SECURITIZATION AND ITS POTENTIAL IMPACT ON COAL GENERATION

2021 Coal Market Strategies

American Coal Council Conference

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ENERGY VENTURES ANALYSIS

1901 N. Moore St., Suite 1200
Arlington, VA 22209

(703) 276 8900
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WHAT IS SECURITIZATION?

Background and Introduction

- The need for sustainable earnings growth can motivate utilities to agree to early retirement of generating assets
  - Regulatory cost recovery is front-end loaded and so legacy assets make lower earnings contribution than new rate base investments
  - Coal capacity has had a hard time competing in a low gas price environment with limited capacity credits and no credits for reliability and resilience, undermining the economics of on-going operation
  - There has been enormous state public policy pressure to reduce carbon emissions quickly which has made early retirement of coal capacity attractive despite the fact that a quick transition is likely to be higher cost.
- In regulated jurisdictions when existing coal capacity is prematurely retired, utilities expect to fully recover both return of and on undepreciated capital assuming demonstration that such retirements are prudent.
- Cost recovery can be done through continued recovery of those costs through the expected depreciation period or through accelerated depreciation. Both approaches impose significant costs on customers that are also being asked to pay for the replacement resources.
- Given this cost sensitivity, regulators are becoming increasingly supportive of alternative financing structures such as Securitization
  - Securitization permits the take-out of utility equity from the asset capital stack and replacing it with low-cost, long-term debt

What is Securitization?

- Securitization is a financing tool that restructures the residual, undepreciated jurisdictional book value of retired asset(s) and converts it to 100% debt.
    - Ratepayer-backed bond securitization is the securitization of a stream of future ratepayer guaranteed payments.
    - The pandemic driven low interest market environment and strong market demand for strong investment grade paper, permits securitized debt obligations, supported by guaranteed repayment, to be sold at low coupon rates and extended amortization.
- Assuming a nominal 50/50 equity to debt ratio for utility assets, securitization allows low-cost debt to replace the utility equity component, which carries an ROE of 8-10% and also replaces the higher cost debt that may have been issued years ago when the plants were constructed.
- As an alternative to selling equity and diluting existing shareholders, securitization provides the utility with a source of equity for new investments and also takes-out a tranche of legacy debt.
- In order to realize the full benefits of securitization, states must pass legislation to ensure that the bonds receive the highest credit ratings thereby having the lowest rates. The legislation should ensure revenue related to the securitization is not by-passable. The investors in the ratepayer-backed security are purchasing a claim on future ratepayer charges, not on physical assets.

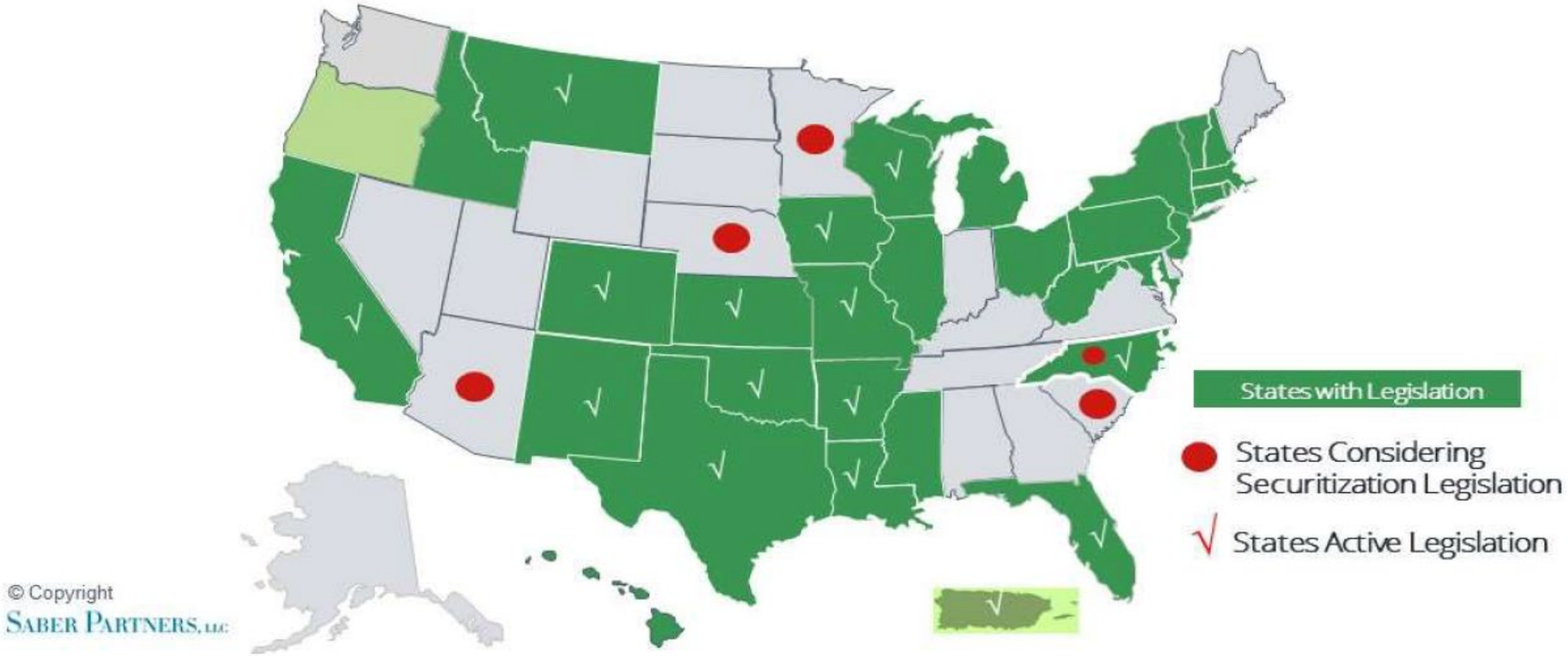
Securitization is Not New in the Utility Sector

- In the 1990s, utility securitizations were used extensively to reimburse power companies for assets that became stranded as a result of market deregulation.
- They subsequently gained favor for use as a means to recover storm costs, nuclear plant retirements, finance pollution control upgrades, and deferral of utility debt.
- Examples include:
  - Entergy New Orleans - $99 million bond issuance to recover Hurricane Isaac Costs and prefund a storm reserve
  - Duke Energy - $1.3 billion bond issuance to finance the closure of the Crystal River nuclear plant in Florida, with a 2.72% bond interest rate
  - Southern California Edison - $338 million to mitigate damages from wildfires
  - Pacific Gas & Electric - $3.2 billion for wildfire mitigation cost
  - Allegheny Energy - $459 million ratepayer-backed bond to pay for the installation of pollution controls at the Fort Martin coal plant in West Virginia

Many States Have Approved Securitization

Utility Securitization as of June 2021

Since 1997 Ratepayer-Backed Bond Laws: 27 States + DC + Puerto Rico
15 Active and Can Issue Now, 5 Considering Legislation



HOW DOES SECURITIZATION AFFECT COAL POWER PLANTS?

Sierra Club and Other Environmental Advocacy Groups Have Supported Utility Securitizations

"Securitization is a key financing tool that can help electric utilities accelerate the retirement of uneconomic polluting coal plants and move more quickly toward a grid power by clean, safe renewable energy." (10//31/19 Press Release)

- In November 2018, the Sierra Club published "Harnessing Financial Tools to Transform the Electric Sector"
- Sierra Club identified three financial tools:
  - Re-purposing excess collections in rates
  - Securitization
  - Green Tariffs
- Environmental Activists have aligned with utilities seeking earnings growth to use securitization has a key tool to accelerate replacement of the existing coal fleet because of guaranteed recovery of stranded costs and related access to financing for new green investments. Retire legacy coal, with an embedded cost of less than $500/kw and replace with new renewable energy and energy storage at a capital cost of 1000-3000 $/KW.
  - Utilities often seek to recover lost earnings as well as capturing new earnings from RE/Energy storage investments.
  - Even if only the "new earnings" are received, they provide a clear benefit.

Utility Support Depends Upon Terms

- Utility support for early retirement/replacement and securitization is dependent upon
  - Whether recovery of lost earnings is included,
  - The impact of large new debt issues on utility credit rating, and
  - Assurance around new utility rate base generation investments.

- Utilities are recognizing that replacing utility owned generation with PPAs may not be attractive unless the utility is allowed to collect a fee related to the PPA
  - In Indiana, CenterPoint Energy is seeking approval of a Debt Equivalency Payment as part of its approval for a new PPA.
    - The Utility has argued that such a payment (which accounts for a 30% increase in the PPA costs) is needed to offset the cost of debt impairment related to the liability of the PPA recorded to its Balance Sheet.
    - The Consumer Counsel in Indiana has objected as has other parties.
    - There could be no debt impairment if the PPA is structured as a lease.
  - In Michigan, Consumers Power made a similar request (entitled Financial Cost Mechanism). The parties agreed to include an amount lower than the request as part of a settlement although many parties including the State AG disagreed with the payment.

The Devil is in the Details

- Multi-Step Process
  - Enact authorizing legislation
    - Create Intangible Property Right to a Non-Bypassable Charge
    - Enable Irrevocable Financing Order
    - Require true up of the Non-Bypassable charge
    - Require state pledge of non-interference with Bondholder Rights
  - Utility submits financing order application
  - Develop and execute financing order
  - Implement financing order

https://saberpartners.com/wp-content/uploads/2019/11/Fichera-NARUC-Electricity-Comm-5-17-19-for-UPDATED-11-1-19.pdf

Indiana Statute - Senate Bill 386

Qualified Costs

- An electric generation facility that will be retired from service within 24 months
- Costs are equal to at least 5% of the electric utility's total electric base rate

Process

- Qualifying utility may file a petition with the IURC for a financing order authorizing the securitization of the qualified costs.
  - Electric utility service to IN customers
  - Under the jurisdiction of the IURC
  - 200,000 retail customers or less
- Within 240 days after a petition for a financing order is filed, the IURC shall conduct a hearing and issue an order on the petition.
- Petitioner must demonstrate that the Utility will make capital investments in Indiana in an amount equal to or exceeding the amount of qualified costs within seven years following the issuance date of the securitization.

Securitization Requirements

- Bonds must be for a term of not more than 20 years
- The securitization charges will be paid by the utility’s customers
- The securitized property will be encumbered with a lien and security interest.
- The qualified costs authorized in a financing order shall be allocated to the electric utility's customer classes using subject to limited exceptions the same cost allocation methodology approved by the IURC in the electric utility's most recent base rate case

Texas Power Disaster Will Use Securitization to Recover from February Storm

- On May 31, 2021, the Texas legislature passed House Bill 4492 and Senate Bill 1580.
- The legislation authorizes the use of securitization and financing from the state's main budget reserve.
- The Economic Stabilization Fund (ESF) will cover the substantial unpaid balances of electric cooperatives and retail energy providers to the wholesale power market which total about $3 billion.
  - SB 1580 allows electric cooperatives to securitize their share of the unpaid balance, currently totaling $2.5 billion
  - HB 4492 authorizes default balance financing for the balance.

CAN THE INDUSTRY TURN LEMONS INTO LEMONADE?

Securitization Decisions Should be Heavily Scrutinized

- Securitization should always be based upon a fundamental economic analysis of generating economics not other financial considerations or carbon ideology

- Securitization should always be tied to a prudence review.
  - Is premature closure of coal plants in fact the most economic?
  - Is the transition period properly considered

- Securitization related to retirement of coal plants should be tied to performance
  - Utilities should be required to realize the projected savings.

Securitization Can Be a Valuable Tool to Lower Utility Costs

- Current securitization efforts are focused on early retirement of regulated coal plants.
- Securitization efforts, however, should not be limited.
  - Utilities have and can securitize pollution control equipment. Why not ELG expenses?
  - Utilities have and can securitize unrecovered fuel costs. Why reduce fuel supply costs through partial securitization?
  - By extension, undepreciated coal plant capital could also be securitized to reduce ratepayer fixed costs associated with existing operating assets.

- The industry should be more proactive in identifying where and how securitization could improve the competitiveness of the remaining coal generation. This could be extended to consideration of the technical feasibility of CCS and the availability of 45Q tax credits.

Questions and Bibliography

- **QUESTIONS?**

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THE FUTURE OF COAL IN ELECTRIC GENERATION

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Emily Medine, Principal

emedine@evainc.com

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About Energy Ventures Analysis

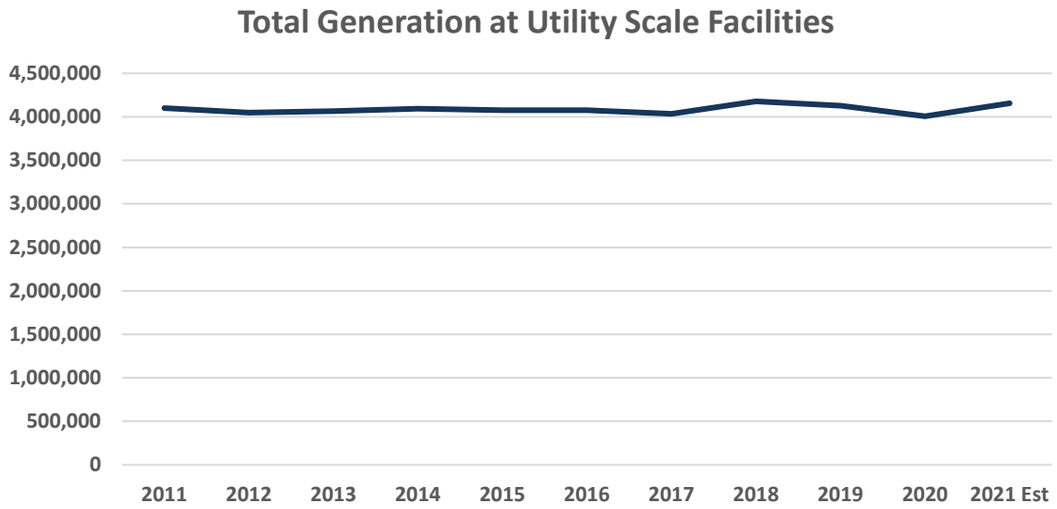
Energy Ventures Analysis is an energy consulting firm located in Arlington, Virginia. Since 1981, EVA has been publishing supply, demand, and price forecasts as part of its FUELCAST subscription service for the electric power, coal, natural gas, petroleum, renewable, and environmental sectors.

EVA's cutting-edge expertise in energy market, economic, financial, and operation management matters has led our firm to international recognition. For over three decades, our innovative insights have helped our clients make confident, informed investment and operational decisions to maximize value and spur financial growth.

