

## ABOUT ENERGY VENTURES ANALYSIS

EVA, Inc. is an energy consulting firm located in Arlington, VA. EVA is focused on economic, financial and risk analysis for the electric power, coal, natural gas, petroleum, and renewable, and emissions sectors.

Since 1981, EVA has been publishing supply, demand and price forecasts as part of its FUELCAST subscription service for these energy sectors.

EVA performs various analyses for an array of clients that include:

- electric utilities,
- fuel producers,
- fuel transporters,
- commodity traders,
- regulators, and
- financial institutions.



## EVA'S EXPERIENCE ANALYZING THE CLEAN POWER PLAN

- EVA has a long history of assessing the impacts of various regulations on the energy sector including:
  - Mercury & Air Toxic Standard (MATS)
  - 316 B Cooling Tower Intake Structures
  - Coal Combustion Residual Rule
  - Cross State Air Pollution Rule/Clean Air Interstate Rule
  - Regional Programs (RGGI, California AB32)
  - Regional Haze
  - State legislation (e.g. Colorado Clean Air-Clean Jobs , Illinois Multi-Pollutant Standard)
  - State Renewable Portfolio Standards
  
- Since the EPA first announced the Clean Power Plan in June 2014, EVA has provided comprehensive analyses to various energy market participants including:
  - Duke Energy
  - Peabody Energy
  - National Mining Association
  - Southern Power
  - North American Electric Reliability Corporation (NERC)
  - American Coalition for Clean Coal Electricity



## STATE OF THE COAL MARKET

- U.S. coal production is expected to decline about 10% in 2015. Every supply region is affected. Additional declines are expected in 2016 and 2017.

<b>U.S. COAL SUPPLY (MILLION TONS)</b>					
	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
<b>Total Supply</b>					
Northern Appalachia	132.0	118.2	115.1	114.2	120.5
Central Appalachia	116.3	96.9	88.4	86.9	89.6
Southern Appalachia	16.6	14.8	14.4	14.1	14.2
Illinois Basin	136.8	131.2	123.9	123.7	133.5
Powder River Basin	418.2	392.1	364.6	360.2	377.8
Rockies	70.9	59.3	59.1	58.5	57.8
Lignite and Other	103.2	89.5	97.4	99.0	99.0
<b>U.S. Production</b>	<b>993.9</b>	<b>902.1</b>	<b>862.9</b>	<b>856.5</b>	<b>892.4</b>
Import, PC, Waste	25.3	23.0	24.3	22.7	24.7
<b>Total Supply</b>	<b>1,019.2</b>	<b>925.1</b>	<b>887.2</b>	<b>879.2</b>	<b>917.1</b>

The current market is the perfect nightmare for coal producers

- Low natural gas prices are causing natural gas-fired generation to displace coal fired generation in the power sector
- Compliance with the Mercury and Air Toxics Standard (MATS) is causing significant retirements of coal-fired plants
- The strong U.S. dollar has caused U.S. dollar-denominated global coal prices to fall which has largely made U.S. coals uneconomic in the global market.
- China's economic woes combined with the devaluation of the Renminbi has caused reduced imports by China as the devaluation has made imports relatively more expensive than domestic Chinese production.



