Mountaineer Plant CCS Project and the Role of Environmental and Financial Regulation:

The US Coal-Fired Fleet is Transitioning and Needs Economical CCS Technology

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Joint Activities and Opportunities
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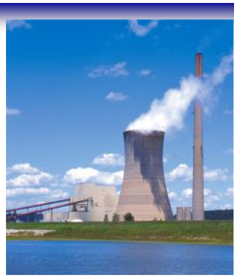
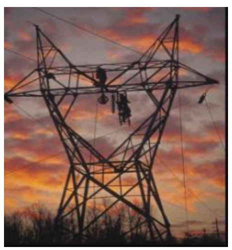
American Electric Power



One of the largest U.S. electricity generators



The largest U.S. electricity transmitter

One of the largest U.S. electricity distributors

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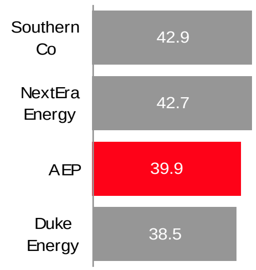
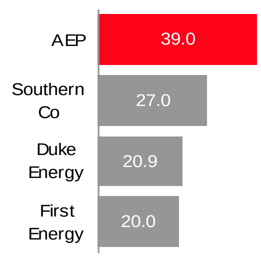
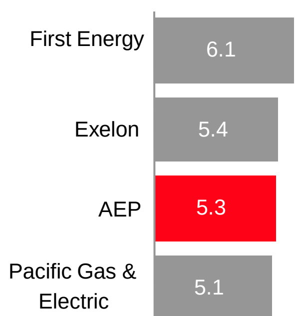
Generation owned[1] (GW)



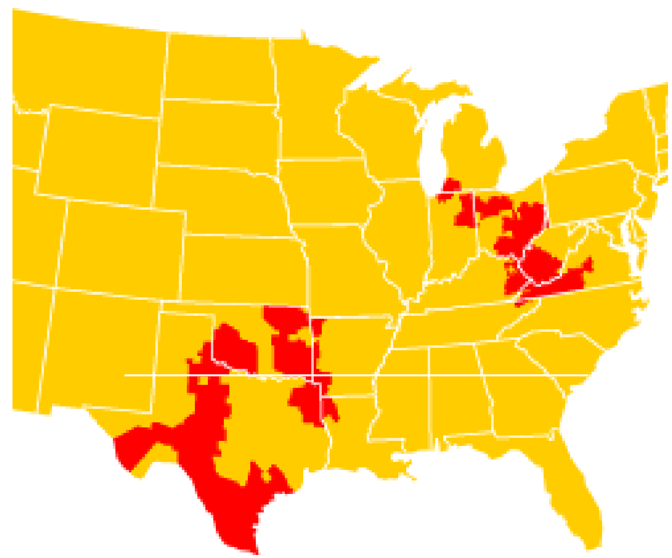
Transmission miles[1] ('000s)



Electric customers[1] (mm)

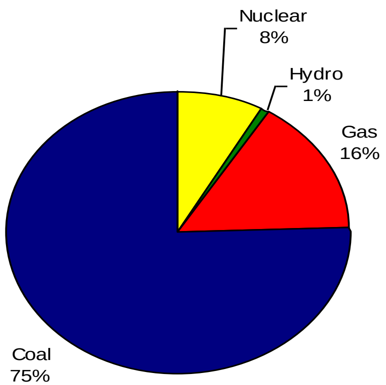


Serving electric customers in 11 states

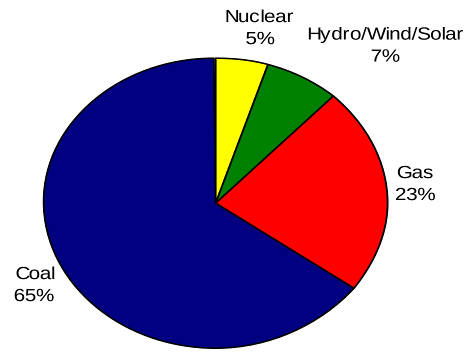


AEP Generation

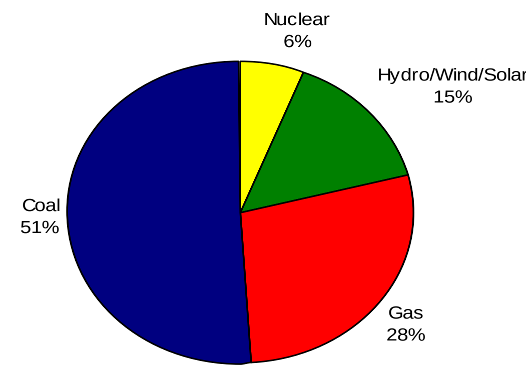
1990 AEP Generating Capacity by Fuel
37,428 total MW's



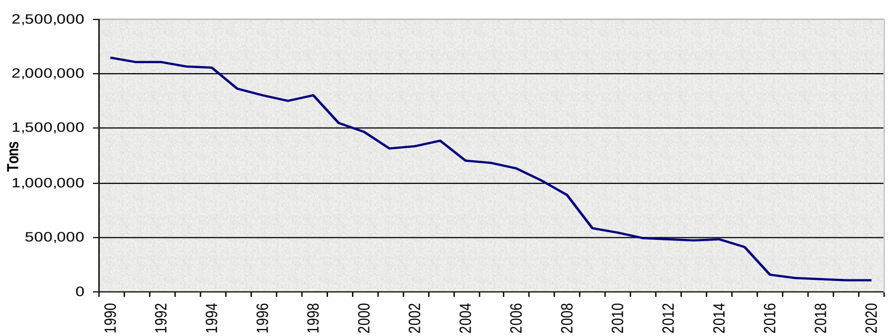
2010 AEP Generating Capacity by Fuel
39,910 total MW's



2020 AEP Generating Capacity by Fuel
37,707 total MW's



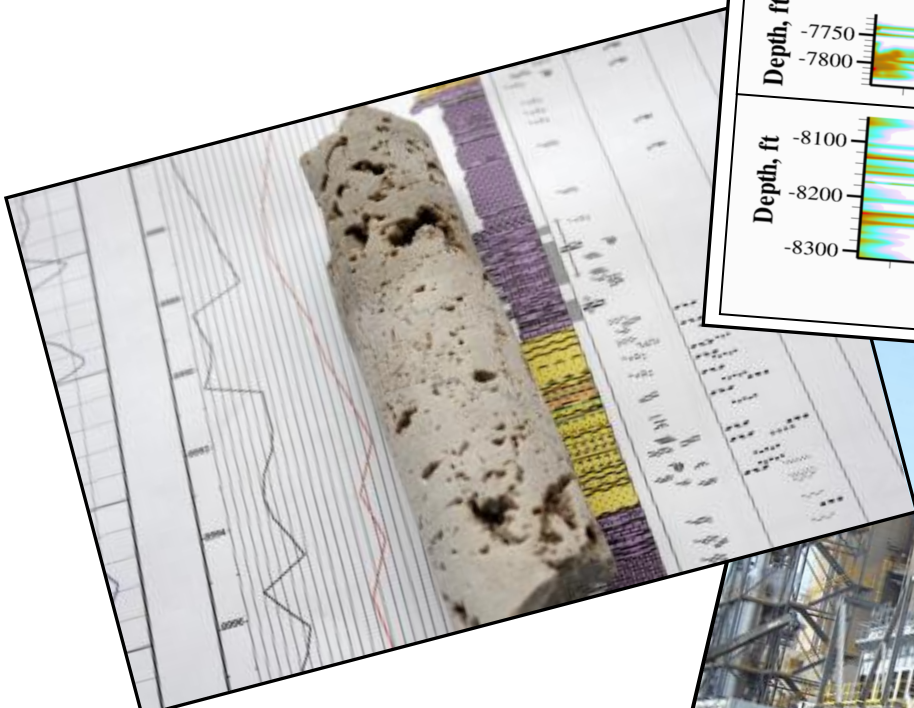
Total System NOx & SO2 (actual through 2010 and forecasted based on proposed EPA regulations)

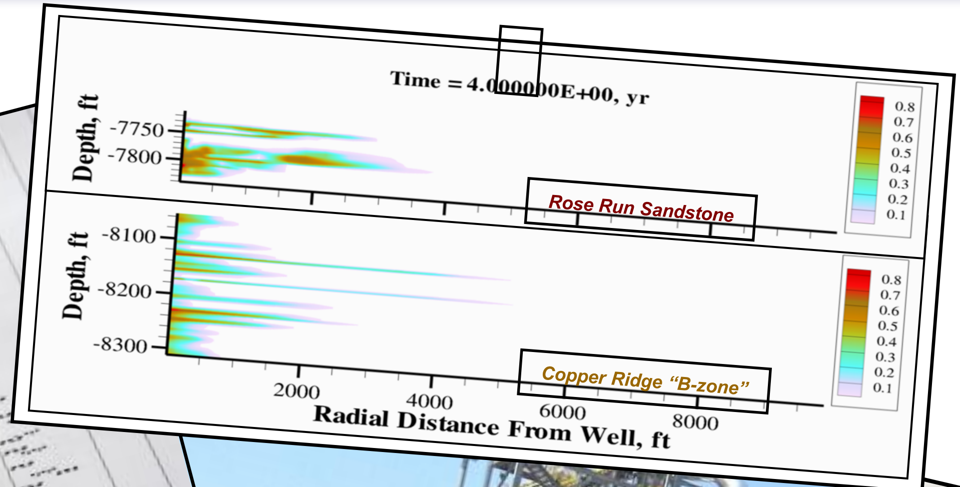


- $7.2 billion capital invested from 1990-2010 to reduce emissions approximately 1.7 million tons
- Estimated $6-$8 billion additional capital investment from 2012-2020 for further reductions of approximately 440,000 tons

