Plan (SIP)**
- **National EPA rejected SIP**
- **Settlement between PSO, ODEQ, EPA and Sierra Club**
    - **Unit 4 shuts down in April, 2016**
    - **Unit 3 installs DSI, ACI and baghouse by April, 2016 then shuts down in 2026**

Oklahoma Regional Haze Comparison

Oklahoma's Controls	EPA's Controls
	

Wichita Mountains Wildlife Refuge, Oklahoma

SWEPCO -Turk Plant

Turk – 1st and Last USC plant

Ultra-SuperCritical (USC)

- **Supercritical unit typically operates at steam pressures above 3500 psig and steam temperatures of 1000 to 1050 degrees F**
- **Advances in metallurgy now can handle USC pressures (above 3500 psig) and temperatures above 1100 degrees F**
- **Typical Supercritical PRB unit without environmental controls has heat rate of 10,250 Btu/kWh.**
- **Turk has heat rate that is 14% more efficient at approximately 8820 Btu/kWh**

Boiler & AQCS Layout

AQCS – Air Quality Control Systems

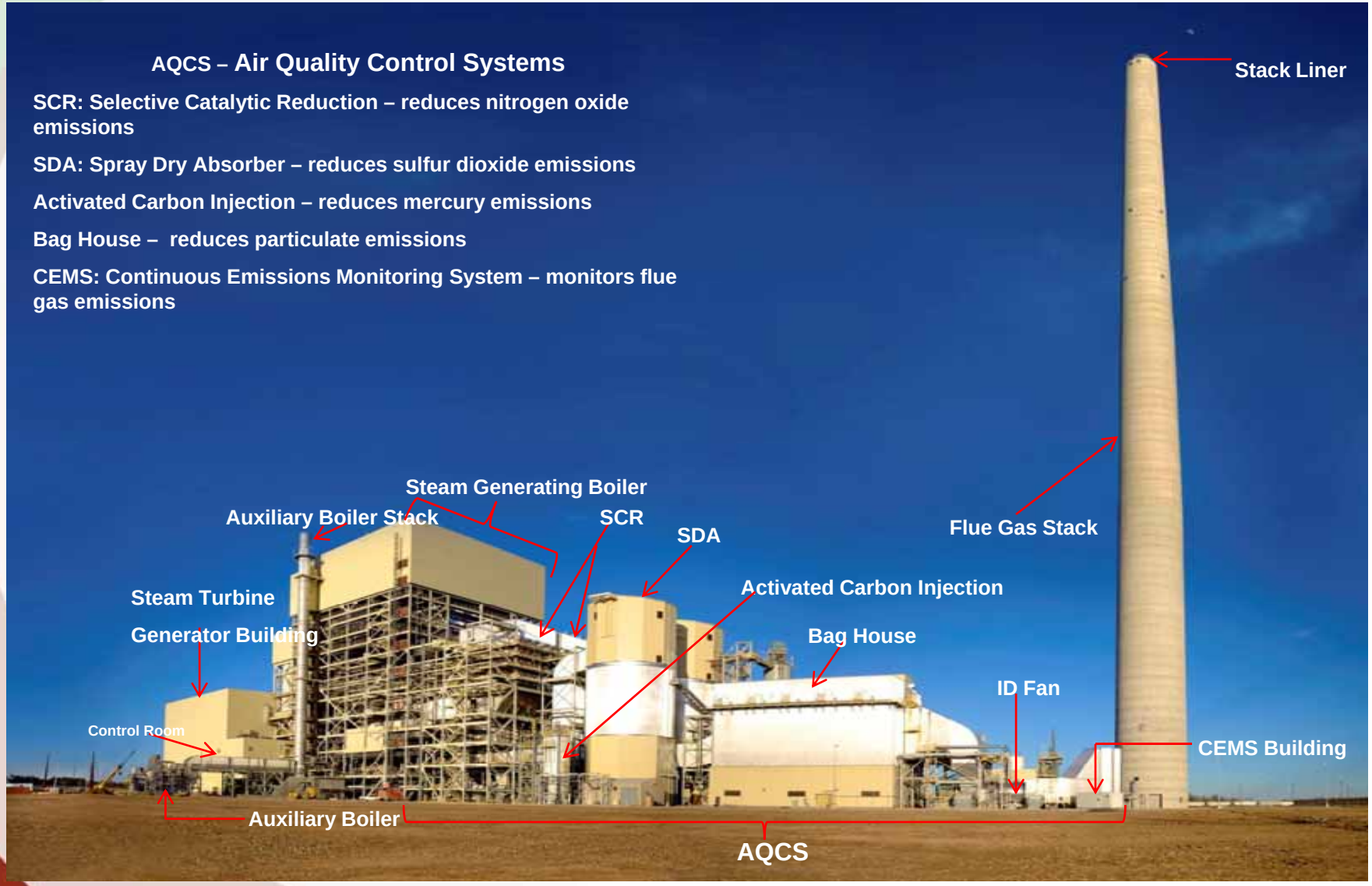
SCR: Selective Catalytic Reduction – reduces nitrogen oxide emissions