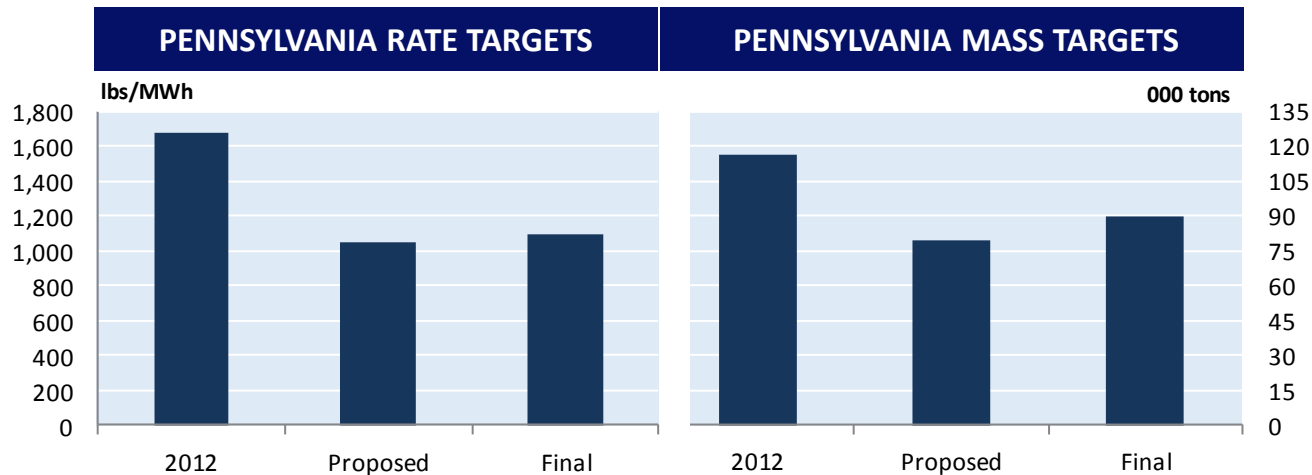
## EPA CLEAN POWER PLAN

- Final Rule issued on August 3, 2015 and published in Federal Register on October 23, 2015
  - Uses EPA's authority under Section 111(d) of the Clean Air Act to regulate emissions from existing power plants
  - Set state-specific CO<sub>2</sub> mass- and rate-based emission limitations that states must achieve beginning in 2022.
  
- The rule applies to 3,056 qualifying fossil-fired generating units based on the following criteria:
  - Commenced construction prior to January 8, 2014
  - Design power boiler heat input >250 MMBtu/hour
  - Delivers >1/3 of potential power output to grid
  - These qualification criteria exempt over 17,400 other existing generating units from the EPA Clean Power Plan



## EPA CLEAN POWER PLAN

- States must develop State Implementation Plans (SIPs) that meet CO<sub>2</sub> emission limitations and are enforceable
  - Initial state plans due by September 2016 unless extension granted
  - Final state plans due by September 2018
  - If states fail to submit a plan, they will be subjected to already-created Federal Implementation Plan (FIP)
- States are given the option to develop either a rate-based or mass-based approach
  - EVA believes most states are likely to adopt a mass-based compliance strategy because it is easier and less resource-intensive to implement and enforce



## EPA CLEAN POWER PLAN

- EPA developed final state emission rate and mass limitations applying 3 “Building Blocks” considered by EPA to be the “Best System of Emission Reduction” (BSER) under section 111(d)
  - Building Block 1: Coal unit process efficiency improvements reduced from 6% to 4.3%, 2.1%, and 2.3% for the East, the West, and TX, respectively. The change reflects the lack of rigor in developing the 6%. The lower numbers are not supportable either.
  - Building Block 2: Regional interconnect gas re-dispatching based upon 75% capacity of summer capacity
  - Building Block 3: Additional clean energy production (Renewables) allowed from new nuclear
- Other changes include
  - Elimination of Building Block 4 (energy efficiency) but energy efficiency is a compliance strategy
  - Delay of initial compliance to 2022 from 2020
  - Updated method to calculate source-specific emission performance rates which caused CO2 targets to be redistributed among states. Some states affected more than others by this change.
  - Ability to comply through interstate trading of allowances without formal regional alliances
  - Inclusion of specific provisions to prevent leakage, i.e., compliance through new plant additions. States have the option to include new plants in their SIPs.