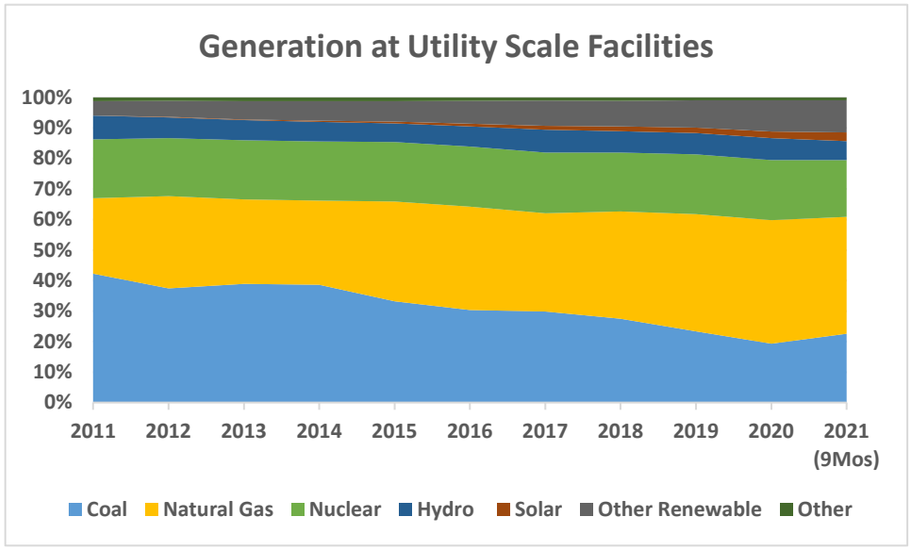
Our clients include:

- power & natural gas utilities
- fuel producers
- fuel transporters
- commodity traders
- regulators
- financial institutions

The Last Decade Has Been a Challenge to Coal Generation



- Effectively no growth in electricity demand. Flat electricity demand depressed organic need for new capacity
- The shale revolution made cheap natural gas increasingly available
- New environmental regulations (MATS, CSAPR) required significant investments in retaining coal generation
- Renewables with tax credits became increasingly commercial

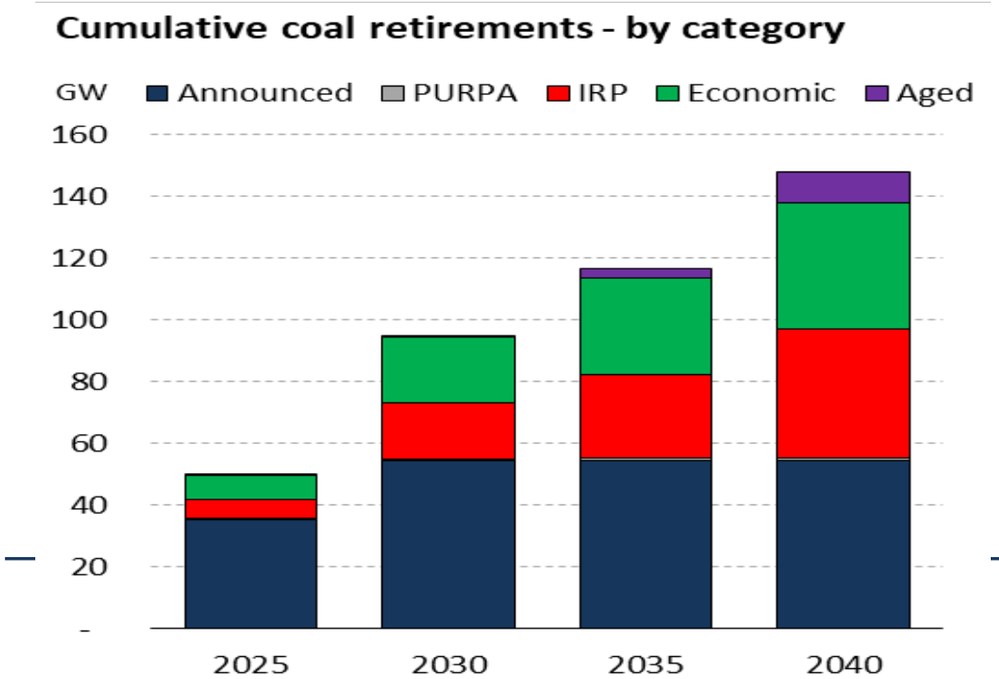


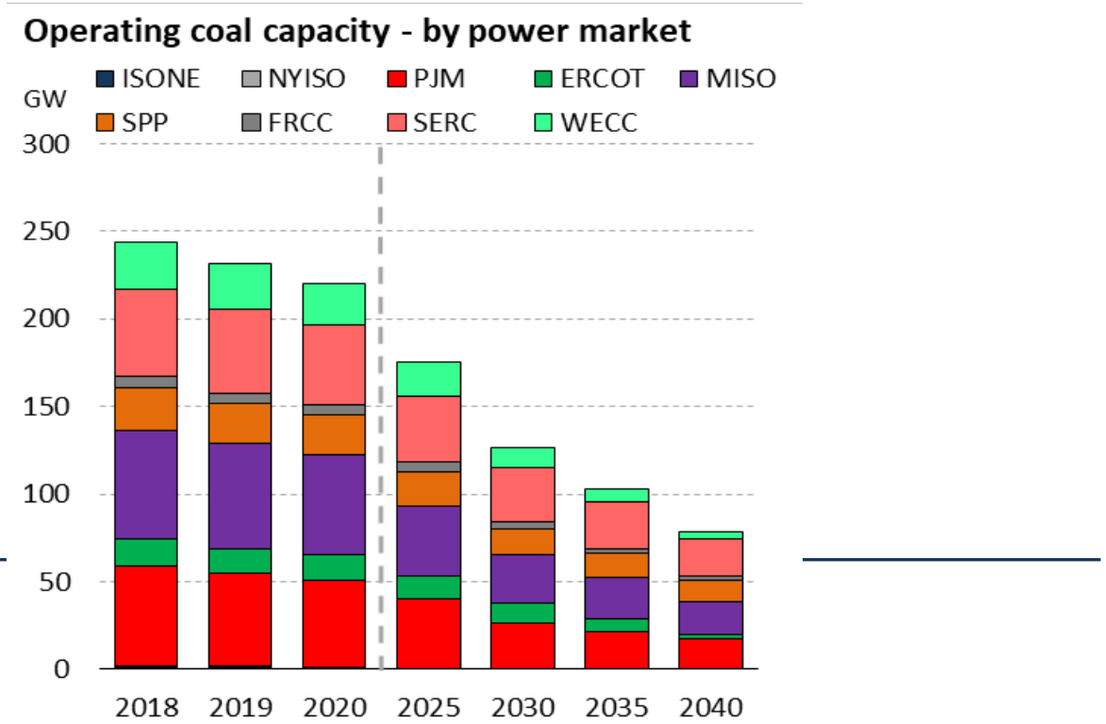
- Net effect was increased generation from natural gas and renewables reduced demand for coal generation
- Coal's share of generation declined from 42% in 2011 to 19% in 2020. 10 Mos 2021 is 23%.
- Gas's share generation increased from 25% in 2011 to 41% in 2020. 10 months 2021 is 38%.
- Renewables' share of generation increased from 5% in 2011 to 12% in 2020. 10 months 2021 is 13%.

Outlook for Coal in Power Generation Through 2030

- Coal continues to account for a significant share of power generation today
- The move to retire coal continues. Retirements are expected to increasingly pose a significant challenge to system stability/reliability and rate containment.
- Contributing to the reliability challenge are new natural gas plants. There is significant opposition to new natural gas plants from consumers concerned about costs and environmental groups. Challenges have extended to the construction of the new pipelines which are needed to supply the plants.
- Further, natural gas plants do not fare well in a Net Zero world. Without carbon capture, they are substantial emitters of greenhouse gases both at the plant and upstream. Assuming new natural gas plants remain on-line over 30 to 40 years, total carbon equivalent emissions from them could exceed carbon equivalent emissions from existing coal plants through their retirement.
- Renewable integration is not advancing as quickly as expected due to issues related to supply chains and transmission integration. MISO has been clear that significant integration by 2035 would be a challenge.
- In light of the above, some coal plant retirements are being delayed or reconsidered.

Coal Plant Retirements





- Basis of forecast is a combination of announced retirements, retirements part of the preferred portfolio in Integrated Resource Plans (IRPs), and economic retirements.
- The biggest uncertainty relates to timing.
- The coal plant retirements are across all power markets with some affected more than others.
- The surviving capacity consists of capacity with favorable coal supply

Incentives to Retire Coal Early

- Regulated Utility Earnings
  - Earnings have been flat to declining as existing coal plants are depreciated
  - Early retirements allow utilities to recover return of and on undepreciated costs and receive similar earnings from new investments.
- Participation in Regional Compacts and/or state mandates related to greenhouse gas emissions.
- State and Federal Regulations on existing coal plants are requiring additional investments (e.g., Effluent Limitation Guidelines (ELG)).
- Environmental, Social, and Governance (ESG) concerns which have resulted in utilities independent of regulations establishing corporate goals.

Emerging Issues Related to Coal Plant Retirements

- **Overly Optimistic Assumptions Regarding Price and Availability of Capacity**
  - Many coal plant retirement decisions were based on market capacity prices that are not currently achievable.
  - A number of utilities have found that capacity is either unavailable or much more expensive than expected
- **Delays in Renewable Projects**
  - For reasons related to permitting, labor shortages, and supply chain issues, delays and/or higher costs are being experienced in bringing renewable projects online.
- **Increasing Challenges to New Natural Gas Projects**
  - Strong opposition from environmental community
  - Pressure to require economics of new gas plants be justified over shorter operating periods.

Examples

- **Big Rivers Electric Cooperative (BREC)**
  - BREC concluded in its October 2020 IRP idling the Green coal-fired station was optimal
  - On March 1, 2021, BREC filed for a Certificate of Public Convenience and Necessity (CPCN) to refuel the Green station with natural gas
  - BREC cited the expected costs in the IRP for the purchase of 300 MW of capacity was @ $2.7 million per year. The market costs turned out to be over 10-fold that amount, necessitating the change in plans.

CenterPoint Energy Indiana South (CEIS)

- CEIS announced in its most recent IRP that Culley #2 would be retired. It is a 90MW 58-year old plant, rarely in operation. In a recent proceeding, CEIS indicated it was reconsidering this decision. It is now considering keeping the plant available as it “was lower cost than the recent bids the Company received to purchase market capacity.”

Examples

Indiana Michigan Power (I&M)

- Rockport stations consists of two 1300 MW units. Rockport 2 was sold and leased back to I&M/AEG under a 33-year lease (subject to certain terms).
- In I&M's 2018 IRP, I&M assumed the Rockport 2 lease, which was due to expire at the end of 2022, would not be renewed under all scenarios and would not be available as a resource through a lease extension.
- In May 2021 I&M filed a petition effectively seeking to reacquire the Rockport 2 unit from the lessors. Among the cited reasons, it is clear the need for capacity was paramount.

  - Flexibility for I&M to operate Rockport Unit 2 as a **capacity** resource, which reduces operating costs as well as unit emissions.
  - Reliability by ensuring I&M's PJM **capacity** requirement is met.
  - Elimination of the need for I&M to purchase **capacity** to satisfy a capacity shortfall
  - Maintenance of in-state generating **resource** which provides stability and resilience of the transmission system.
  - The provision of **reliable and economic generating capacity** during the ongoing development of emerging technologies and orderly transition to increased reliance on renewable energy and a more environmentally sustainable and diverse generation mix.

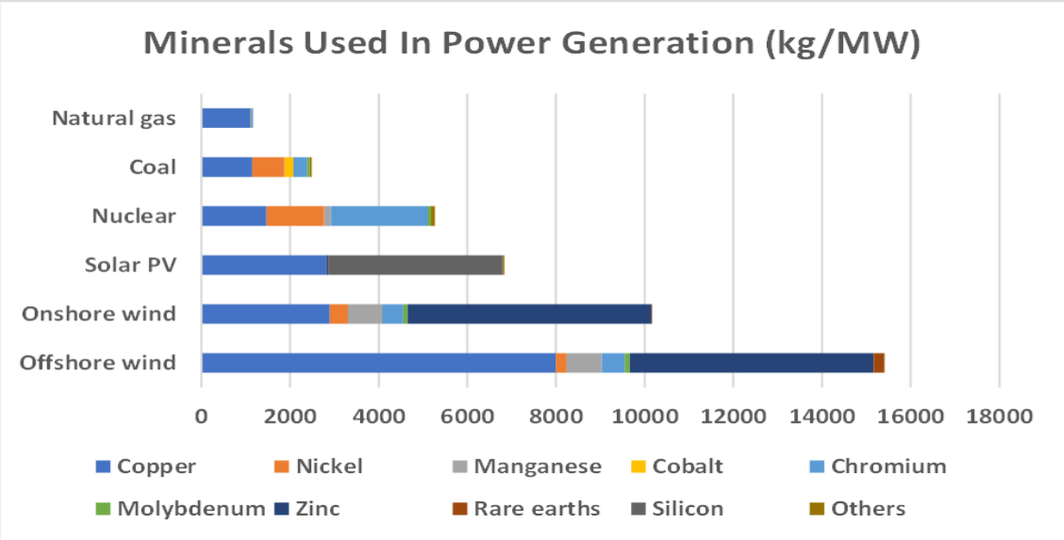
Examples`

Public Service of New Mexico (PNM)

- A merger agreement between PNM and Avangrid was rejected in December 2021 by the New Mexico Public Regulation Commission (PRC) concluding the potential risks to customers outweigh the benefits. The Hearing Examiner noted the reliability risks, the potential for higher prices, and slower development of renewables. A merger requirement related to PNM selling its 13% interest in the Four Corners plant.

- Later in December 2021, the PRC rejected PNM's proposed sale of its 13% ownership of the Four Corners station to the Navajo Transitional Energy Company (NTEC) citing PNM's failure to identify or propose replacement resources.