SDA: Spray Dry Absorber – reduces sulfur dioxide emissions

Activated Carbon Injection – reduces mercury emissions

Bag House – reduces particulate emissions

CEMS: Continuous Emissions Monitoring System – monitors flue gas emissions



Turk - Key Dates

- Air Permit Application – August 9, 2006
- Air Permit final & start const – Nov 5, 2008
- First fire on gas – August 21, 2012
- First fire on coal – October 27, 2012
- First sync to grid – November 8, 2012
- COD – December 20, 2012

Turk Plant Legal Challenges

Legal challenges by Sierra Club, National Audubon Society and Audubon Arkansas

- U.S. Army Corps of Engineers Section 404 permit
- Arkansas DEQ air permit
- Arkansas DEQ wastewater permit
- Arkansas Public Service Commission - Certificate of Environmental Compatibility and Public Need (CECPN)

Turk Plant Settlement

- **All legal challenges withdrawn**
- **AEP agrees not to construct a second unit at Turk or within 30 miles of Turk**
- **Welsh unit 2 must run below 60% of annual capacity and must be retired prior to 2017**
- **AEP must construct or secure 400 MW of renewable energy**
- **SWEPCO will contribute $8 million to "The Nature Conservancy" and $2 million to the "Arkansas Community Foundation" for promotion of clean energy resources and will reimburse Sierra and Audubon for $2 million in attorneys' fees**

SWEPCO – Welsh Plant

SWEPCO – Environmental Upgrades

- **Welsh Plant to install ACI and Baghouse on Units 1 & 3, Welsh 2 will shut down in 2016**
- **Flint Creek applied and was approved for Scrubber and ACI**

- **AEP ‘s PRB burn will actually decrease with Turk coming online and Welsh 2, Northeastern 4 and Tanners Creek 4 shutting down.**

What will it take for power companies in the USA to build additional coal-fired capacity?

New Power Plant – Estimated Power Costs at $4.50/MMBtu Natural Gas

Plant Type	MW	Heat Rate	Capital Cost Billion $	Fuel Cost $/MMBtu	Variable $/Mwhr	Var & Fixed $/MWhr
Coal Plants						
Advanced PC - PRB	650	8,800	$2.11	$2.27	$24.47	$48.28
Advanced PC with CCS - PRB	650	12,000	$3.40	$2.27	$36.78	$78.33
IGCC - NAPP	600	8,700	$2.64	$2.40	$28.10	$62.17
IGCC with CCS - NAPP	520	10,700	$3.43	$2.40	$34.13	$81.88
Natural Gas						
Conventional CC	620	7,050	$0.57	$4.50	$35.33	$43.65
Advanced CC	400	6,430	$0.41	$4.50	$32.21	$41.62
Advanced CC with CCS	340	7,525	$0.71	$4.50	$40.64	$59.98
Conventional CT	85	10,850	$0.08	$4.50	$64.28	$75.63
Advanced CT	210	9,750	$0.14	$4.50	$54.25	$62.68
Uranium						
Dual Unit Nuclear	2,234		$12.35		$10.14	$49.75

Note – Based on EIA plant Cost Data

New Power Plant – Estimated Power Costs at $6.00/MMBtu Natural Gas

Plant Type	MW	Heat Rate	Capital Cost Billion $	Fuel Cost $/MMBtu	Variable $/Mwhr	Var & Fixed $/MWhr
Coal Plants						
Advanced PC - PRB	650	8,800	$2.11	$2.27	$24.47	$48.28
Advanced PC with CCS - PRB	650	12,000	$3.40	$2.27	$36.78	$78.33
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IGCC with CCS - NAPP	520	10,700	$3.43	$2.40	$34.13	$81.88
Natural Gas						
Conventional CC	620	7,050	$0.57	$6.00	$45.90	$54.22
Advanced CC	400	6,430	$0.41	$6.00	$41.85	$51.26
Advanced CC with CCS	340	7,525	$0.71	$6.00	$51.93	$71.26
Conventional CT	85	10,850	$0.08	$6.00	$80.55	$91.90
Advanced CT	210	9,750	$0.14	$6.00	$68.87	$77.31
Uranium						
Dual Unit Nuclear	2,234		$12.35		$10.14	$49.75

Note – Based on EIA plant Cost Data