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## EPA CLEAN POWER PLAN

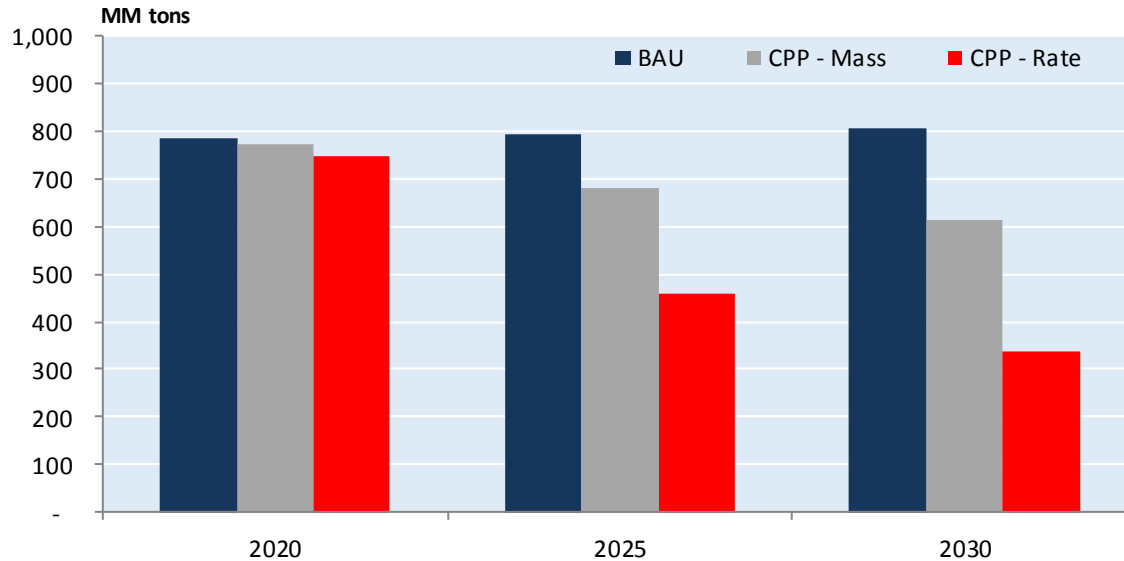
- The resulting emission standards are not based upon the ability of each category to actually achieve these rates using emission control technology or operational practices that power plants can implement at the facility. Rather, compliance with the standards requires states to develop individual plans for achieving the emission standards, all of which require significant reductions in coal-fired generation.
- EPA’s impact analysis also changed
  - Lower electricity demand growth which effectively incorporates Building Block #4 into the baseline
  - Revised baseline showing significantly less coal generation, significantly more renewable
  - The revised baseline results in lower impacts
  - The revised baseline also means if the baseline generation is higher, the emission reduction requirements will be greater

Generation (Billion KWH)	Base Case - EPA Proposed CPP					Base Case - EPA Final CPP					Revised Base Case vs Original Base				
	2016	2018	2020	2025	2030	2016	2018	2020	2025	2030	2016	2018	2020	2025	2030
Coal	1,577	1,654	1,648	1,683	1,648	1,335	1,389	1,448	1,410	1,443	-15.3%	-16.0%	-12.1%	-16.2%	-12.4%
Gas/Oil	1,139	1,082	1,158	1,263	1,454	1,339	1,293	1,209	1,327	1,411	17.6%	19.5%	4.4%	5.1%	-3.0%
Nuclear	784	820	817	817	797	767	764	798	799	783	-2.2%	-6.8%	-2.3%	-2.2%	-1.8%
Hydro	278	279	280	280	280	283	284	310	340	340	1.8%	1.8%	10.7%	21.4%	21.4%
Other Renewables	256	282	299	335	350	316	388	406	436	473	23.4%	37.6%	35.8%	30.1%	35.1%
Other	26	26	25	26	28	17	18	19	16	17	-34.6%	-30.8%	-24.0%	-38.5%	-39.3%
TOTAL	4,060	4,143	4,227	4,404	4,557	4,057	4,136	4,190	4,328	4,467	-0.1%	-0.2%	-0.9%	-1.7%	-2.0%