AEP's Mountaineer Project:

A Look Into The Future of Coal-Fired Generation





Characterization…

Simulation…

Validation…

AEP CCS Validation Facility

1,300 MWe Mountaineer Plant, New Haven, WV

- ***Scale:*** ***20 MWe slipstream***
  - *~1.5% of power plant flue gas*
- ***Cost:*** ***>$100M***
  - *Project initiated in September 2007*
  - *Funding by AEP, Alstom, RWE, & EPRI*
- ***Capture:*** ***Alstom Chilled Ammonia Process***
  - *Ammonium Carbonate/Bicarbonate Reaction*
  - *>85% CO_2 capture rate*
- ***Sequestration:*** ***Deep saline formation storage***
  - *~100,000 tons CO_2 per year*
  - *~1.5 miles below the plant surface*
- ***First CO_2 Capture:*** ***September 1, 2009***
- ***First CO_2 Storage:*** ***October 1, 2009***
- ***Planned operation:*** ***1 to 5 years***

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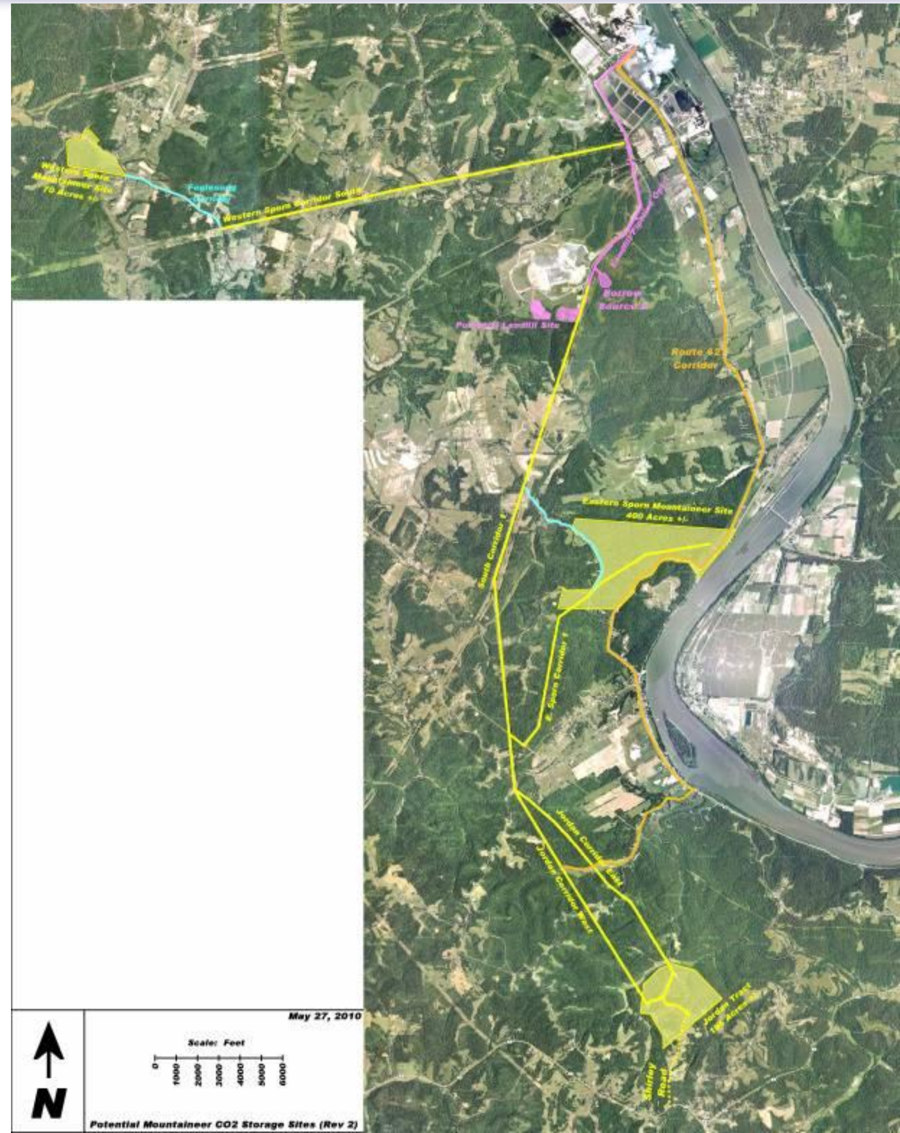
AEP CCS Commercialization Project on Hold
1,300 MWe Mountaineer Plant, New Haven, WV

- ***Scale:*** ***Full commercial demonstration***
  - ***235 MWe Slipstream***
- ***Cost:*** ***~$668M***
- ***Funding:*** ***CCPI Round III Selection***
  - ***DOE awarded 50% cost share, up to $334M***
  - ***Cooperative agreement signed in January, 2010***
- ***Capture:*** ***Alstom Chilled Ammonia Process***
  - ***~90% CO_2 capture rate***
- ***Sequestration:*** ***Battelle is Storage Contractor***
  - ***Deep saline reservoirs***
  - ***~1,500,000 tons CO_2 per year***
  - ***~1.5 miles below the surface***
  - ***Pipeline system with off-site wellheads***
- ***NEPA Process Underway***
- ***Geologic Experts Advisory Group:*** ***Actively Meeting***
  - ***Battelle, CONSOL, RWE, MIT, Univ. of Texas, Ohio State, WVU, Virginia Tech, LLNL, WV Geo. Survey, OH Geo. Survey, WV DOE, NETL, & CATF***
- ***Planned Operation:*** ***Startup in second half of 2015***