Renewable Delays are Occurring



- Critical minerals are used disproportionately in renewables.
- Top concerns are:
  - Geographic concentration of supply
  - Long project development times
  - Declining resource quality
  - Growing scrutiny of environmental and social performance
  - Higher exposure to climate risks

https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/executive-summary

- The World Economic Forum (WEF) in November 2021 reported on concerns about delays in solar projects.
- Citing Rystad Energy, **WEF noted that rising "shipping and equipment costs are threatening to postpone or cancel 56% of worldwide utility-scale solar projects planned for 2022."**
- WEF states that **shipping costs have "increased roughly six-fold** from" pre-pandemic levels. WEF further states costs have increased because of **rising costs of solar panel components, particularly polysilicon**.

https://www.weforum.org/agenda/2021/11/supply-chain-problems-solar-power-renewable-energy/

Renewable Integration a Challenge

Interconnection Requests by ISO (MW)

	2021	2022	2023
ISONE	374	3,917	7,708
NYISO	436	8,006	11,861
PJM	5,137	26,156	37,803
MISO	1,885	19,622	37,584
SPP	11,283	12,460	27,274
ERCOT	3,804	33,817	76,568
CAISO	1,358	10,139	18,876
TOTAL	**24,277**	**114,117**	**217,674**

Source: EVA Monthly Renewable Report

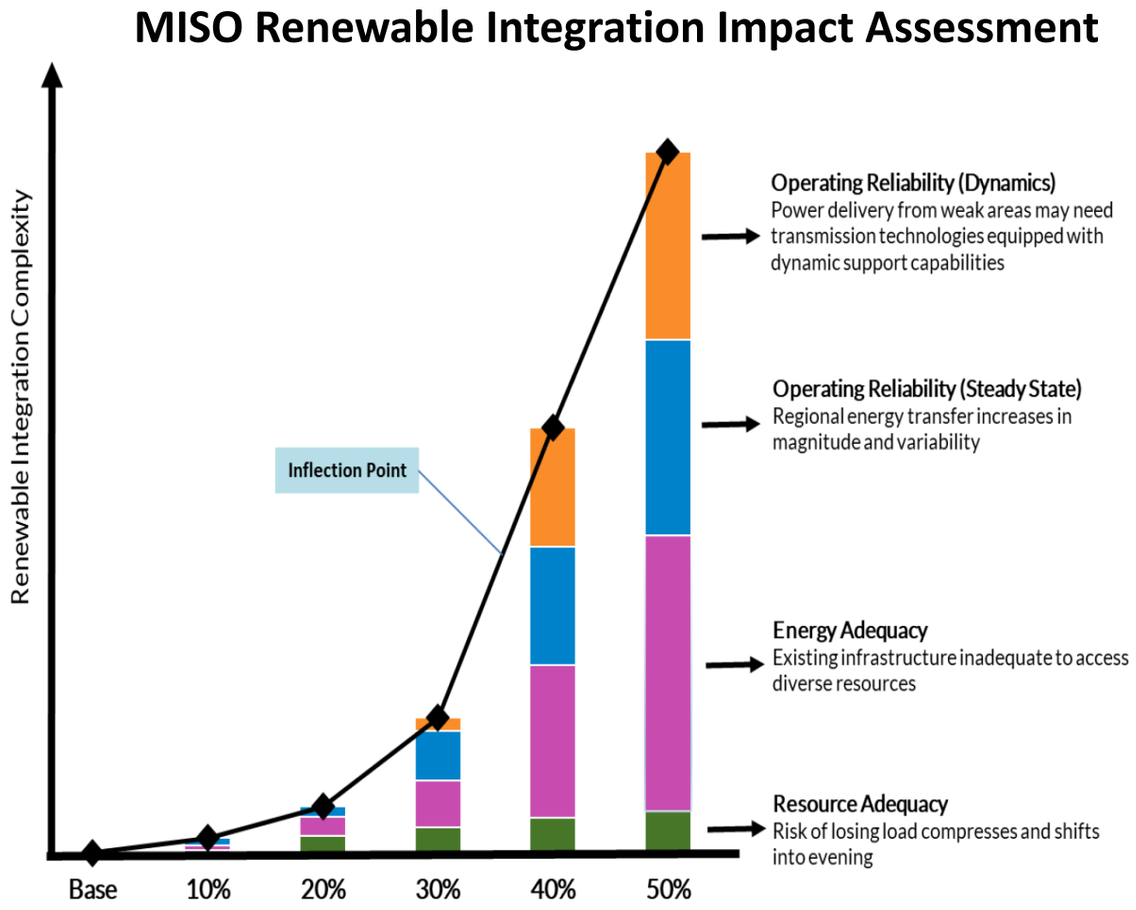
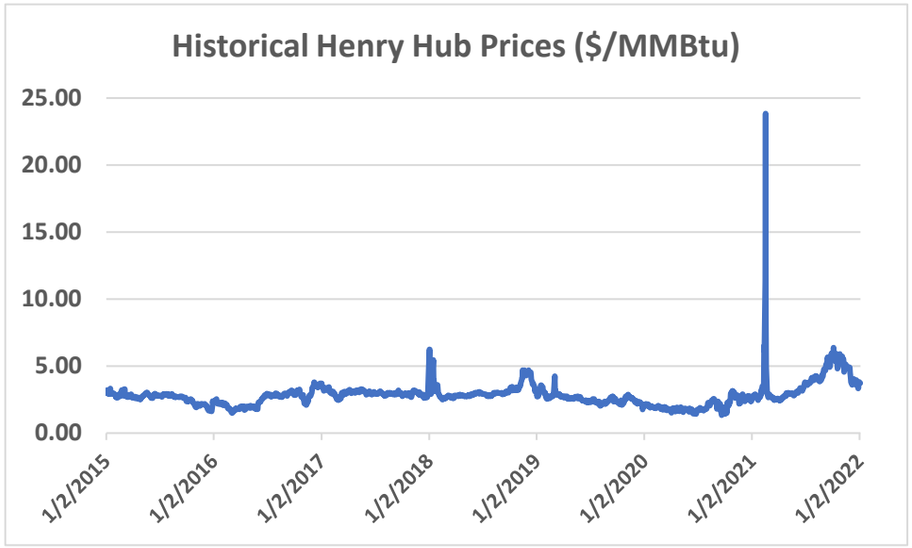
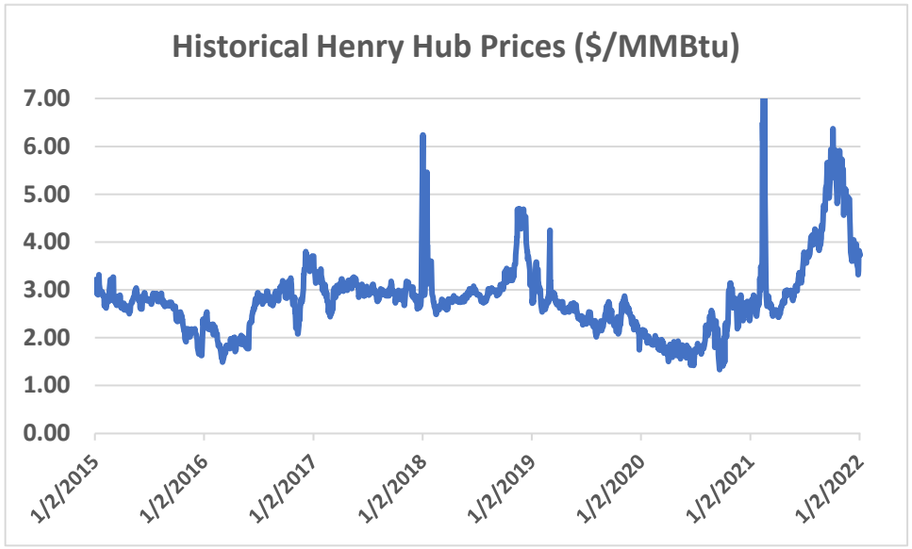


Figure 1: Increasing renewable penetration will significantly impact grid performance with complexity increasing sharply after 30% renewable penetration levels

Growing Concerns Related to Natural Gas – Natural Gas Price Volatility`



- In 2021, natural gas prices demonstrated significant volatility.
- Winter Storm Uri which caused the first spike in February was relatively short-lived.
- The second spike in the fall, while not nearly the magnitude of the February spike, was relatively significant and demonstrated two phenomenon that had not seriously been previously considered in most gas price forecasts.



- Domestic natural gas prices are increasingly linked to the international price of natural gas.
- Power sector coal gas switching that has occurred over the last decade or so has capped natural gas prices. As coal capacity is retired, the price of natural gas will not be similarly constrained.

Coal Gas Switching Has Played a Material Role in Utility Sector

COAL BURN SENSITIVITY BY COAL BASINS (Million Tons)

Coal Basins	NYMEX - $1.00	NYMEX - $0.50	NYMEX - $0.40	NYMEX - $0.30	NYMEX - $0.20	NYMEX - $0.10	NYMEX	NYMEX + $0.10	NYMEX + $0.20	NYMEX + $0.30	NYMEX + $0.40	NYMEX + $0.50	NYMEX + $1.00
Cal 2022	**$2.60**	**$3.10**	**$3.20**	**$3.30**	**$3.40**	**$3.50**	**$3.60**	**$3.70**	**$3.80**	**$3.90**	**$4.00**	**$4.10**	**$4.60**
Total U.S. L-48	**470.7**	**501.7**	**504.4**	**507.5**	**509.8**	**512.5**	**515.5**	**517.9**	**520.5**	**523.3**	**525.3**	**526.9**	**545.3**
NAPP	57.4	63.5	64.1	64.7	65.2	65.8	66.5	67.0	67.5	68.1	68.6	69.0	73.0
CAPP	14.7	16.9	17.1	17.3	17.5	17.7	17.9	18.1	18.4	18.6	18.8	19.0	20.5
ILLB	56.9	63.2	64.1	65.0	65.6	66.4	66.9	67.5	68.1	68.7	69.1	69.6	73.4
PRB	259.6	274.2	275.2	276.3	277.2	278.2	279.4	280.4	281.4	282.5	283.2	283.7	291.2
Rockies	29.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	31.1	31.2	31.3	31.4	32.2
Other	52.9	53.6	53.6	53.7	53.8	53.8	53.9	54.0	54.1	54.2	54.3	54.3	55.0
Cal 2023	**$2.30**	**$2.80**	**$2.90**	**$3.00**	**$3.10**	**$3.20**	**$3.30**	**$3.40**	**$3.50**	**$3.60**	**$3.70**	**$3.80**	**$4.30**
Total U.S. L-48	**459.8**	**489.9**	**493.6**	**497.4**	**500.1**	**503.9**	**506.4**	**510.6**	**513.1**	**516.0**	**519.3**	**521.7**	**543.7**
NAPP	56.2	62.3	63.1	64.0	64.7	65.5	66.1	67.1	67.7	68.4	69.1	69.8	74.9
CAPP	13.8	16.2	16.7	17.0	17.3	17.7	17.9	18.4	18.7	19.0	19.4	19.7	22.0
ILLB	50.6	57.4	58.4	59.4	60.1	61.0	61.5	62.5	63.1	63.7	64.4	64.9	69.5
PRB	259.4	271.9	273.0	274.2	275.1	276.5	277.4	278.7	279.5	280.6	281.7	282.5	290.2
Rockies	30.2	31.4	31.6	31.8	31.9	32.1	32.3	32.5	32.6	32.7	32.9	33.0	34.3
Other	49.6	50.7	50.9	51.0	51.1	51.1	51.2	51.5	51.5	51.6	51.7	51.8	52.9

Source: EVA Power: Gas & Coal Price Sensitivity Outlook, January 2022

Future Ability to Construct Natural Gas Pipelines is Uncertain `

- Atlantic Coast Pipeline (ACP) – Initially announced in 2014 by Dominion and Duke Energy, ACP was cancelled in 2020 resulting in a reported estimated loss to the developers of about $5 billion. ACP was pursued to support new natural gas plants in the utilities respective jurisdictions. The decision to cancel the project was based on continuing litigation over permits.
- PennEast Pipeline (PennEast) – Initially started in 2014, the PennEast Project was an 118-mile pipe from the Marcellus to Pennsylvania and New Jersey. PennEast required approvals from state and Federal agencies including FERC. PennEast faced many legal challenges. Despite a successful ruling from SCOTUS, the PennEast Project was cancelled in 2021.
- Mountain Valley Pipeline (MVP) could be completed but challenges remain including a Sierra Club lawsuit just filed against West Virginia Department of Environmental Protection (WVDEP) related to recently issued permits.
- Challenges are also underway for smaller lateral pipes. For example, in June 2021, Texas Gas Transmission applied for a permit to build a 24-mile pipe to deliver gas for a new gas plant being proposed by CEIS arguing only an Environmental Assessment (EA) should be required. As a result of the intervention by environmental groups, FERC concluded a full Environmental Impact Statement (EIS) was required. At a minimum, this will extend the approval period. It could also result in no permit at all.

Growing Concerns Related to New Natural Gas Power Plants

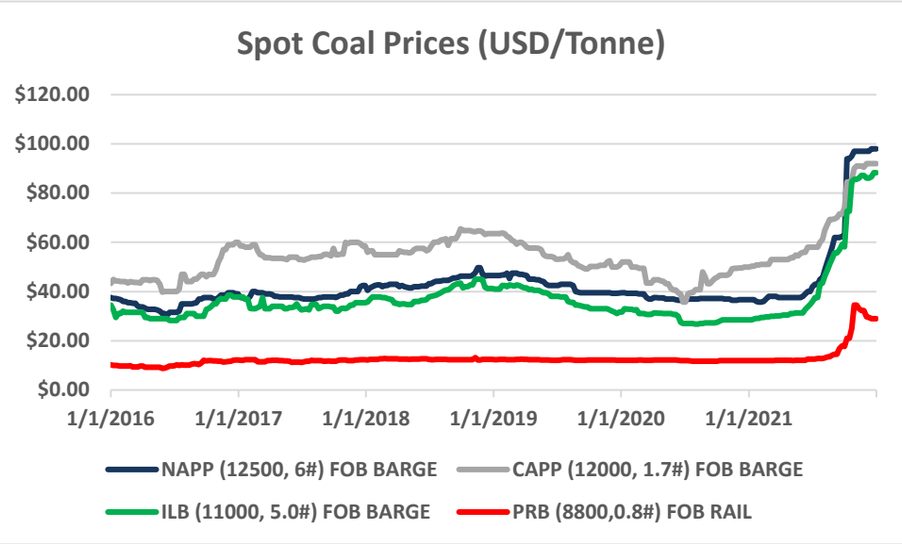
- Unlike most coal plants when initially constructed, the expectation that new gas plants will operate 30 plus years is questionable.
  - In a Net Zero world, gas plants will be required to retire and/or be retrofit with carbon capture.
  - As a result, a prudent evaluation of new gas plants should be justified upon the shorter life, e.g., 15 years, in order to avoid leaving a stranded cost. The shorter period significantly increases project costs.
  - Alternatively, the evaluation of new gas plants should include the potential carbon capture retrofit costs at some future date.
- Given the uncertainty at the time of construction of the new gas plants, arguments that stranded costs should be recovered if not fully depreciated are at best tenuous.
- Most utilities only look at the annual greenhouse gas emissions of natural gas from new plants inside the fence line. This ignores the upstream emissions which can be rather significant and ignores the fact that gas plants could continue to operate for a significantly longer period than their alternative, e.g., existing coal plants. The best way to capture this difference is through Life Cycle Analysis of emissions.