## SUMMARY OF FINDINGS – U.S.

### Power Sector Coal Demand

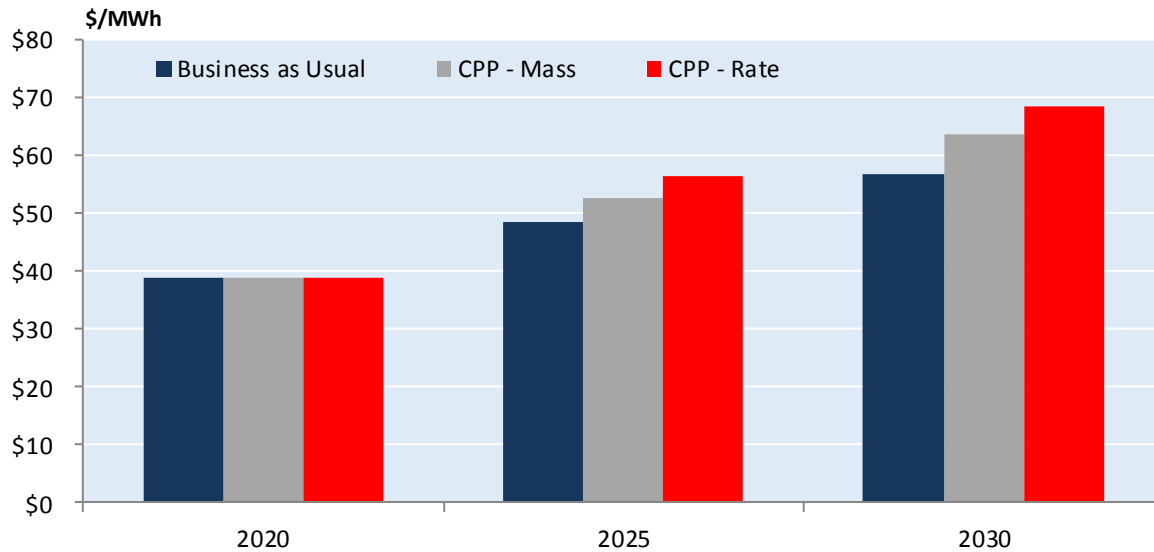


- Implementation of the Clean Power Plan will result in declining demand for coal in the power sector due to its emission intensity relative to competing fuels
- Long-term coal demand trends will be heavily dependent on whether states opt for mass- vs. rate-based compliance strategies, as shown in the chart
- Compared to a Business as Usual (BAU) baseline, total coal demand is expected to decline by 24% and 58% under a mass- and rate-based regimes, respectively.
- EVA's analysis suggests that between 2022 and 2030, the mass- and rate-based regimes will respectively result in nearly a cumulative loss in coal demand of 1.2 billion and 3.2 billion tons.