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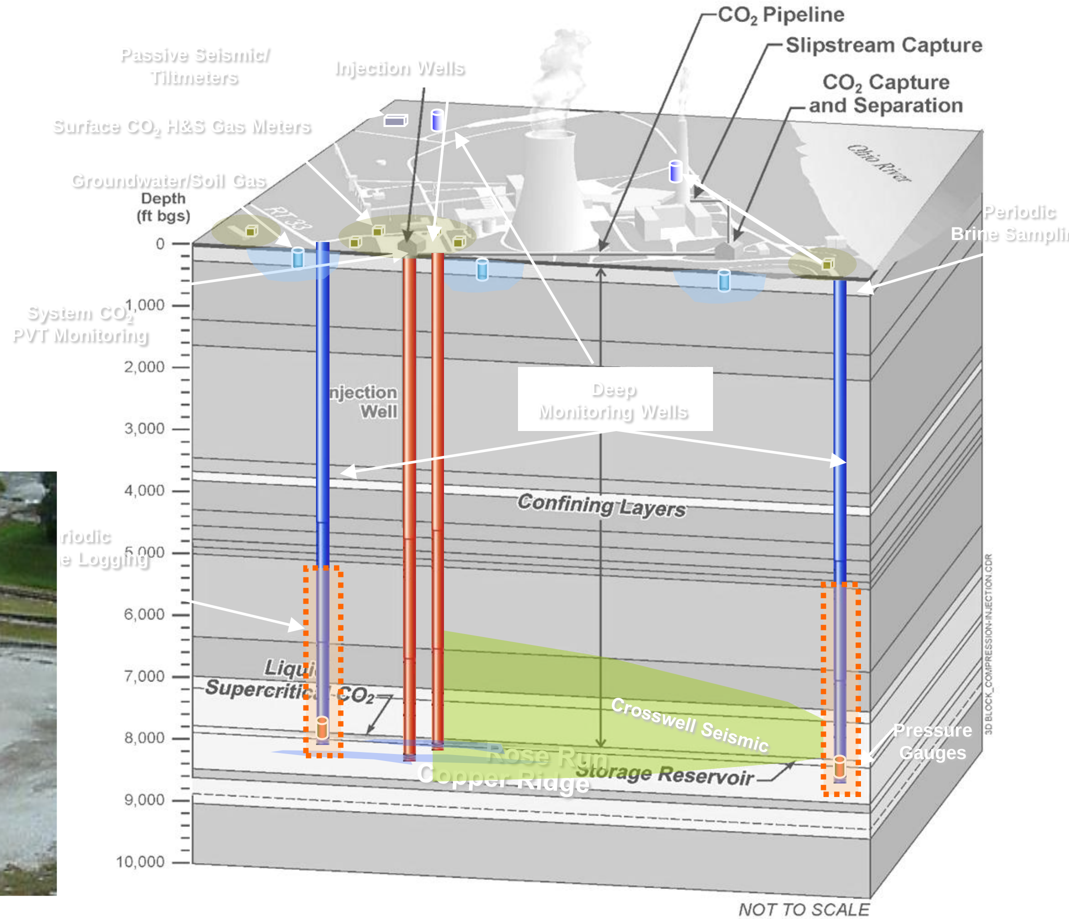
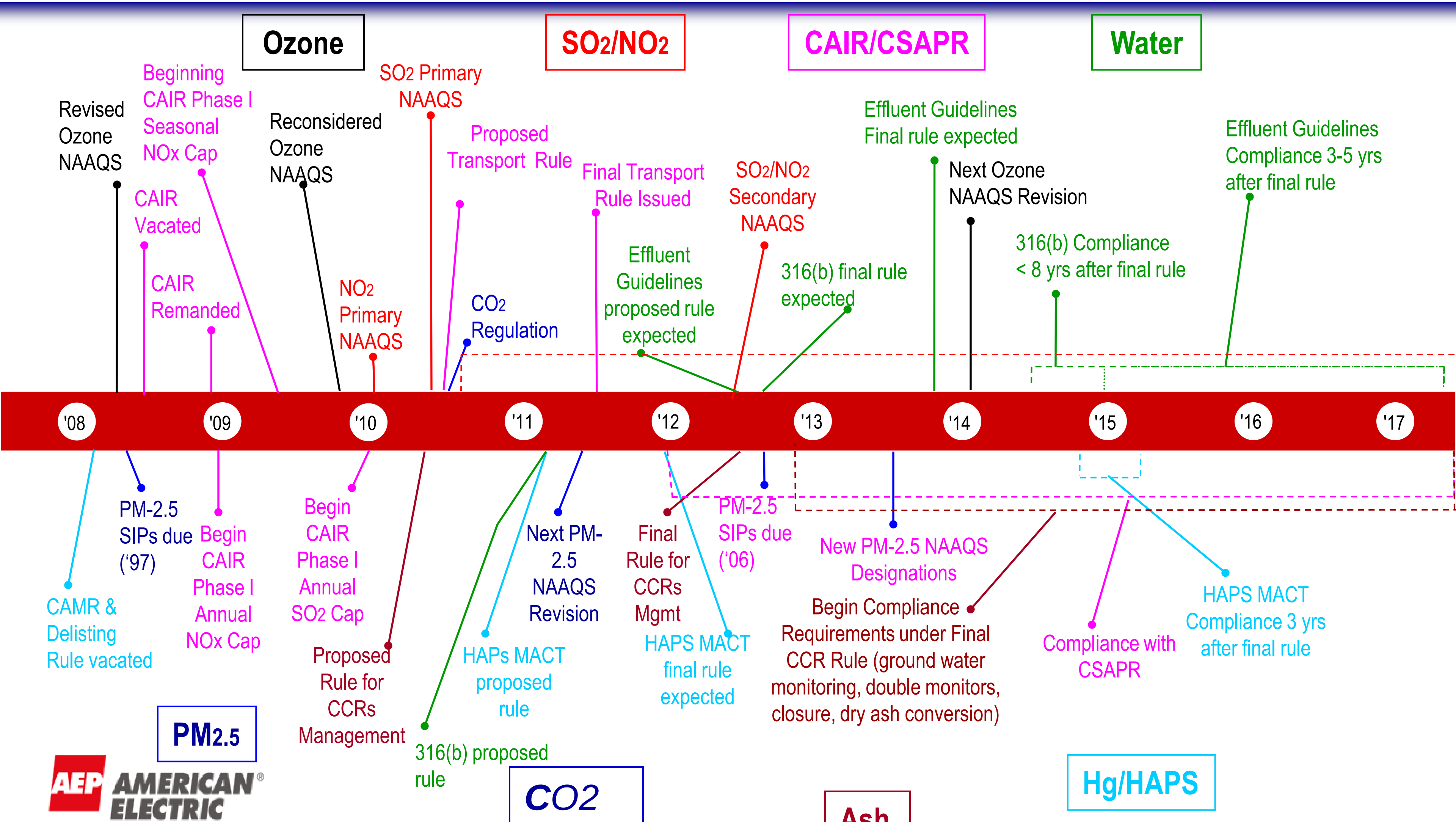
Validation Facility Results
October 2009 - May 2011

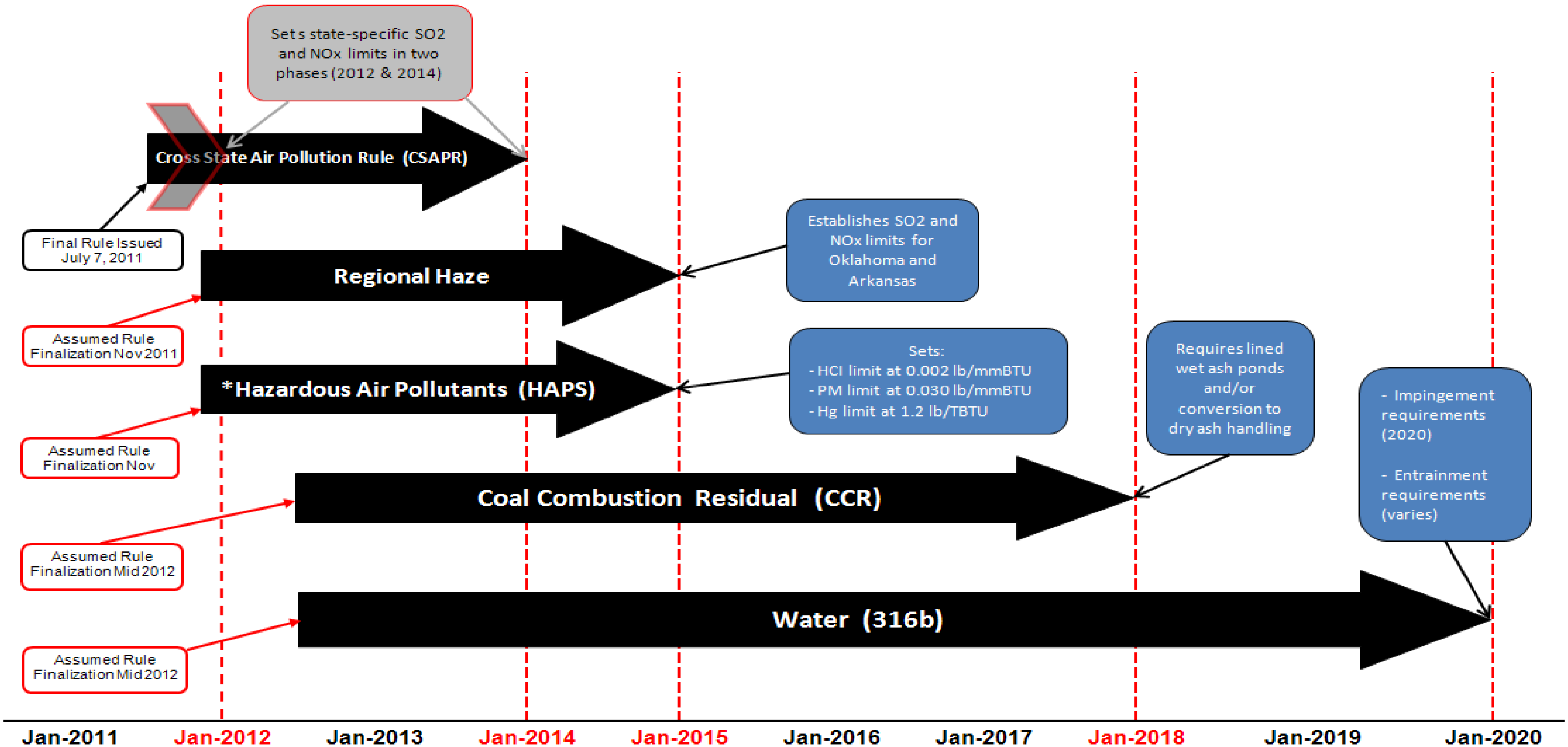
- *~6,500 hours operation*
- *~50,000 metric tons captured*
- *~37,000 metric tons stored*
- *Process availability approaching 100%*
  - *Both capture and storage*
- *>90% CO_2 capture rate*



US EPA Regulatory Agenda Impacting Coal-Fired Generating Plants



Near Term Environmental Regulations and Deadlines Before CO_2 Emission Reductions are Required



* Units that will be retrofit are eligible for a one year compliance extension from the EPA

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Major impacts for AEP, similar impacts for other owners with Coal-Fired units

To meet compliance deadlines for new environmental regulations, AEP expects it will need to invest $6 billion to $8 billion to:

- Retire nearly 6,000 MW of existing coal-fired generation by Dec. 31, 2014.
- Refuel, retrofit with new or upgrade existing environmental controls on another 11,000 MW.(*see appendix)
- Temporarily (1 – 4 years) idle / curtail 1,500 MW – 5,200 MW.
- Build approximately 1,700 MW of new generation, mostly natural gas.