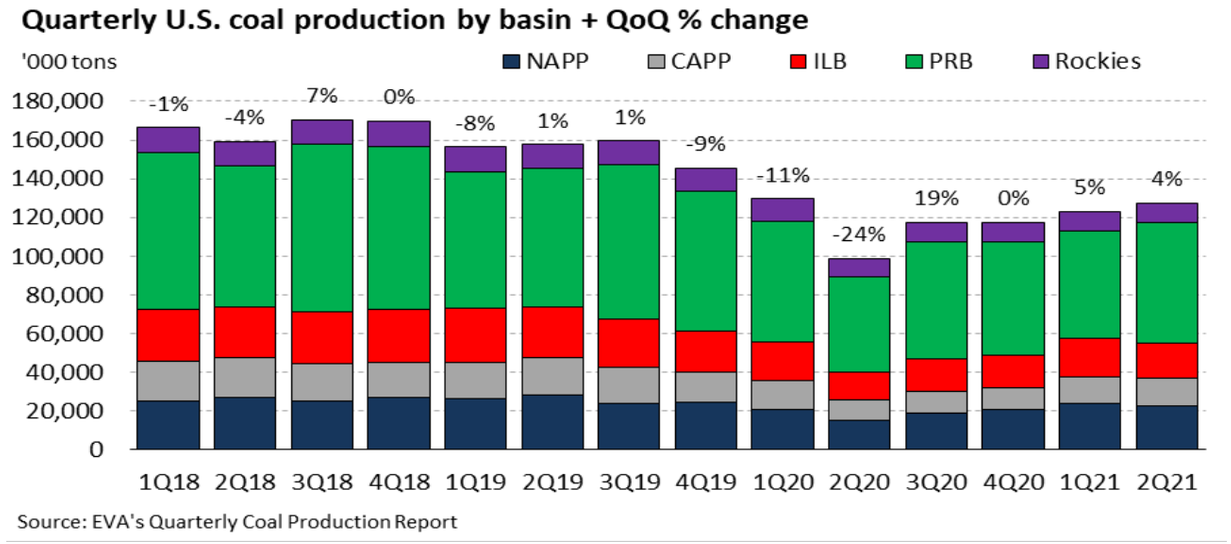
Absent Carbon Capture Future of Coal Beyond 2030 is Likely Limited

- Long-term use of coal depends upon CCUS or other carbon collection possibilities such as Direct Air Capture.
- There are good carbon capture retrofit targets
  - Some have been awarded Front End Engineering and Design grants from DOE (e.g., Prairie State, Gerald Gentleman, and Milton Young)
  - Others are simply not being pursued. Mountaineer is a good example of a project which should be pursued. Carbon capture was considered for Mountaineer over 15 years age. A successful test pilot was conducted at the plant in 2009. A 30 MW slide slip employed a post-combustion capture with chilled ammonia. The captured CO2 was sequestered in the saline Mount Simon Sandstone. While AEP elected not to proceed to Phase 2 despite a significant financial grant from the DOE, the pilot was deemed a success. It successfully operated for over a year. The captured CO2 was successfully sequestered and the Mount Simon Sandstone was shown to have ideal properties for storing CO2.
- Technology has advanced in recent years with an attendant reduction in expected costs.
- Section 45Q tax credits are available but need to be expanded.
- There is significant interest in CCUS from natural gas and biofuels.

APPENDIX – WHAT HAPPENED TO COAL IN 2021

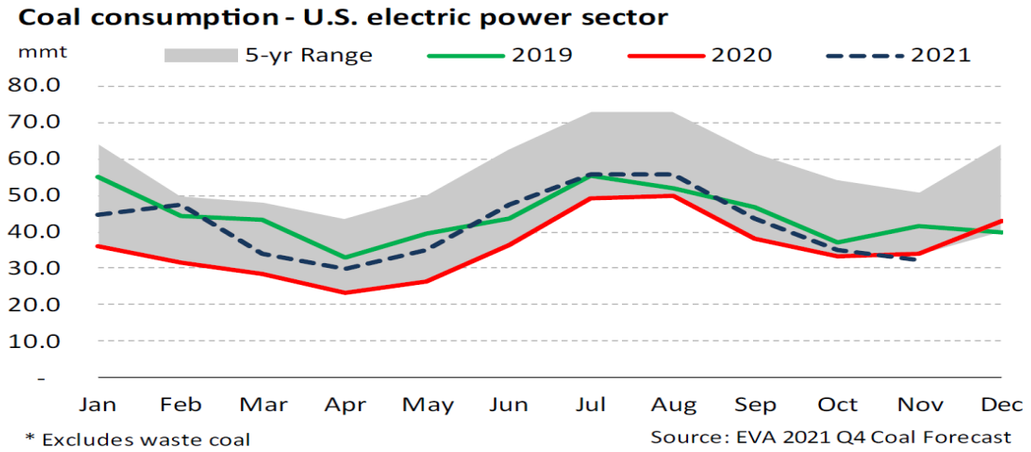
Coal Demand Surged in 2021 with High Gas Prices and COVID Recovery

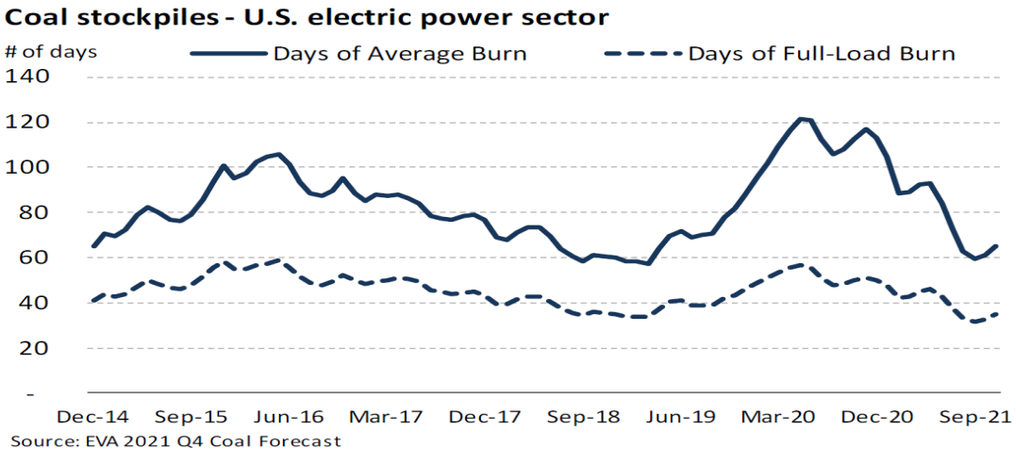




- Domestic steam coal hit a supply shortage as coal burn became economic with high natural gas prices.
- Spot coal prices rose to “gas-equivalent” levels as utilities sought additional supplies to support the higher burn.
- Due to low burn in 2019 and 2020, production capacity had been scaled back.
- Labor and supply shortages and rail constraints limited the speed with which the industry could respond.

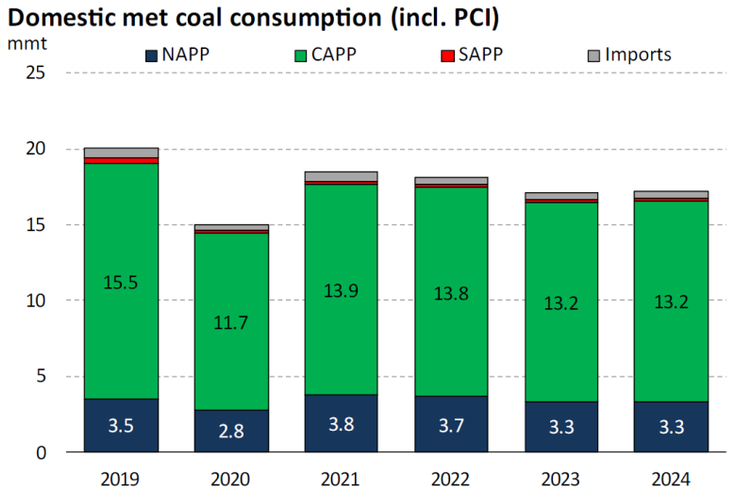
Higher Burn Caused Precipitous Fall in Inventories

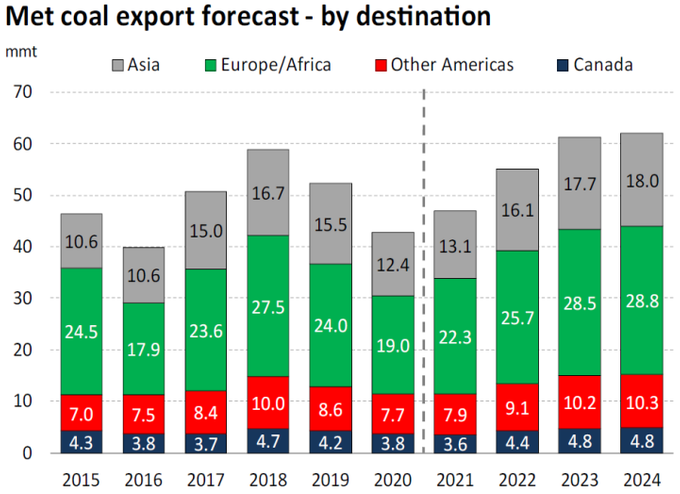


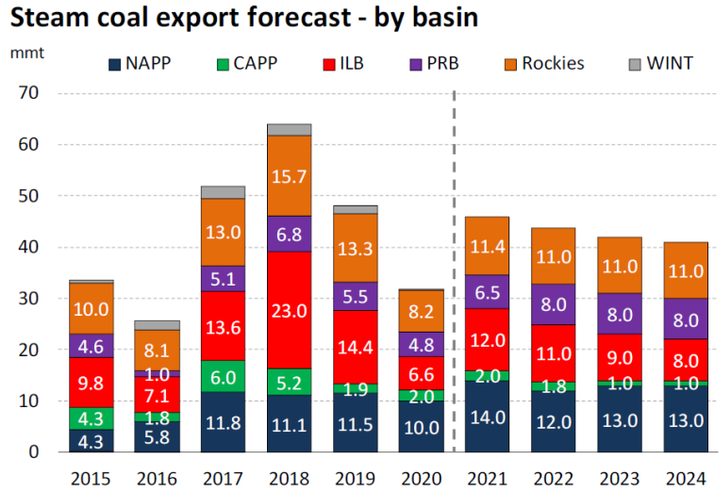


- Throughout 2021 coal burn was higher than 2020 levels.
- Healthy inventory levels at the beginning of 2021 were believed to be sufficient to manage the higher burn
- This turned out not be the case as inventory levels plunged and utilities were not able to secure additional supplies due a combination of production and transportation constraints.
- A number of utilities managed the potential shortfall with conserving coal supplies through dispatch limitations.
- A mild December eased coal supply concerns.

Domestic Met and Export Markets Rebounded in 2021







- U.S. steel production is not above pre-COVID levels and plant operating rates are above 85%.
- U.S. met coal exports to China are replacing Australian exports amid the ongoing China Australia disputes
- Reopened and new U.S. met coal mines will support export growth (Lear South Itmann, Longview)
- U.S. steam coal exports increased with higher global prices. This reversed when domestic prices rose to comparable levels.
- U.S. export into the Asian market are competitive off the west coast, but export capacity is limited.

Short-Term Coal Market Outlook

US Coal Demand (mmt)	2020	2021	2022	2023	2024
Electric Burn	429.3	506.8	508.6	459.5	438.2
Electric Receipts	428.2	446.2	489.5	475.5	445.8
Stockpile Change	*5.2*	*(53.9)*	*(19.1)*	*15.9*	*7.6*
Coke Ovens	15.0	18.5	18.2	17.2	17.3
Comm./Indust.	25.1	25.0	24.4	23.8	23.4
Domestic Receipts	**468.3**	**489.7**	**532.1**	**516.4**	**486.5**
Export Metallurgical	42.8	46.9	55.2	61.2	62.0
Export Steam	31.9	45.9	43.8	42.0	41.0
Export Other*	0.3	0.3	0.3	0.3	0.3
Total Exports	**75.0**	**93.1**	**99.3**	**103.5**	**103.3**
Total Demand	**543.3**	**582.8**	**631.4**	**620.0**	**589.8**

**Includes Lignite & Anthracite*

Source: EVA Quarterly Coal Report

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Arlington, VA 22209

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CAN EXISTING COAL PLANTS BE SAVED?