## SUMMARY OF FINDINGS – WHOLESALE ENERGY PRICE IMPACTS

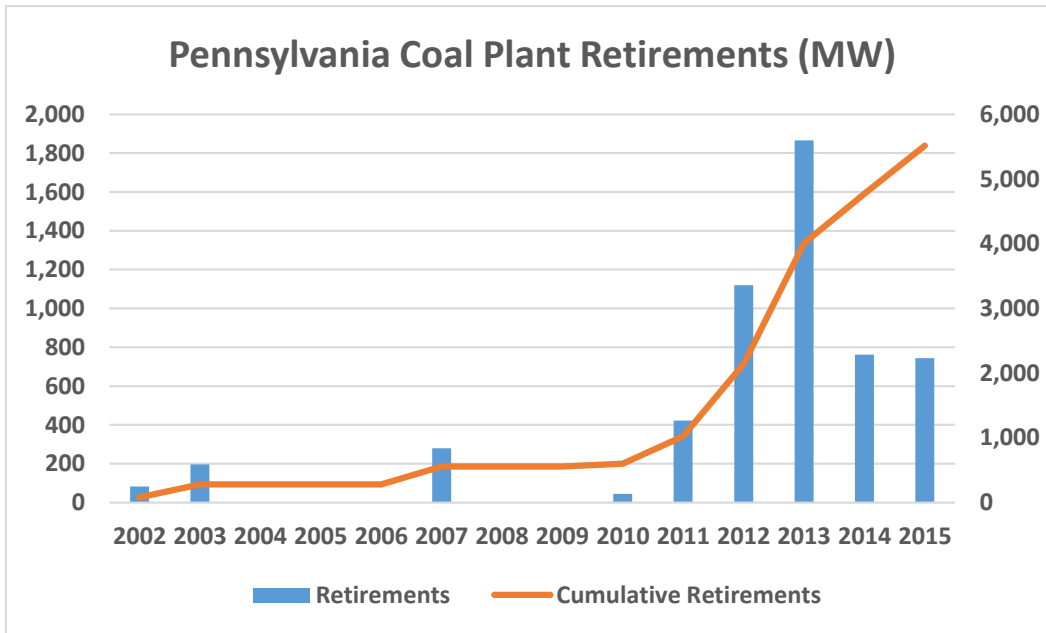
### PJM West Wholesale Energy Prices



- Wholesale energy prices represent marginal fuel plus variable operating and maintenance costs including allowances.
- Wholesale energy prices are expected to be higher under both CPP scenarios compared to a Business as Usual case
- The major drivers of higher energy prices are elevated natural gas prices and environmental compliance costs.
- Average wholesale energy prices by 2030 are expected to be 12% and 20% higher in the mass- and rate-based scenarios, respectively, compared to the Business as Usual scenario
- Consumer cost impacts would likely be greater because of additional capital requirements under CPP.



## DEMAND – SIGNIFICANT PLANT RETIREMENTS HAVE ALREADY OCCURRED



- Since 2010, there have been significant retirements of coal capacity in Pennsylvania.
- Retirements include:
  - Martins Creek
  - Cromby and Eddystone
  - Elrama
  - Hatfields Ferry
  - Mitchell
  - Portland
- Primary reasons for closure in last five years were MATS compliance costs and PJM capacity payments
- This capacity represents 10 to 15 million tons per year of lost Pennsylvania coal demand potential.

## DEMAND – TOP 20 CONSUMERS OF PENNSYLVANIA COAL IN 2014

Plant	State	PA Tons	Total Tons	PA Share
Homer City Generating Station	PA	5,460,731	5,700,867	95.8%
Seward Waste Coal (PA)	PA	2,693,110	2,693,110	100.0%
Belews Creek	NC	2,620,017	5,351,619	49.0%
Conemaugh Fuels LLC	PA	2,602,873	4,559,176	57.1%
Cross	SC	2,594,951	4,315,055	60.1%
Keystone Fuels LLC	PA	2,404,530	4,467,893	53.8%
Morgantown Generating Station	MD	2,210,011	2,489,737	88.8%
Brandon Shores	MD	2,054,759	2,298,943	89.4%
Longview Power LLC	WV	1,527,336	1,738,749	87.8%
FirstEnergy Bruce Mansfield	PA	1,480,528	7,325,724	20.2%
Elm Road Generating Station	WI	1,324,518	3,049,449	43.4%
Roxboro	NC	1,301,758	3,622,222	35.9%
FirstEnergy W H Sammis	OH	1,226,938	2,766,057	44.4%
Mt Storm	WV	1,139,354	3,802,865	30.0%
PPL Montour	PA	1,069,936	2,827,402	37.8%
Shawville	PA	1,015,715	1,021,870	99.4%
Chalk Point LLC	MD	969,728	1,096,865	88.4%
PPL Brunner Island	PA	751,010	2,731,652	27.5%
Cardinal	OH	732,325	4,344,329	16.9%
Avon Lake	OH	727,468	934,959	77.8%

- 20 plants accounted for about 75% of utility purchases of Pennsylvania coal in 2014.
- Only two of the plants (Shawville and Chalk Point) have announced retirement dates.
- In-state plants account for just over 50% of the top 20
- Compliance strategies in other states also impact demand for Pennsylvania coal.