This will create:

- Abrupt rate increases ranging from 10% to 35%.
- Significant reliability concerns, particularly in the 2014 – 2016 time frame.
- The need to install additional equipment to address impacts on the transmission system due to the reduction in generating capacity.
- Net loss of 600 Jobs
- Annual lost wages of $40 million
- $20 million decline in payroll taxes
- $12 million decline in property tax payments

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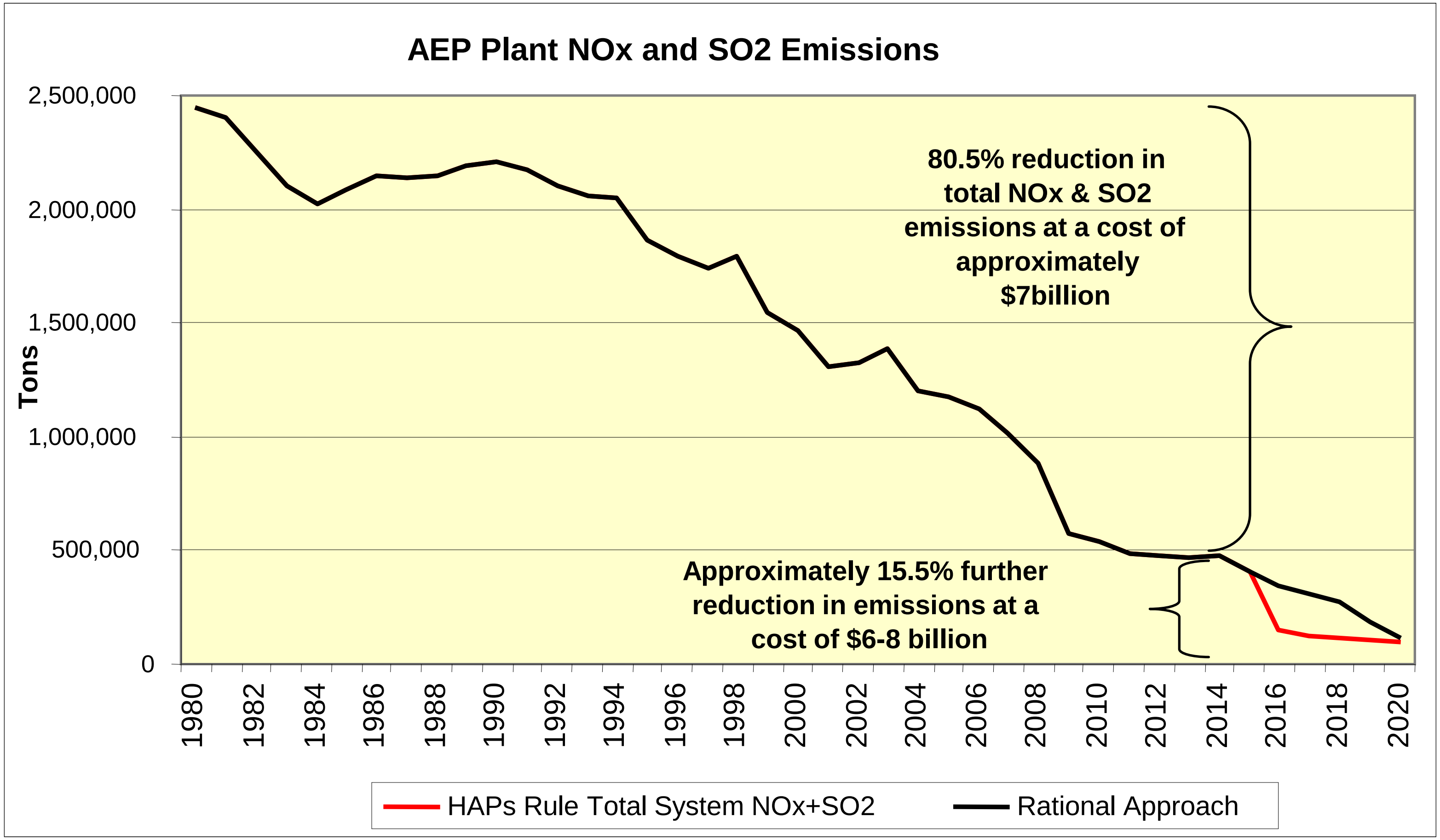
A Phased-in Approach Will Arrive at the Same Destination



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Project on Hold… But Progress on Economical CCS is Critical

- *Main reasons are uncertain status of climate policy, weak US and State economy*
- *As a financially regulated utility, impossible to gain regulatory approval to recover our share of costs for validating and deploying the technology without federal requirements to reduce greenhouse gas emissions are already in place.*
- *Uncertainty also makes it difficult to attract partners to help fund the industry's share.*
- *Commercialization vital to comply with future CO2 regulations without prematurely retiring efficient cost-effective generating capacity.*
- *AEP will continue to be engaged in an advisory role in engineering CCS technology development and active in developing enabling public policies for development and commercial deployment.*

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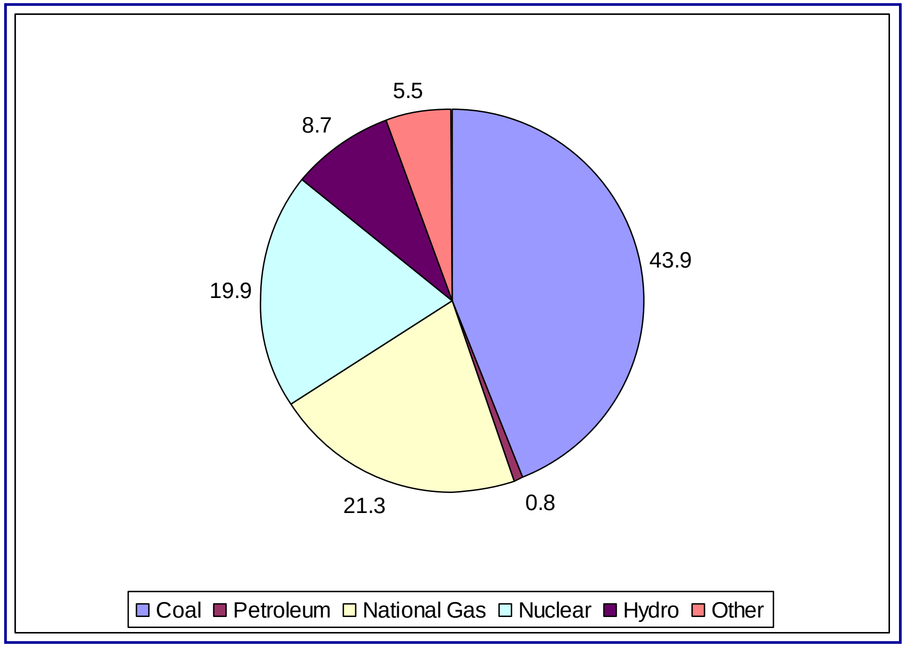
Appendix

Containing

Background and Detail Slides

(Not showing on screen)

The United States relies on Coal for almost 50% of the Electricity Generated in the Nation



Source: US Energy Information Administration Electric Power Monthly July 2011

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Transition Concerns

- *Implementation Schedule*
- *Electric System Reliability*
- *Costs and Job Losses*
- *Labor Availability*
- *Retirement Decisions*
- *Equipment Availability*
- *Natural Gas Infrastructure and Deliverability*

Mercury and HAPs MACT

- Proposed rule issued in March 2011, comment period extended to Aug. 4
- Final HAP regulations must be issued by November 2011
  - Maximum Achievable Control Technology (MACT) standards for Hg, other metals and acid gases, with combustion practices for organics
- Compliance Required 3 Yrs. After Final Rule, EPA could grant a 1 year extension
- Very little flexibility in the proposal; opportunity to average across a plant and limited sub-categorization
- MACT could require FGD or DSI for acid gases and/or baghouses with activated carbon injection for Hg and metals.

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Coal Ash (CCR) Rules

- *Proposed coal ash disposal rules issued in May 2010; final rule expected mid-2012*
- *EPA proposed two different regulatory designations:*
  - *"Non-hazardous", solid waste - action required by ~2017*
  - *"Special" hazardous waste - action required by ~2018-2020*
- *AEP supports Subtitle D Prime Option of RCRA (solid waste NOT hazardous)*
- *AEP capital cost of ~$4 billion for solid waste option*
- *"Hazardous" option could cost DOUBLE this amount*

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316(b) Proposal

- ***EPA issued proposal March 28, comment period extended to Aug 19; final rule expected mid-2012***
- ***Addresses impingement and entrainment of aquatic species***
- ***Proposes upgraded intake screens for impingement***
- ***Suggests cooling towers as an effective technology for entrainment, but defers the decision until a site-specific study is conducted***
- ***Cost impact very uncertain at this time***

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AEP Emissions/Retrofit Facts

- ***AEP built nine scrubbers between 2003 and 2010 retrofitting approx. 8,000 MWs of coal generating capacity.***

- ***In 2007, AEP had the 2nd largest construction effort in the US when labor peaked at 8,500 craft workers.***

- ***SO_2 and NOx emissions have been reduced by more than 80% since 1980.***

- ***AEP's mercury emissions were 36% lower in 2009 than in 2000, SO2 emissions were 63% lower than in 2000 and NOx emissions were 79% lower during this same timeframe.***

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Potential Impact of Proposed Rules