Coal Marketing Days

September 20, 2018

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ABOUT ENERGY VENTURES ANALYSIS

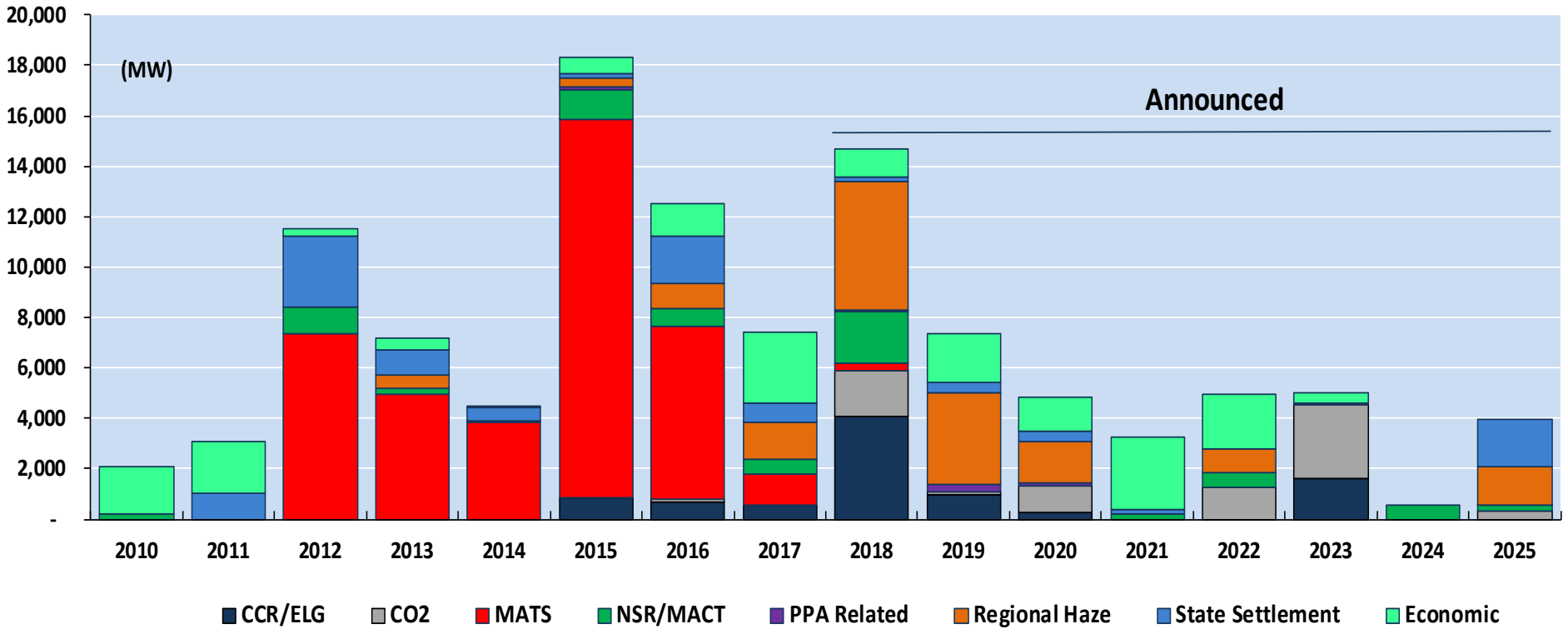
Energy Ventures Analysis is an energy consulting firm located in Arlington, Virginia. Since 1981, EVA has been publishing supply, demand, and price forecasts as part of its FUELCAST subscription service for the electric power, coal, natural gas, petroleum, renewable, and environmental sectors.

EVA's cutting-edge expertise in energy market, economic, financial, and operation management matters has led our firm to international recognition. For over three decades, our innovative insights have helped our clients make confident, informed investment and operational decisions to maximize value and spur financial growth.

Our clients include:

- power & natural gas utilities
- fuel producers
- fuel transporters
- commodity traders
- regulators
- financial institutions

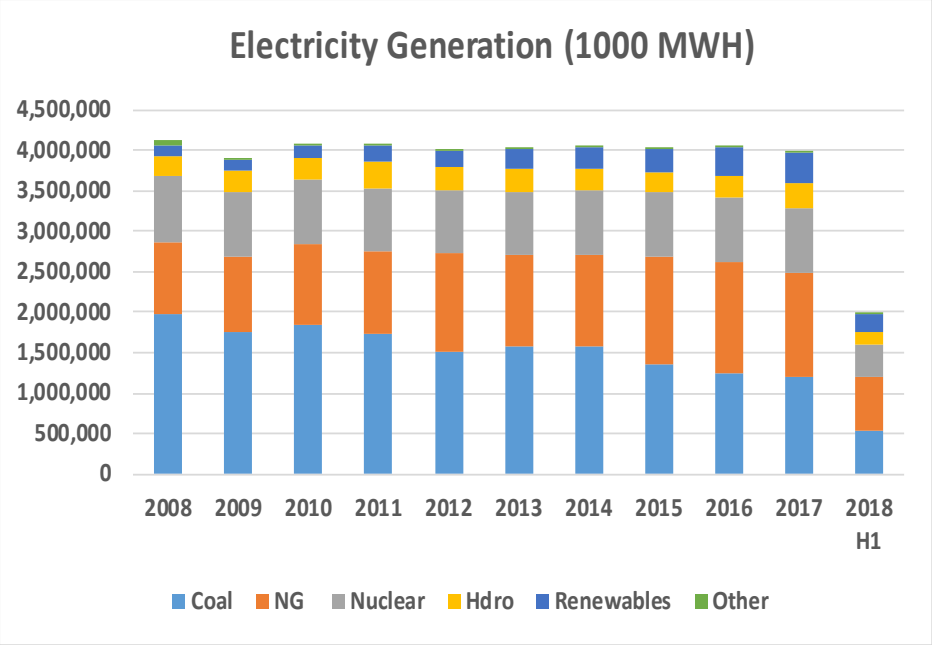
COAL PLANT RETIREMENTS BY STATED CAUSE OF RETIREMENT

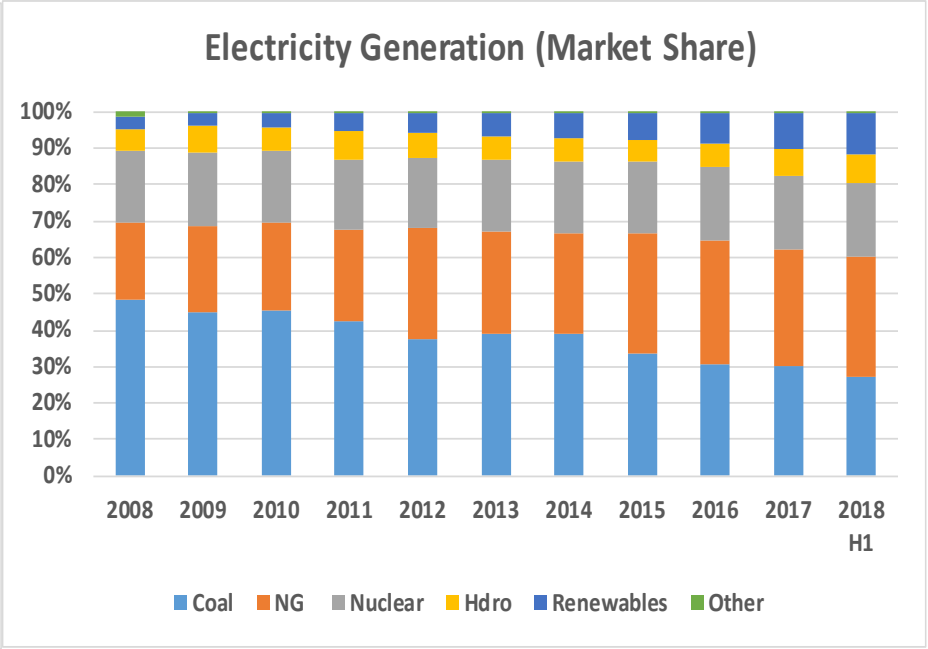


REASONS FOR EARLY RETIREMENT OF COAL PLANTS POST 2018

- **Environmental Regulations**
  - CCR/ELG
  - Carbon
  - Other
- **Flat Electricity Demand Growth**
  - Oversupply of natural gas
  - Subsidized Renewables
- **Utility Earnings**

ELECTRICITY DEMAND

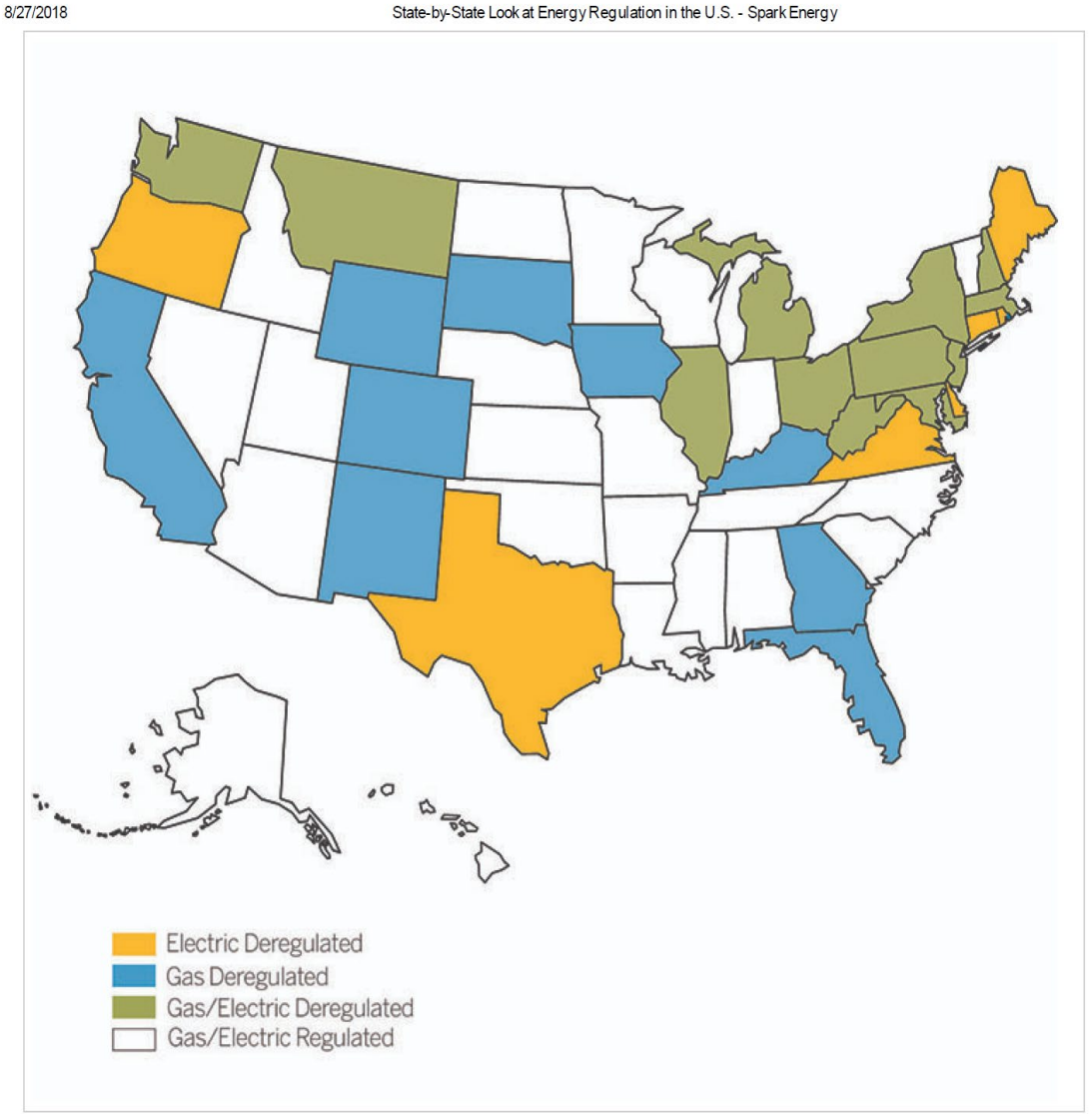




- **Electricity demand growth has all but disappeared**
- **Increase in gas supply resulted in gas prices being discounted to the point where gas generation displaced coal**
- **Significant renewables subsidies (PTC for wind, ITC for solar)increased generation from renewables**
- **Growth in generation from natural gas and renewables has caused coal's share to decline**

UTILITY EARNINGS

- Regulated utilities receive a return of and on their undepreciated invested capital.
- When electricity demand was growing, there was a continuous flow of capital into new projects allowing utilities to maintain or grow earnings.
- Without electricity demand growth, earnings are declining as existing plants depreciate.
- Replacement of coal largely depreciated plants can support earnings growth in regulated utilities that do not have an organic need for new capacity.
- It is clear that a new model for compensating regulated utilities based upon performance is needed.



CHALLENGING PREMATURE COAL PLANT RETIREMENTS

- **Integrated Resource Plans (IRPs)**
  - Periodic mandatory review of resource plans
  - IRPs have become the “first step” in justifying coal plant retirements
  - Stakeholder involvement is critical to insure proper assumptions regarding commodity price forecasts, regulations, resource options, and modeling approaches.
- **Life Cycle Analysis (LCA) of Carbon Emissions**
  - NETL and others have developed LCA models which incorporate upstream emission levels
  - Most LCA analyses compare new coal versus new gas
  - Appropriate analysis for early coal plant retirements is Existing Coal vs New Gas
  - New gas is either a commitment to carbon generation for 35 plus year or the construction of an asset that will be stranded before its expected life.
  - If Existing Coal is followed by low or no carbon renewables, existing coal plants have considerably lower life cycle emissions.
  - A recent analysis shows Existing Coal (10 years) plus Renewables (30 years) has about 50 percent lower carbon emissions than New Gas (40 years).

CHALLENGING EARLY COAL PLANT RETIREMENTS CONTINUED

- **Support for Changing Regulated Utility Compensation Model**
  - Investor Owned Utilities (IOU) are facing challenges due reduced need for new generation
  - IOU's have a tremendous incentive to promote high cost self build replacements for depreciated coal
  - Alternative compensation structures should be promoted to eliminate the self build bias.
- **Support Policy on Grid Resilience Initiatives**
  - Acknowledge importance of on-site storage
  - Acknowledge security risks related to pipeline delivery
  - Acknowledge potential price risk with heavy reliance on gas
  - Develop long-dated capacity tranches in RTO's to support coal commitment
- **Other**
  - Improve competitiveness of existing coal plants
  - Vertical integration

FINAL NOTE - ODD BEDFELLOWS

- **Environmental community is strongly against new gas plants**
- **New report by Rocky Mountain Institute states:**

  RMI's analysis finds that, because of recent innovation and rapid cost declines in renewable energy and DER technologies, clean energy portfolios can often be procured at significant net cost savings, with lower risk and zero carbon and air emissions, compared to building a new gas plant. More dramatically, the new-build costs of clean energy portfolios are falling quickly, and likely to beat just the operating costs of efficient gas-fired power plants within the next two decades—a sobering risk for investors and customers in a market with over $100 billion of already announced investment in new gas-fired power plants.

- **Sierra Club applauds new coal-base purchase power agreement (PPA) in Kentucky as an alternative for a new gas plant.**

  "*We are pleased to see OMU make a decision that does not involve long-term commitment(s) to risky natural gas and that acknowledges solar as an affordable and low-risk source of energy for our community …*" (Sierra Club, July 5, 2018)

Thanks

Any questions?