- *Nearly 60% of AEP's Coal Generating Capacity is expected to be impacted by the EPA's proposed Clean Air Transport Rule (CATR) and Hazardous Air Pollutants (HAPs) Rule.*
  - *> 14,000 MWs, either retire/replace or retrofit*
- *The proposed Coal Combustion Residuals Rule (CCR) will impact 20,000 MWs of AEP's Coal Generating Capacity.*
- *It is not possible to meet proposed deadlines for CATR and HAPs - estimated 25,000 peak craft workers (three times more than historical peak year) is needed for AEP construction requirements.*
- *The cost to meet the deadlines would more than double our costs-to-date for environmental retrofits.*
- *Safety, productivity, and quality of projects would suffer under such a tight schedule*

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Potential Impact of Proposed Rules

- *Unit Retirements would be significant due to inability to meet schedules for retrofit/replacement. As of Sept. 2011, 34GW announced to be retired, Fed. Energy Reg. Comm. states up to 81GW (8% installed capacity) likely retired. This produces Grid reliability and stranded cost issues. See ERCOT and Southwest Power Pool July 19, 2011 statement and letter respectively, NARUC Resolution July 20, 2011.*
- *Cost recovery and Regional Transmission Organization (RTO) approval process would be extremely challenging and lengthy.*
- *Craft labor demands would produce a huge "boom-bust" cycle.*
- *Local economies would be impacted significantly.*
  - *Customer rates would see very sharp increases in deadline years*
  - *Internal labor, service support labor, and industrial customer labor would all see net reductions.* (Charles River Associates estimates over 1,000,000 job reduction nationally)

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There is a Better Way…

- More flexibility in regulations (e.g., HAPs emissions averaging, low capacity factor allowed during retrofit construction)
- Phase-in requirements over 2015-2020
- Allow off-ramp for units that commit to retire or repower through 2020
- Continues emission reduction progress starting today, but reduces capital cost, rate shock and other economic impacts
- All coal units "well controlled" by 2020

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Legislation, not regulation, is a smarter approach

We need legislation from our elected representatives in Congress that balances economic growth, energy security, reliability and affordability and environmental protection by giving more time for pollution control retrofits and a fully integrated and coordinated emissions reduction program that efficiently uses the hard earned money of Americans.

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Benefits of a phased-in approach

- *Will provide the time utilities need to install environmental retrofits without idling or curtailing generating units.*
- *Will allow unit retirements to occur over a more reasonable timeframe needed to address grid reliability issues raised by ERCOT, Southwest Power Pool RTOs July 19, 2011 and NARUC July 20, 2011.*
- *Will support construction jobs over a longer period of time.*
- *Will provide long-term environmental benefits.*
- *Will give local communities time to plan for economic losses.*

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AEP Retrofits/New Generation

Announced Before July 7, 2011

Cross-State Air Pollution Rule

- The tables below represent our estimated $6 - $8 billion capital investment from 2012 to 2020 for environmental retrofits on 10,500 MW and new/refueled generation of 2,152 MW. The below costs include management estimates for compliance with CATR, HAPs MACT, CCR and 316(b) regulations as currently proposed.

Plant	MW	Type of retrofit	Low Cost Estimate 2012-2020 ($MM)	High Cost Estimate 2012-2020 ($MM)	
Conesville 5	400	SCR, DSI			
Conesville 6	400	SCR, DSI			
Muskingum River 5	510	Refuel with Natural Gas			
Gavin 1	1320	FGD upgrade			
Gavin 2	1320	FGD upgrade			
Zimmer 1	330	FGD upgrade			
Total Expected Cost			**2,100**	**2,800**	*
Clinch River 1	211	Refuel with Natural Gas			
Clinch River 2	211	Refuel with Natural Gas			
Dresden	580	New Natural Gas			
Total Expected Cost			**580**	**765**	**
Rockport 1	1320	FGD, SCR			
Rockport 2	1320	FGD, SCR			
Tanners Creek 4	500	DSI, ACI			
Total Expected Cost			**1,240**	**1,670**	***
Big Sandy 1	640	New Natural Gas			
Total Expected Cost			**400**	**525**	

*Assumes regulatory cost recovery for environmental investments including refuel are non-bypassable surcharges as proposed in the 2012 - 2014 ESP

** Total capital invested is expected to be $366 million for the Dresden plant once completed; $343 million of which is forecasted to be spent prior to 2012.

*** Includes AEG portion of costs related to Rockport upgrade

Operating Company	Plant	MW	Type of retrofit	Low Cost Estimate 2012-2020 ($MM)	High Cost Estimate 2012-2020 ($MM)
PSO	Northeastern 1	470	FGD, ACI, Baghouse		
	Northeastern 2	465	FGD, ACI, Baghouse		
	Oklaunion	101	FGD upgrade, ACI		
	Total Expected Cost			**700**	**940**
SWEPCO	Flint Creek	264	FGD, ACI, Baghouse		
	Welsh 1	528	ACI, DSI, Baghouse		
	Welsh 3	528	ACI, DSI, Baghouse		
	Pirkey	580	ACI, Baghouse		
	Dolet Hills	270	ACI, Baghouse		
	Total Expected Cost			**900**	**1,200**
TNC	Oklaunion	377	FGD upgrade, ACI		
	Total Expected Cost			**80**	**100**

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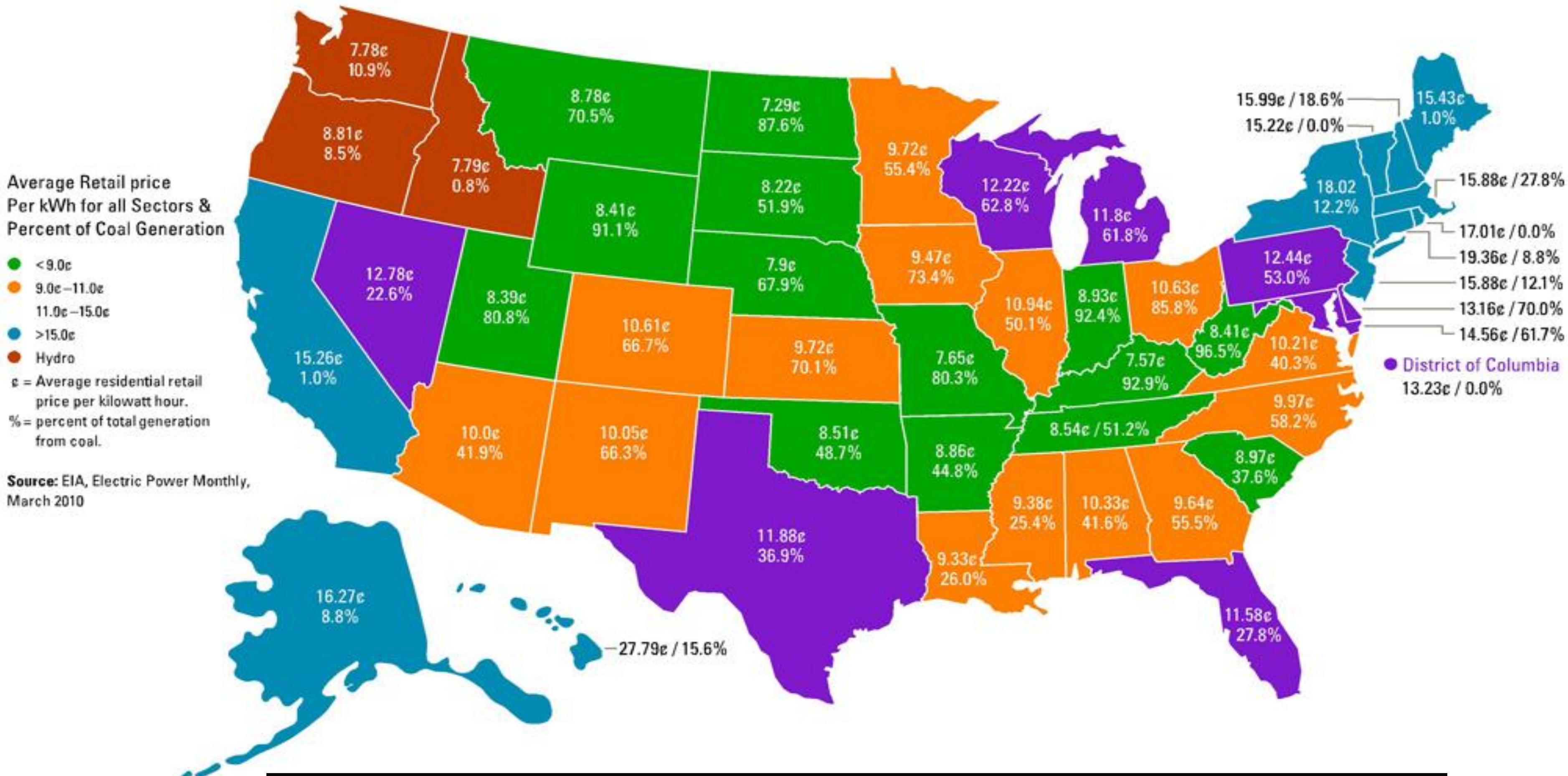
Average KW Price for Coal Generation



The more coal used, the lower the consumers electric costs

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Principal factors driving energy costs

- *Household expenditures for gasoline have more than doubled since 2001.*

- *Increased gasoline costs account for nearly three-fourths of average household energy cost increases since 2001.*

- *The average household electric bill has increased from $938 in 2001 to an estimated $1,369 in 2011 (46%).*

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Impacts on senior citizens

- *Senior citizens also are vulnerable to energy price increases due to their relatively low incomes.*
- *In 2009, the median gross income of 25 million senior households over 65 years was $31,354, some $19,000 below the national median income of $50,200.*
- *Seniors have the highest per capita residential energy consumption among all age categories.*

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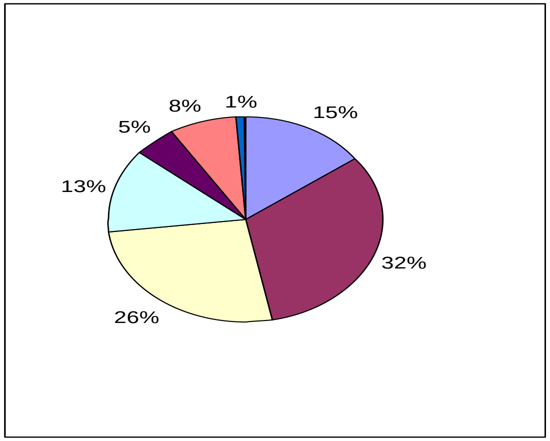
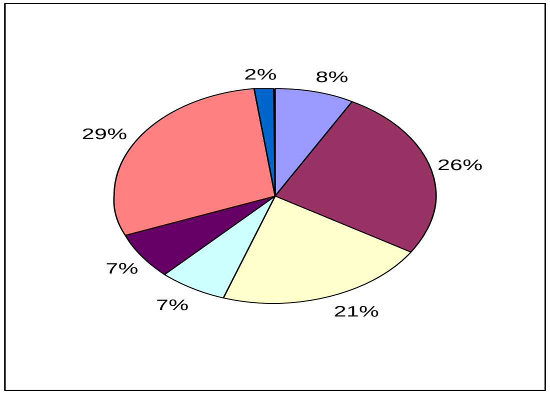
In 2009, Electric Generating Units (EGUs) Contributed Just 8% of Total Ozone Precursor Emissions in the Eastern U.S.



PERCENTAGE SHARE OF NOX EMISSIONS
Eastern United States, 2009

15%	Electric generating units
32%	Onroad vehicles
26%	Offroad vehicles
13%	Industrial fuel
5%	Other fuel
8%	Industrial processes
1%	Miscellaneous



PERCENTAGE SHARE OF TOTAL NOX PLUS VOC EMISSIONS
Easter United States, 2009

8%	Electric generating units
26%	Onroad vehicles
21%	Offroad vehicles
7%	Industrial fuel
7%	Other fuel
29%	Industrial processes
2%	Miscellaneous

Source: ftp://ftp.alpinegeophysics.com/pub/Trends/

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"The Nightmare on Utility Street?"

- <u>Transport Rule</u>
  - SO_2 and NOx caps in 2012, tighter SO_2 caps in 2014
  - FGD effectively "required" for most all AEP East units in 2014
- <u>Mercury and Other HAPs MACT Rules</u>
  - Compliance in 3 years = 1/2015 (or 1/2016 "case by case")
  - FGD for acid gases likely required on most AEP-East units
  - Baghouses (BH) w/ activated carbon injection (ACI) COULD ALSO be required to meet Hg and heavy metal limits
  - Some AEP-West coal units may be able to comply with only BH and ACI; however other EPA requirements (CAVR) likely to force scrubbers at most units
- <u>CCR Rule (e.g. ash disposal)</u>
  - Compliance estimated by 2017
  - AEP capital + pond closure cost: $1.4-2.4 billion if "non-hazardous"
  - Costs DOUBLE with "hazardous" designation by EPA

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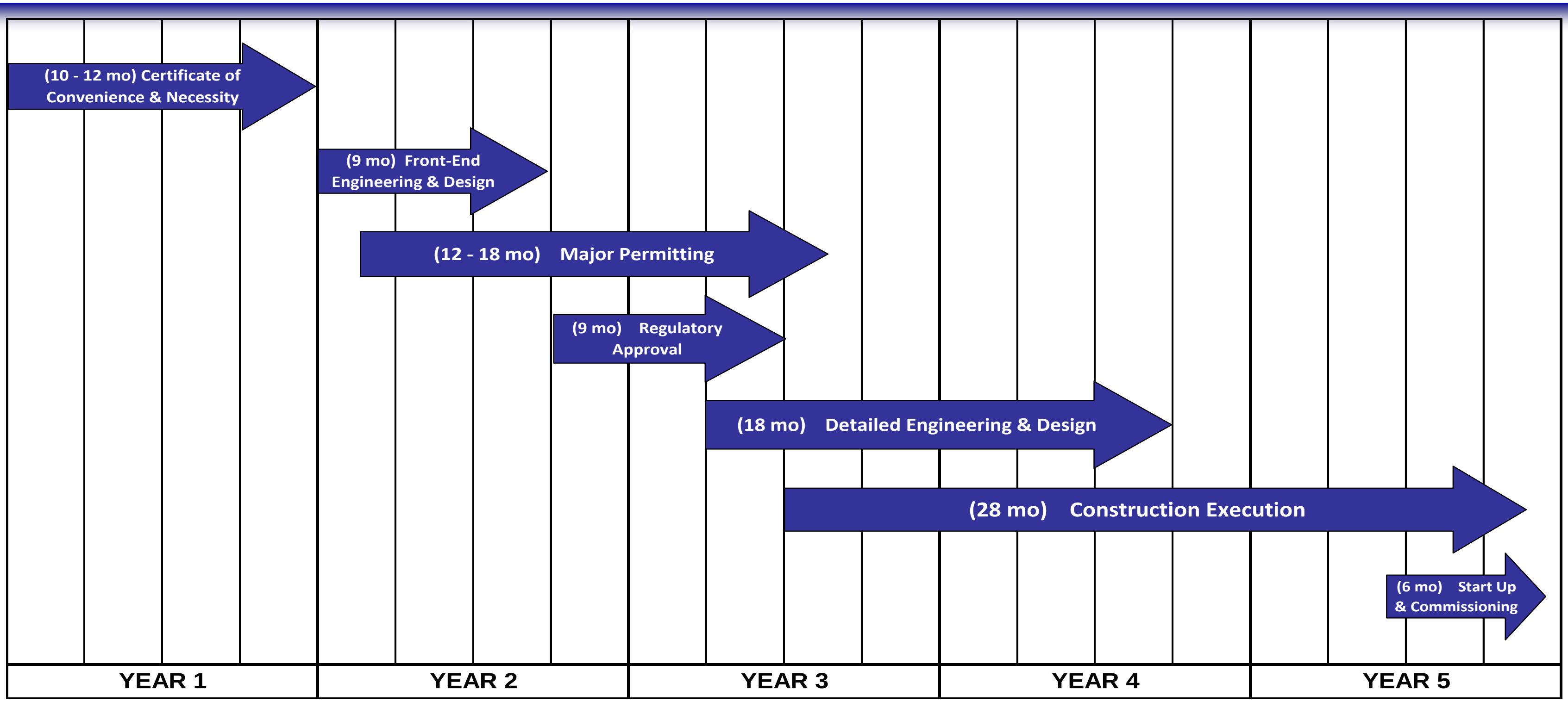
Typical AEP FGD Retrofit Timeline



- *Timeline milestone lengths based on actual AEP construction experience*
- *Phases could be longer if the support system becomes strained from multiple companies facing similar compliance deadlines*
- *From 2003-10 AEP retrofitted 7,800 MWs (9 units), using over 35 million work hours at a cost of over $3.6 billion*

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Energy price impacts in brief

- One-half of U.S. households have average pre-tax annual incomes less than $50,000.

- In 2001, these families spent an average of 12% of their after-tax income ($21,834) on residential and transportation energy.

- In 2011, these households will spend an estimated 20% of their after-tax income of $22,727 on energy.

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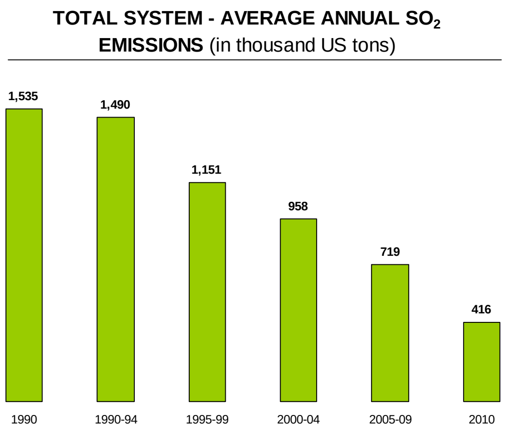
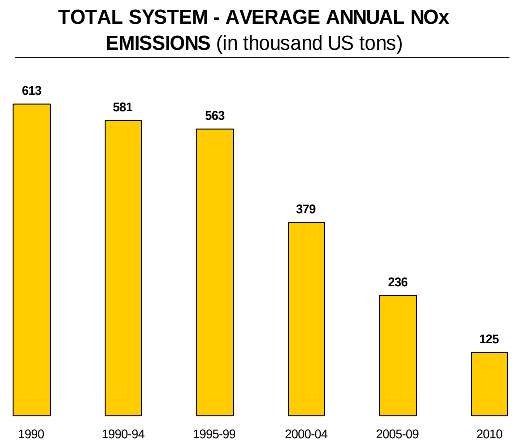
Ongoing air quality improvements

- *AEP has improved its environmental performance.*
  - *Since 1990, AEP has reduced its NOx emissions by 80% and its SO_2 emissions by 73%.*
  - *AEP has invested more than $7 billion since 1990 to reduce emissions from its coal-fueled generation fleet .*
- *AEP will continue to improve the environmental performance of its power plants.*





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In 2009, Electric Generating Units (EGUs) Contributed Just 8% of Total Ozone Precursor Emissions in the Eastern U.S.