Emily Medine

emedine@evainc.com

412-421-2390

STRATEGIES FOR RETAINING EXISTING COAL FLEET

COALTRANS USA

January 23, 2020

ENERGY VENTURES ANALYSIS

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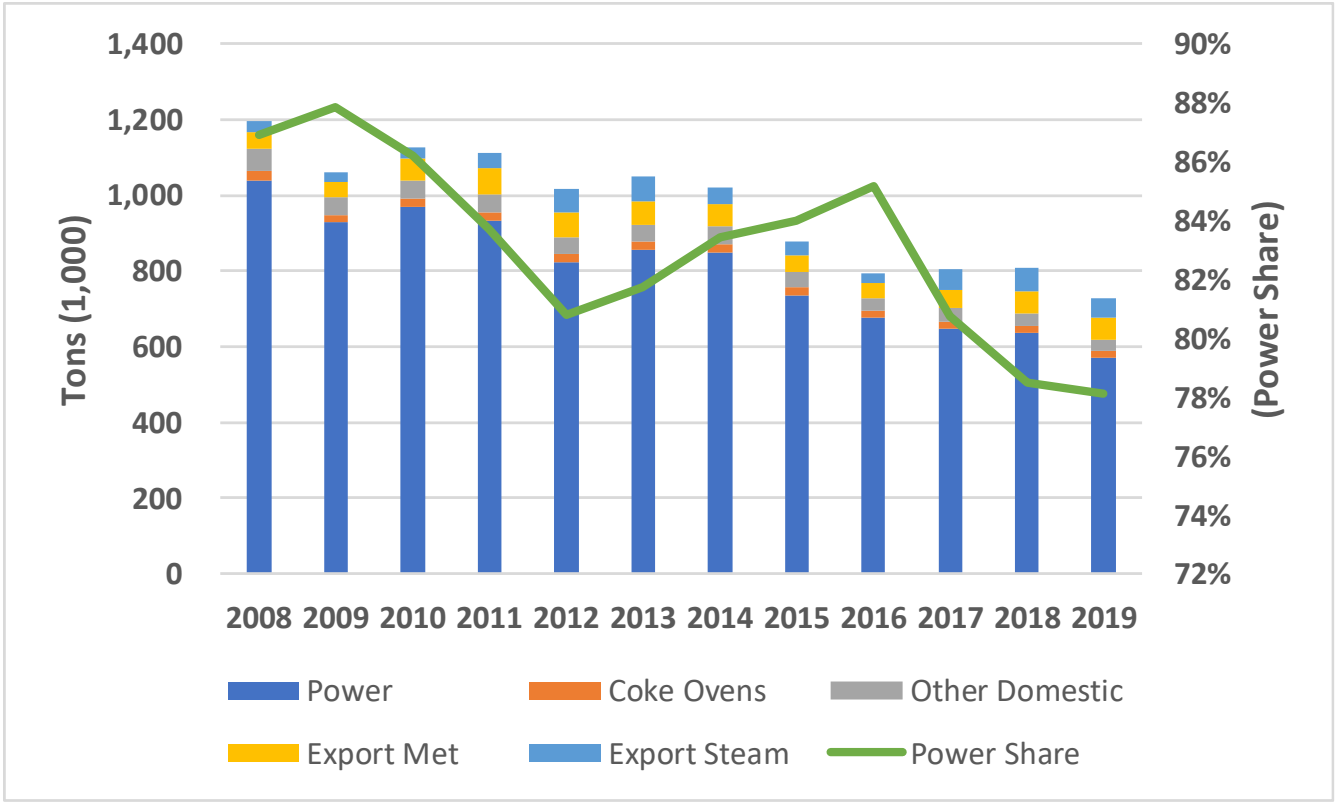
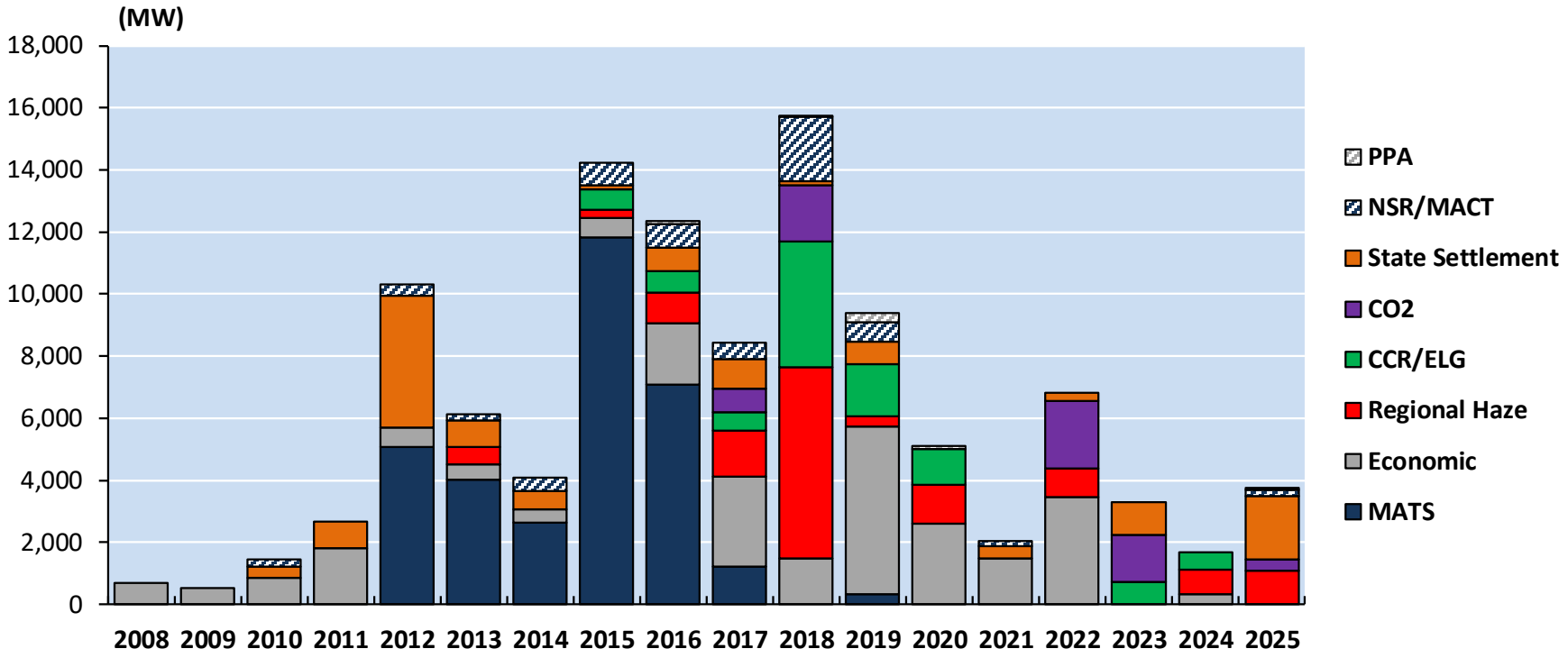
OUTLINE

- Importance of domestic power market to U.S. coal industry
- Reasons for coal plant retirements
- Strategies to maintain coal fleet

IMPORTANCE OF POWER MARKET TO U.S. COAL INDUSTRY

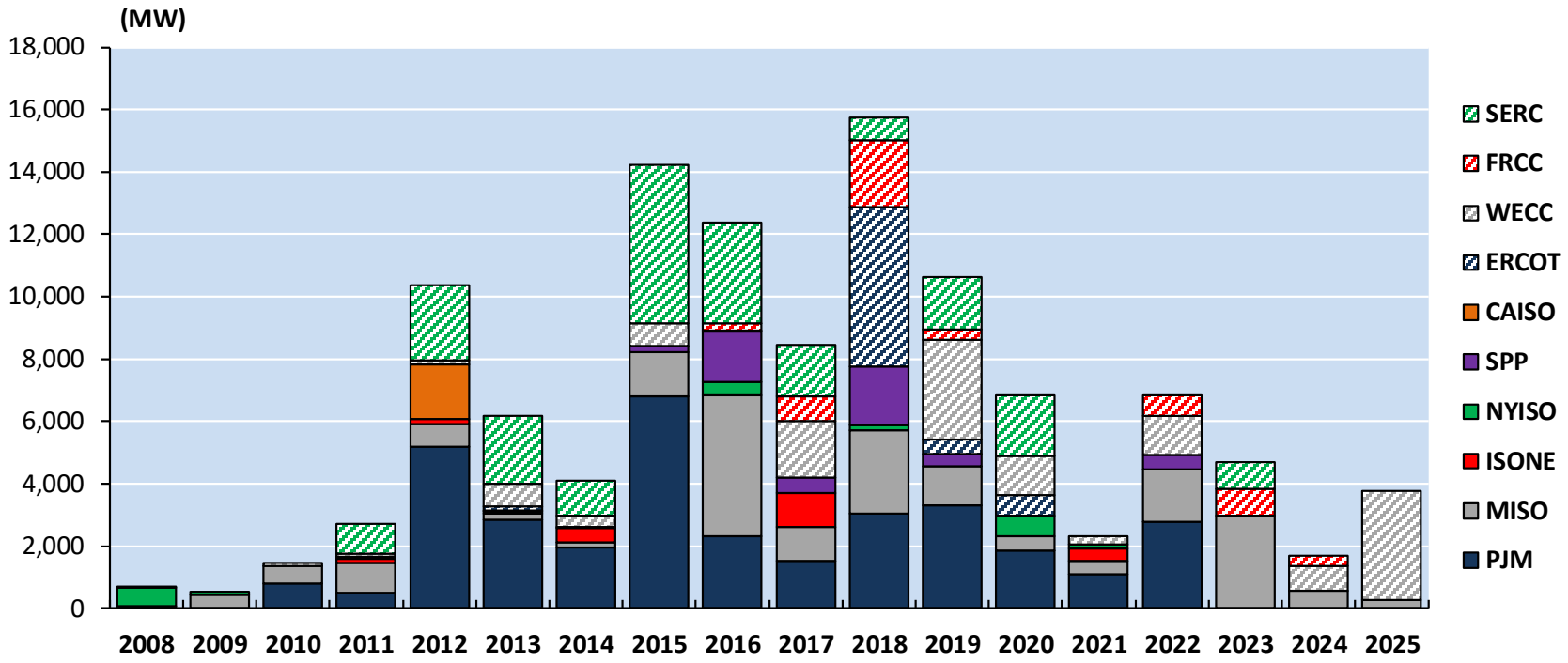


COAL PLANT RETIREMENTS BY STATED CAUSE OF RETIREMENT



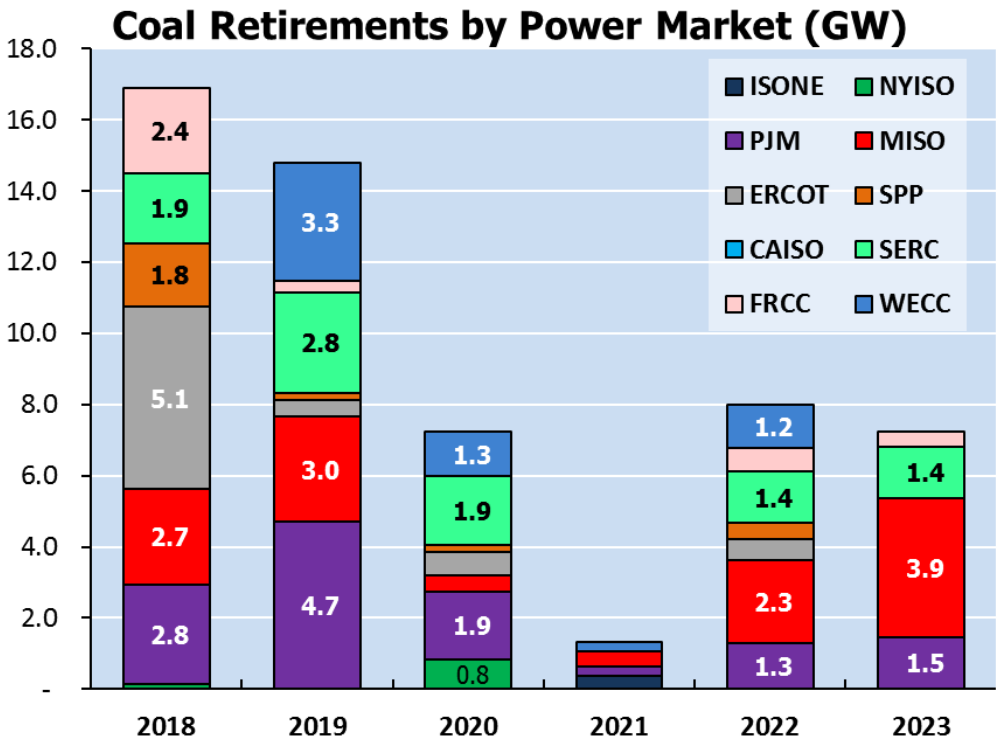
Source: EVA Powerplant Tracking System

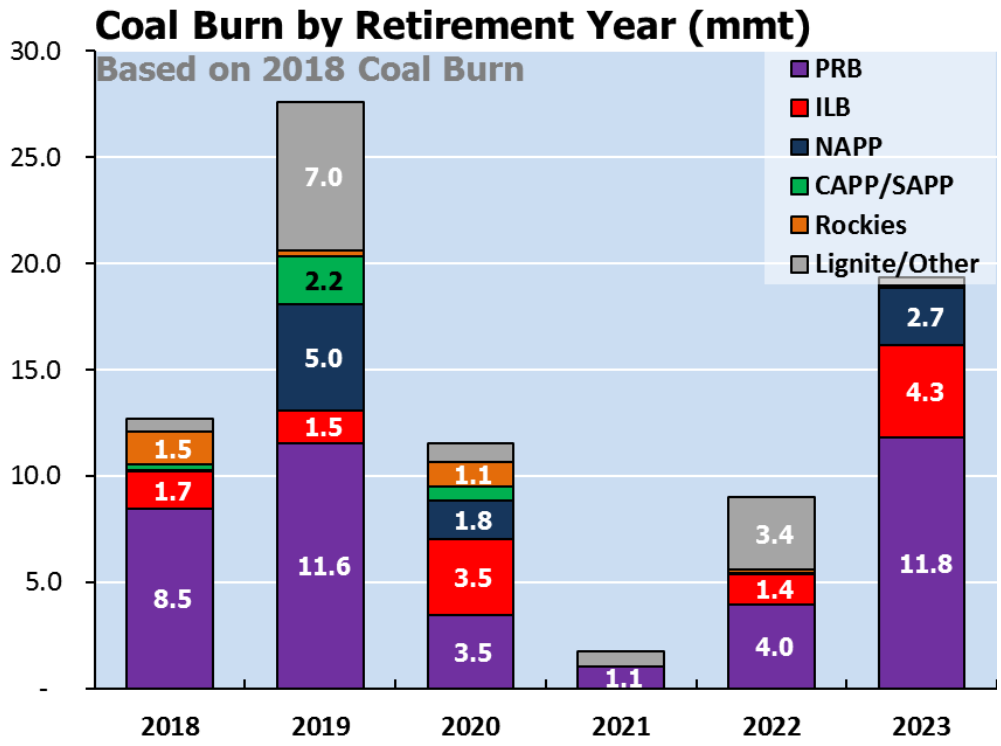
COAL PLANT RETIREMENTS BY POWER MARKET



Source: EVA Powerplant Tracking System

ANNOUNCED COAL RETIREMENTS THROUGH 2023



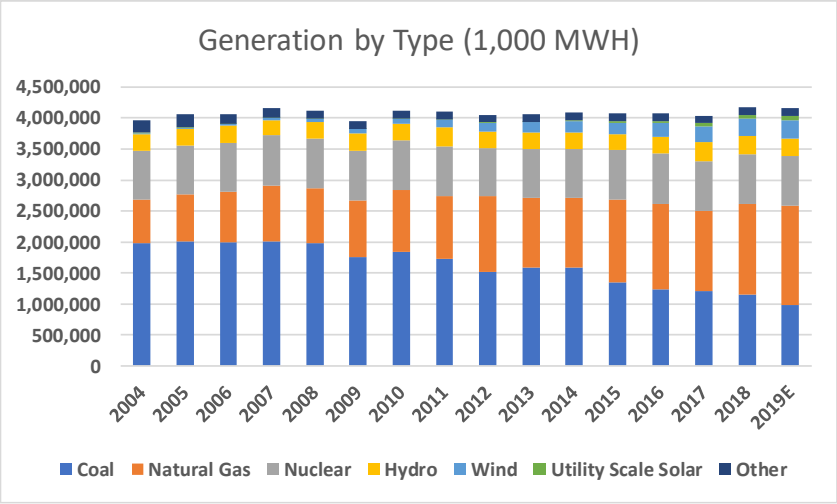


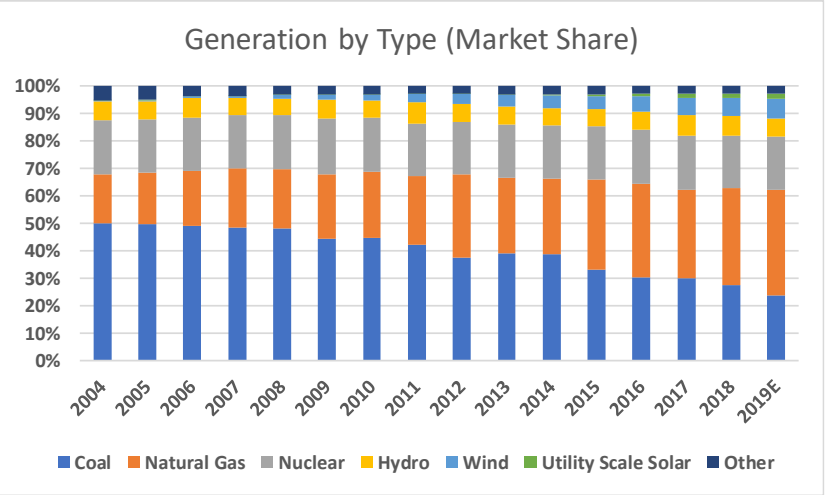
- **Major retirements in 2019/2020 (with MW/2018 coal burn) include:**
  - NAPP: Mansfield (2,490 MW/1.5 mmt); Conesville (1,530 MW/1.9 mmt)
  - ILB: Paradise 3 (1,000 MW/1.8 mmt); Lowman (547 MW/0.65 mmt); Elmer Smith (411 MW/1.1 mmt)
  - PRB: Coffeen (915 MW/3.4 mmt); Duck Creek (425 MW/1.5 mmt); Havana (434 MW/1.7 mmt); Hennepin (294 MW/1.1 mmt); Oklaunion (700 MW/2.0 mmt); Colstrip 1-2 (614 MW/2.1 mmt)
  - Rockies: Cholla (400 MW/1.1 mmt)
  - Other: Navajo (2,250 MW/6.4 mmt); Gorgas (1,014 MW/2.2 mmt)

REASONS FOR PREMATURE COAL PLANT RETIREMENTS

- Flat electricity demand growth
- Subsidized renewables
- Utility earnings
- Discounted gas prices
- Regulations

FLAT ELECTRICITY DEMAND AND SUBSIDIZED RENEWABLES

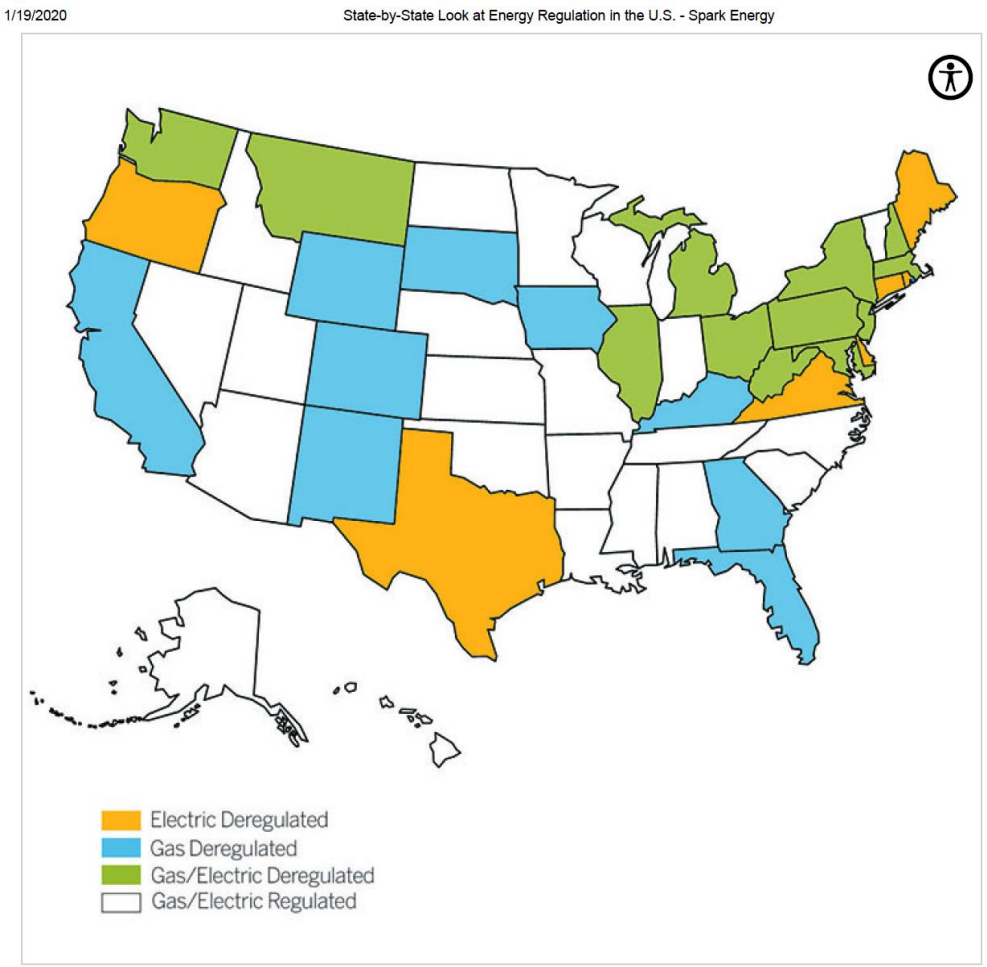




- **Electricity demand growth has all but disappeared**
- **Increase in gas supply resulted in gas prices being discounted to the point where gas generation displaced coal**
- **Significant renewables subsidies (PTC for wind, ITC for solar)increased generation from renewables**
- **Growth in generation from natural gas and renewables has caused coal's share to decline**
- **Lack of growth limits the organic need for new capacity which historical has been the basis for supporting utility earnings**

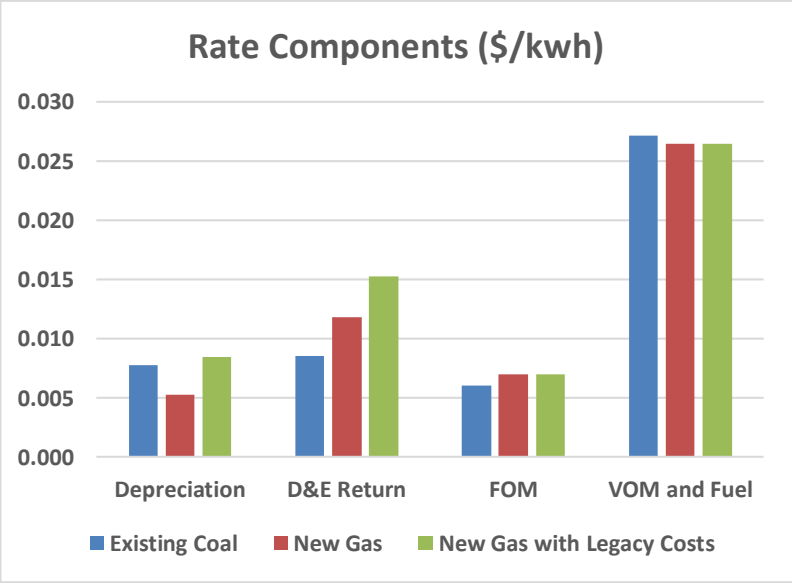
REGULATED UTILITY EARNINGS

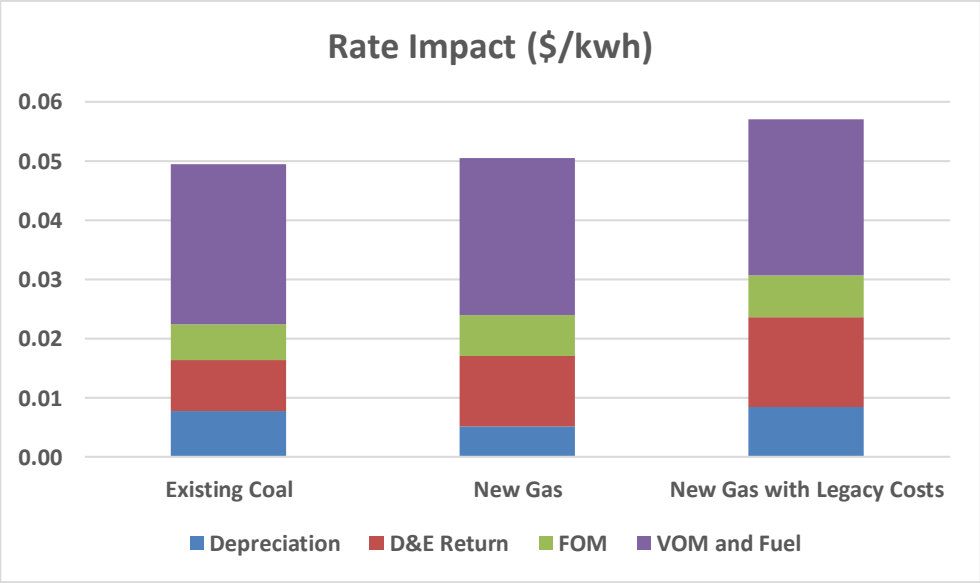
- Regulated utilities receive a return of and on their undepreciated invested capital.
- When electricity demand was growing, there was a continuous flow of capital into new projects allowing utilities to maintain or grow earnings.
- Without electricity demand growth, earnings are declining as existing plants depreciate.
- Replacement of coal largely depreciated plants can support earnings growth in regulated utilities that do not have an organic need for new capacity.



REGULATED UTILITY EARNINGS

- When plants are prematurely retired, utilities expect to receive their full returns of and on their investments in these stranded assets.
- New investments also provide returns on and of their investments.
- As a result, the utilities which prematurely retire plants are able to significantly increase their earnings.

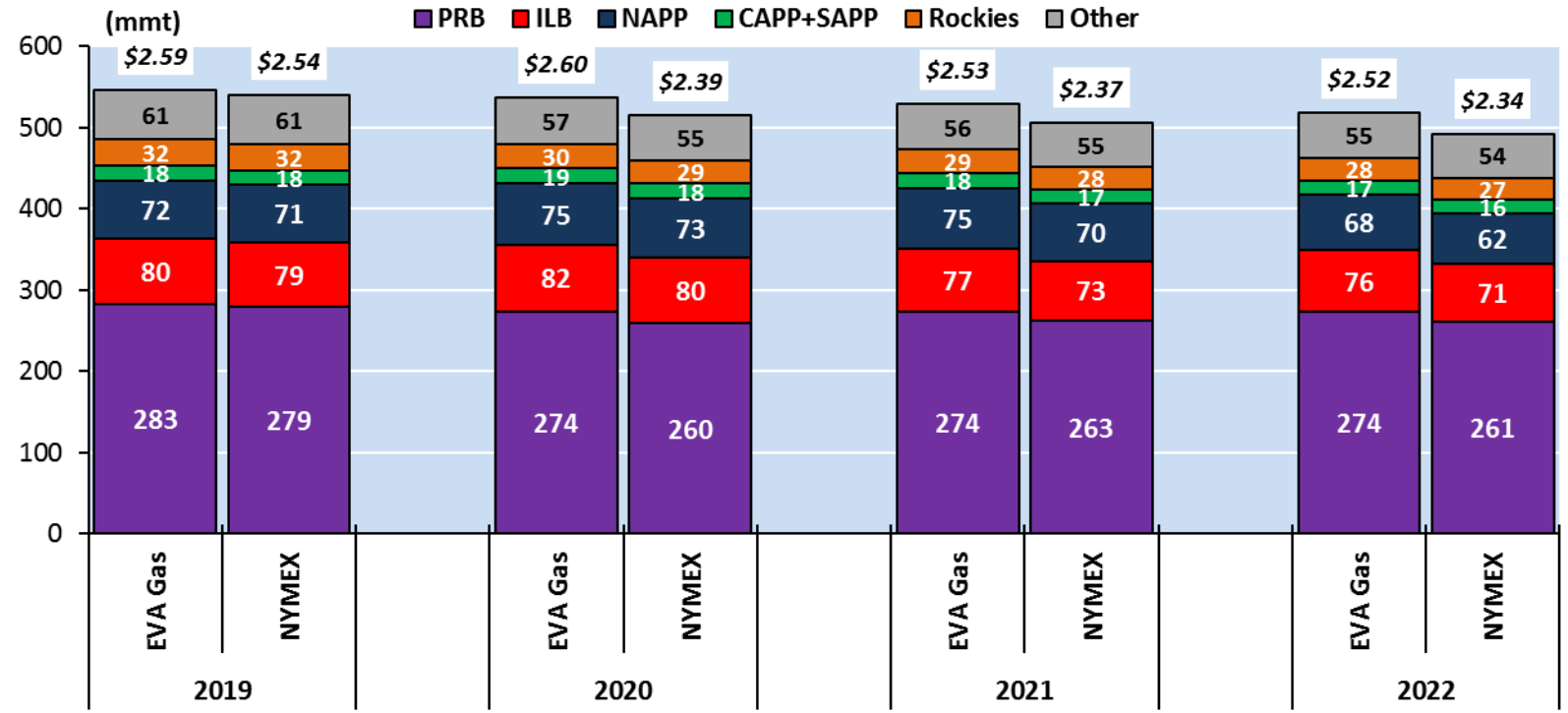




GAS PRICES CONTINUE TO IMPAIR COAL GENERATION

- **Low gas prices and continued coal retirements limit upside to electric power coal burn**
- **Coal retirements and increased renewable generation are expected to push coal burn down to 520 million tons in 2022. The lower NYMEX forward prices could push burn below 500.**