REGIONAL NOX AND VOC EMISSIONS, 1999 AND 2009
(thousand tons/year)

	Total EGU NOX		Coal EGU NOX		Onroad vehicle NOX		All other NOX		Total NOX		Total VOCS	
Region	1999	2009	1999	2009	1999	2009	1999	2009	1999	2009	1999	2009
Northeast	527	220	400	161	1,478	681	1,034	903	3,038	1,803	3,059	2,645
Midwest	1,369	441	1,334	414	1,392	798	1,281	1,140	4,042	2,379	3,073	2,361
Southeast	1,964	516	1,719	436	2,092	1,226	1,878	1,529	5,934	3,271	4,848	3,989
Central	1,185	606	841	470	1,671	927	2,549	2,595	5,405	4,127	3,793	3,109
Total	5,044	1,782	4,294	1,480	6,633	3,631	6,742	6,167	18,419	11,581	14,773	12,105

Source: Alpine Geophysics/ENVIRON
ftp://ftp.alpinegeophysics.com/pub/Trends/

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Cross-State Air Pollution Rule (SO_2 and NOx) Final July 7, 2011

- *Further limits power sector SO_2 and NOx emissions*
- *SO_2 and NOx subject to caps in 2012, with further SO_2 reductions required in most Eastern states by 2014*
- *Major concerns with the rule:*
  - *Not enough time is provided for environmental control installations (i.e. FGD/SCR)*
  - *Rule does not account for recent improvements in air quality from retrofits made after 2005*
  - *Inability to trade and bank allowances effectively*

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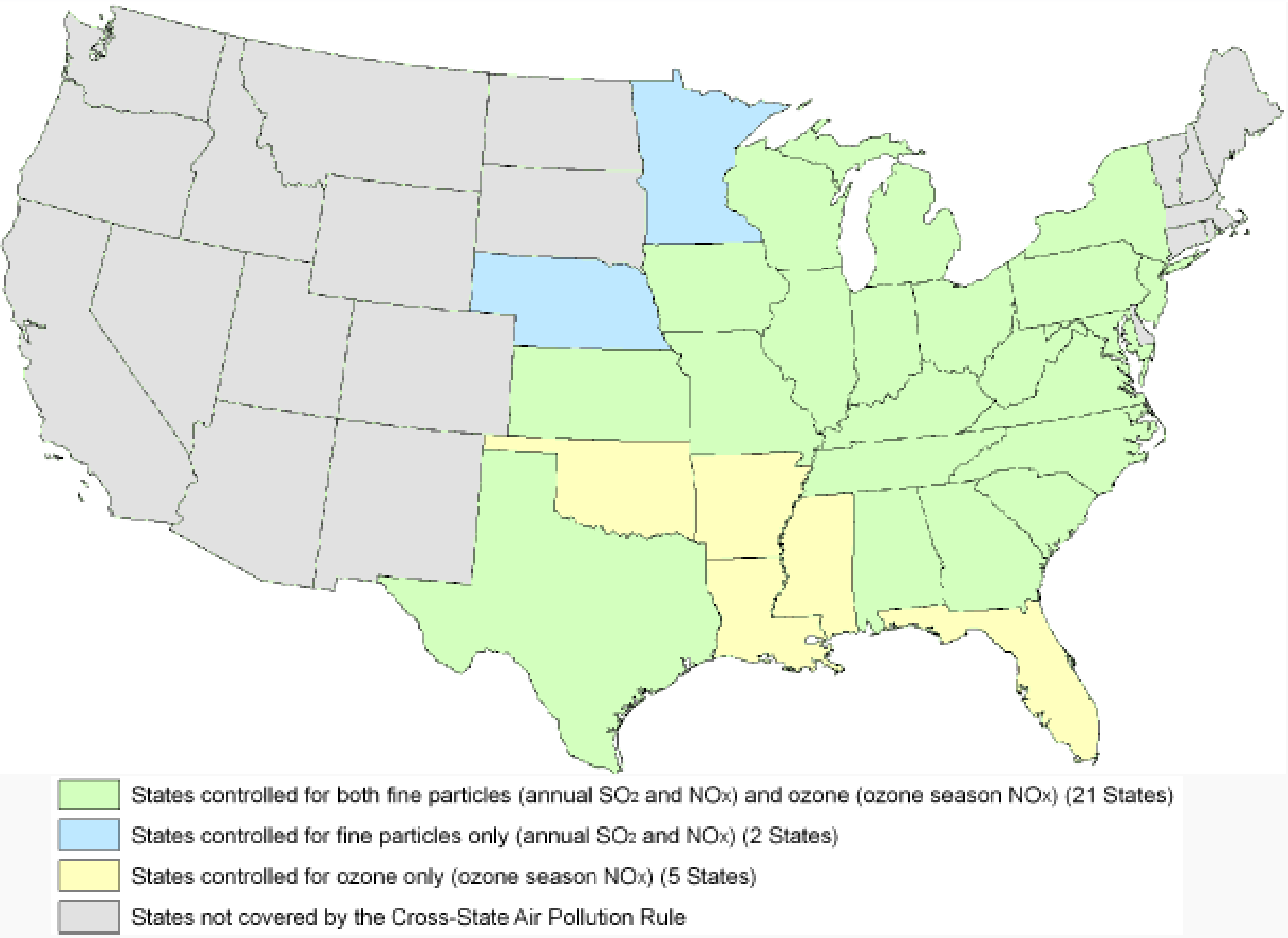
Cross States Air Pollution Rule July 7, 2011



- ***Coverage of states changed slightly from proposed rule.***
- ***Most notably for AEP, Texas is now in the SO2 program while Louisiana is not.***

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Curtail or Retire to Comply with the Air Rule in 2012

Percentage Reduction Required from 2010 Levels				
State	**2012 SO2**	**2014 SO2**	**2012 NOx**	**2012 S NOx**
Alabama	6%	4%	15%	15%
Arkansas	N/A	N/A	N/A	-16%
Florida	N/A	N/A	N/A	-25%
Georgia	-28%	-56%	2%	4%
Illinois	7%	-44%	-37%	-24%
Indiana	-31%	-61%	-3%	-5%
Iowa	2%	-28%	-15%	-13%
Kansas	-8%	-8%	-37%	-39%
Kentucky	-14%	-61%	-7%	-7%
Louisiana	N/A	N/A	N/A	-42%
Maryland	1%	-6%	-14%	-24%
Michigan	-6%	-41%	-25%	-26%
Minnesota	1%	1%	-5%	N/A
Mississippi	N/A	N/A	N/A	-37%
Missouri	-12%	-30%	-10%	-11%
Nebraska	1%	1%	-29%	N/A
New Jersey	-63%	-63%	-24%	-35%
New York	-45%	-63%	-33%	-35%
North Carolina	14%	-52%	-7%	-10%
Ohio	-46%	-76%	-12%	-16%
Oklahoma	N/A	N/A	N/A	-37%
Pennsylvania	-33%	-73%	-10%	-10%
South Carolina	-6%	-6%	18%	1%
Tennessee	25%	-50%	14%	2%
Texas	-47%	-47%	-8%	-8%
Virginia	-24%	-62%	-13%	-21%
West Virginia	34%	-31%	12%	4%
Wisconsin	-27%	-63%	-5%	-6%

AEP Generating States

- ***Significant reductions are required in as soon as 6 months in many states. Most notably, 47% and 46% reductions in SO2 in TX and OH respectively.***
- ***Additionally, major seasonal NOx reductions are required in LA and proposed for OK.***

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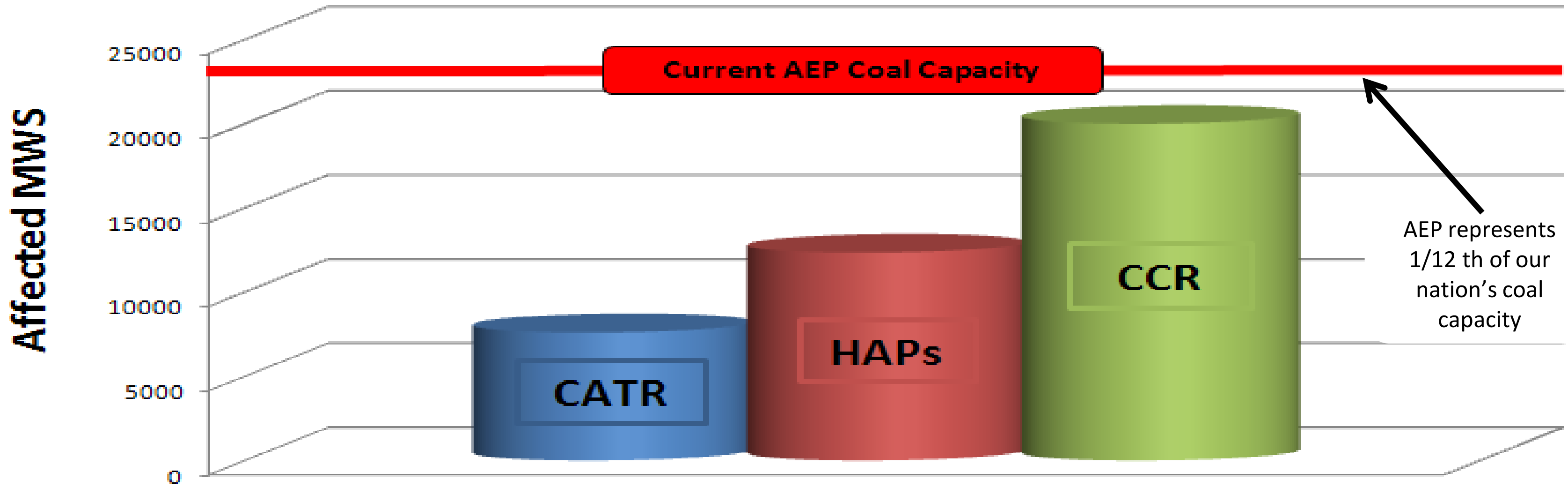
AEP Affected Coal Generation



- *The Final Air Rule affects at least 7600 MWs, requiring perhaps more than 2100 MWs of FGD retrofits. Units that show no economic value to retrofit with emission controls or fuel switching options could be forced to prematurely retire by 2012*
- *The HAPs ruling affects total of 12,340 MWs, requiring an additional 6000 MW of retrofits beyond what would be required under the Transport Rule*
- *CCR affects over 20,000 MWs, requiring 18,000 MWs of coal-fired generation to have lined wet ash ponds and/or conversion to dry ash handling systems*
- *All retrofits will require regulatory approval for financing. Also, units prematurely retired in response to these EPA rules will have remaining book value issues to address*

**Affected MWs do not reflect the possibility of fabric filters being required under HAPs*

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Updated data and models show more air quality improvement than EPA recognizes

- EPA did not include SO2 and NOx retrofits after 2005 in the proposed and final regulations

- When all retrofits are included, most locations are in compliance

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Announced Retirements Before Cross-State Air Pollution Rule Finalized July 7, 2011

Operating Company	Plant	MW	Expected Retirement
AEP Ohio	Sporn 5	450	2011
	Conesville 3	165	2012
	Muskingum River 1-4	840	2014
	Picway 5	100	2014
	Sporn 2-4	300	2014
	Kammer 1-3	630	2014
	Total MW	**2,485**	
APCO	Glen Lyn 5	95	2014
	Glen Lyn 6	240	2014
	Clinch River 3	235	2014
	Sporn 1	150	2014
	Sporn 3	150	2014
	Kanawha River 1	200	2014
	Kanawha River 2	200	2014
	Total MW	**1,270**	
I&M	Tanners Creek 1	145	2014
	Tanners Creek 2	145	2014
	Tanners Creek 3	205	2014
	Total MW	**495**	
KPCo	Big Sandy 1	278	2014
	Big Sandy 2	800	2014
	Total MW	**1,078**	
SWEPCO	Welsh 2	**528**	2014
	Total MW	**528**	
	Grand Total	**5,856**	

- AEP plant units are located in Ohio, West Virginia, Virginia, Indiana, Kentucky and Texas
- AEP units to be retrofitted and new generation (mostly natural gas) are listed in the appendix
- Approximately 28,000MW of retirements has been announced by US plant owners as of July 1, 2011
- Industry estimates were 50,000-60,000 MW by 2015 for US before the rule.
- EPA estimate was 10,000 MW for US

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Other Economic Impacts of EPA Regulations

- ***Higher natural gas use and related price increases affects ALL consumers***
- ***<u>$0.50/MMBtu gas price change increases other consumer costs about $8-9 billion/year</u>***
- ***Net Job Impacts are Negative:***
  - ***Near term increases in temporary (2-5 years) construction jobs***
  - ***BUT, "NET" NEGATIVE for Total Jobs mostly due to large electricity price increases***
    - ***NET LOSS of 1.4MM Jobs (2013-2020) **According to National Economic Research Associates (June 2011)***
  - ***'Green jobs' studies such as PERI study don't consider big negatives of higher electricity & energy prices***

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No New Coal-Fired Plants under EPA's Proposed Maximum Achievable Control Technology Standards

- John W. Turk Jr. Ultra-Supercritical Coal Plant is a base load 600-MW advanced coal combustion plant. Located in Arkansas. SWEPCo owns 73 percent or roughly 440 megawatts of the total unit.

- Will begin commercial operation in 2012.

- The Turk Plant will use low-sulfur coal and state-of-the art emission control technologies, including a design that allows for the retrofit of carbon dioxide controls

- EPA's MACT standards are technology, not health based, requirements that are supposed to reflect the capabilities of emission control technologies in use now by the best performing units
- EPA overstates these capabilities with proposed standards that cannot all be met by any state- of- the -art plants now being built.
- EPA data show that no coal plant in operation could meet all of the standards.
- Air permits issued by states for new units reflect vendor guarantees, fuel data, variable operating condition that are practical and achievable and will protect public health.

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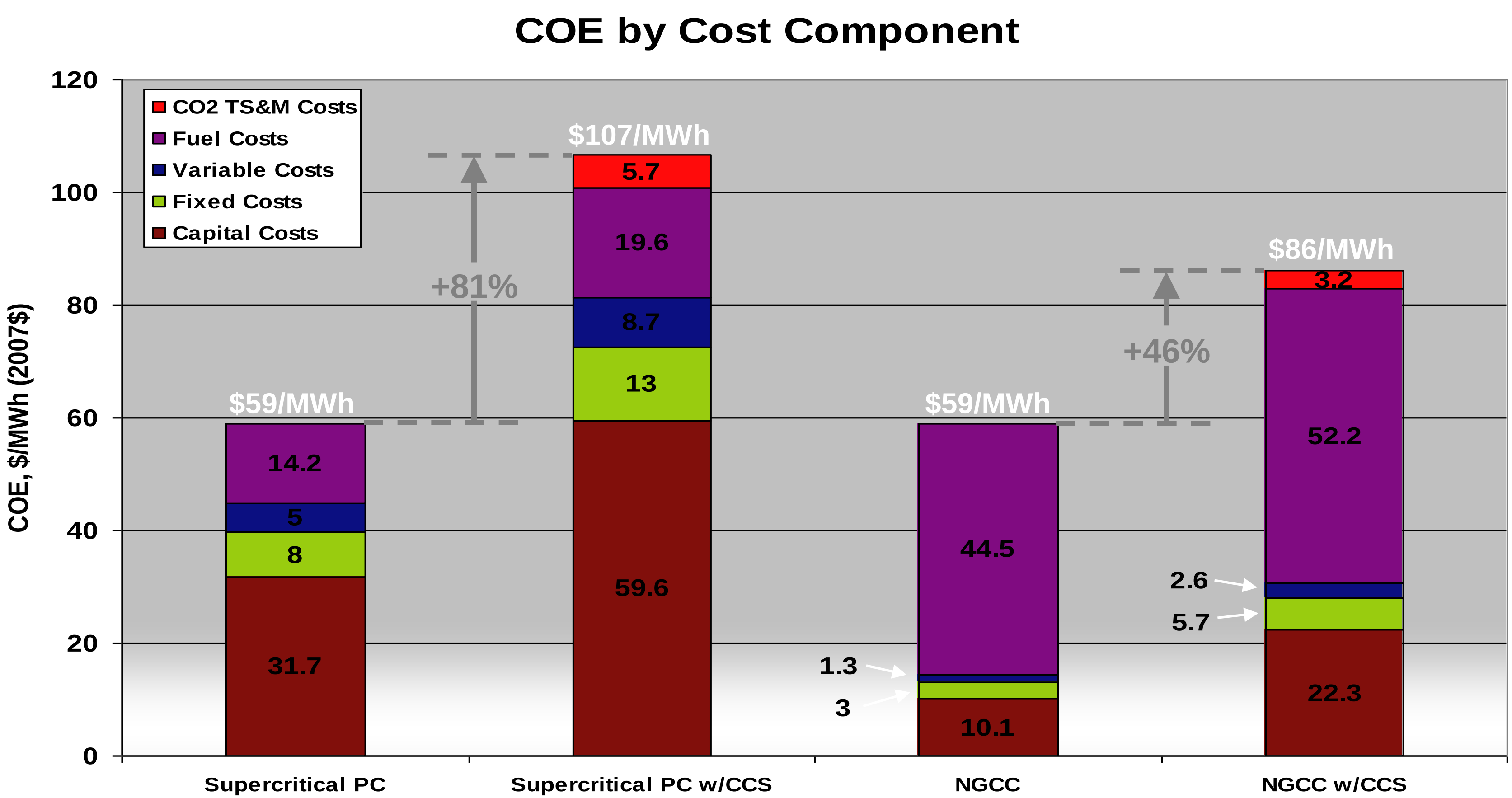
Today's CCS Technology is Expensive
New Plant Basis



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