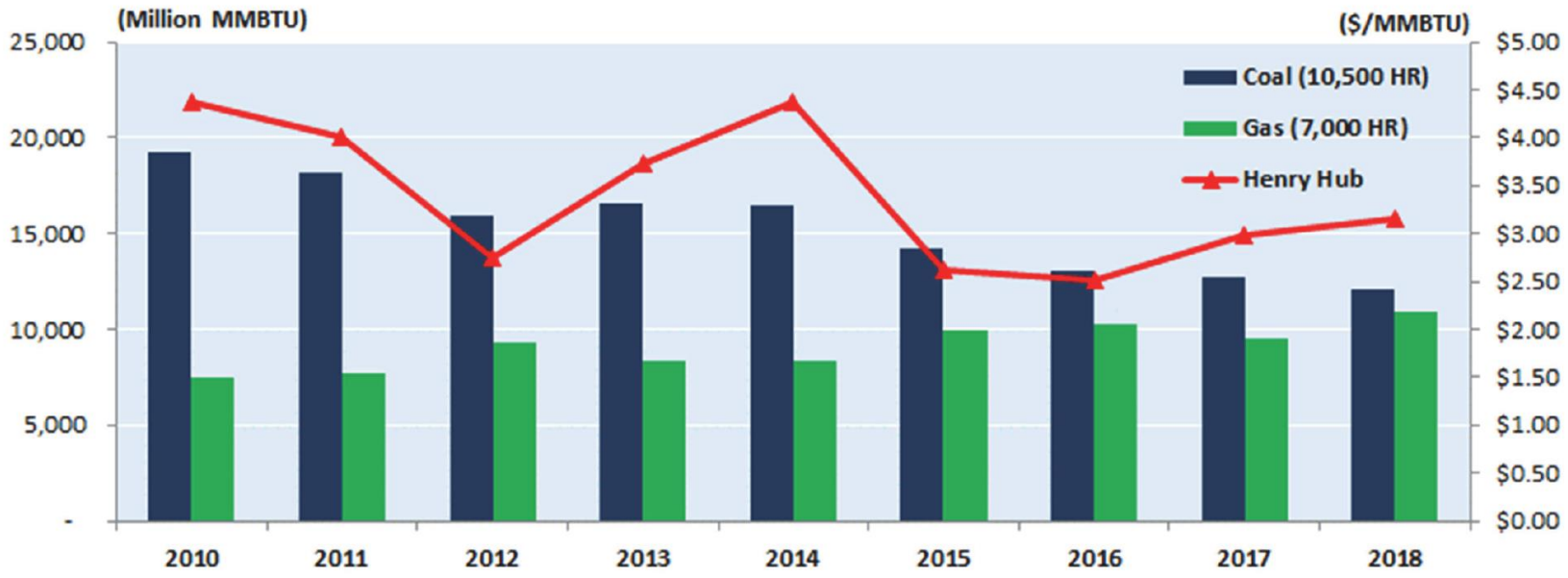
ST COAL BURN FORECAST: EVA GAS VS. NYMEX



Source: EVA 2019 Q4 Coal Forecast

DISPLACEMENT OF COAL GENERATION BY DISCOUNTED GAS PRICES

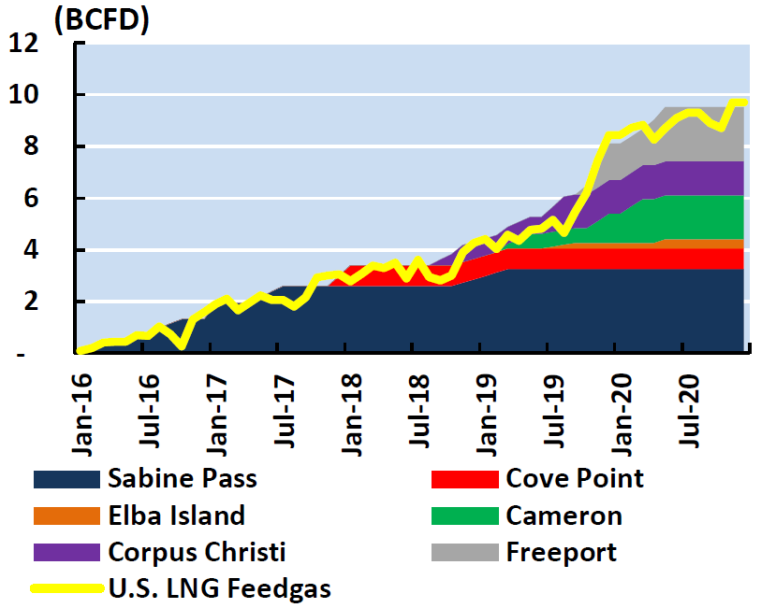
- **The shale gas revolution resulted in growth in supply exceeding growth in demand**
- **With the utility sector being the only readily available market and limited gas storage options, the price of gas was discounted to what was needed to displace coal generation.**
- **As coal plants are retired, displacement potential from coal is less**



INCREASED EXPORTS OF NATURAL GAS COULD LINK DOMESTIC GAS PRICE WITH WORLD MARKET

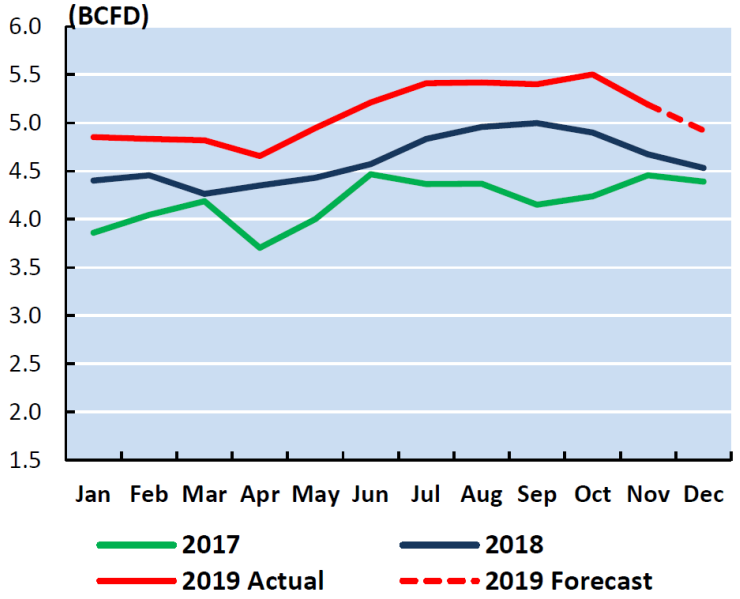
- **The power sector accounts for only about one-third of current gas demand. With the growth in gas demand in other sectors, the power share of gas demand is expected to remain about the same.**
- **The growth in gas demand is expected to come from exports of LNG and gas to Mexico**

U.S. LNG EXPORTS CAPACITY



Source: EVA

U.S. EXPORTS TO MEXICO



Source: EVA

REGULATIONS

- **The Mercury and Air Toxics Standard (MATS) was the single largest cause of coal plant retirements. In December 2018, EPA issued a proposed Revised Supplemental Cost Finding that concluded the rule was not appropriate and necessary. Reportedly, a draft rule revoking MATS is under review which is expected to be completed in 2020.**
- **Coal Combustion Residuals Rule (CCR) requires "clay-lined" surface impoundments. This requirement is independent of whether the plant is to be closed although it could affect deadlines.**
- **Effluent Limitation Guidelines will require FGD wastewater treatment for most plants with wet scrubbers that is the combination of chemical and biological treatment**
  - **EPA relaxed the required compliance plan for bottom ash (BA) transport water to dry handling or high recycle rate system with recycling rate exceeding 90%**
  - **EPA established multiple categories with no or relaxed compliance requirements**
  - **Affected units will have until December 31, 2023 to comply with the BA transport water section of the Rule and until December 31, 2025 to comply with the FGD section of the Rule**
- **The Affordable Clean Energy (ACE) rule will reduce the impact on coal demand as compared to the Clean Power Plan. Over 95 percent of the heat rate improvement (HRI) eligible capacity is expected to retrofit HRI by the compliance deadline and the balance is projected to retire. The retirements could be significantly higher without changes in the NSR.**

CHALLENGING PREMATURE COAL PLANT RETIREMENTS

- **Integrated Resource Plans (IRPs)**
  - Periodic mandatory review of resource plans
  - IRPs have become the "first step" in justifying coal plant retirements
  - Stakeholder involvement is critical to insure proper assumptions regarding commodity price forecasts, regulations, resource options, and modeling approaches.
  - Require "real" customer rate impact analysis
- **Promote IURC/State Requirements Regarding Sales of Coal Plants**
  - Wyoming recently passed a law stating that unless a good faith effort to sell coal plants was performed, future return on investment may not be available. Wyoming law requires utility purchase power at utility's avoided cost.
  - New Hampshire mandated and managed the engagement of a sale manager for the sale of the Eversource assets.
- **Life Cycle Analysis (LCA) of Carbon Emissions**
  - NETL and others have developed LCA models which incorporate upstream emission levels
  - New gas is either a commitment to carbon generation for 35 plus year or the construction of an asset that will be stranded before its expected life.
  - If Existing Coal is followed by low or no carbon renewables, existing coal plants have considerably lower life cycle emissions.

CHALLENGING EARLY COAL PLANT RETIREMENTS CONTINUED

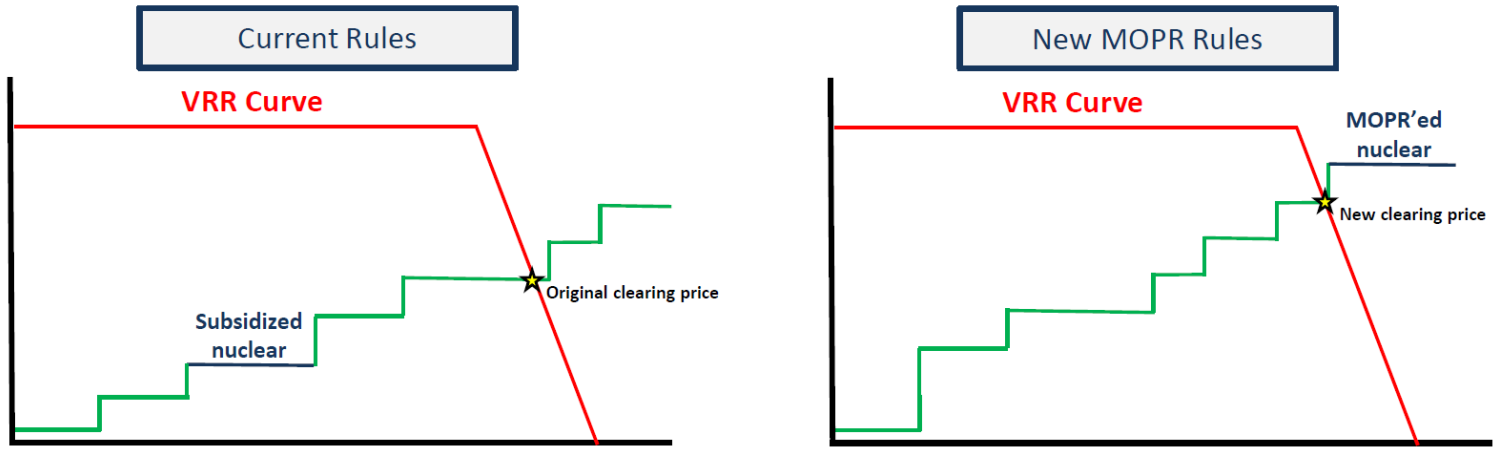
- **Support for Changing Regulated Utility Compensation Model**
  - Investor Owned Utilities (IOU) are facing challenges due reduced need for new generation
  - IOU's have a tremendous incentive to promote high cost self build replacements for depreciated coal
  - Alternative compensation structures should be promoted to eliminate the self build bias.
- **Support Policy on Grid Resilience Initiatives**
  - Acknowledge importance of on-site storage
  - Acknowledge security risks related to pipeline delivery
  - Acknowledge potential price risk with heavy reliance on gas
  - Develop long-dated capacity tranches in RTO's to support coal commitment
- **Other**
  - Improve competitiveness of existing coal plants
  - Vertical integration
  - Support demonstration of Carbon Capture and Sequestration (CCS) and Carbon Capture Utilization and Storage (CCUS) projects at existing sites

CCS AND CCUS ADVANCES GLOBALLY AND DOMESTICALLY

- CCS and CCUS are increasingly being considered.
- According to Global CCS Institute, there are 19 large-scale CCS in operation, 4 under construction and 28 in various stages of development
- In September 2019, the U.S. DOE selected nine facilities for Front End Engineering Design (FEED) grants. Five of the facilities selected are post-combustion options for existing coal plants. The plants - Dry Fork (WY), Gerald Gentleman (NE), Milton Young (ND), Prairie State (IL) and San Juan (NM) – burn a range of coal types from lignite through bituminous and operate in different geographic regions.
- Section 45Q tax credits, which are available for CCS and CCUS, are likely to be the key to further activity.
- The Bipartisan Budget Act of 2018 contained several modifications to Section 45Q including elimination of the 75 million tonne cap, an increase in the value of the tax credit from $10 to $35 for CO_2 used in enhanced oil recovery and $20 to $50 for sequestration, and expanding the eligibility to include CO_2 captured through direct air capture technology. Guidance from Treasury Department and IRS, which are required, has not been provided to date.
- Ultimately, CCS and CCUS may be needed to achieve significant global reductions given the non-U.S. dependence on coal.

SUPPORT FOR CREDITS FOR COAL GENERATION ARE BEING CONSIDERED

- **PJM's FERC-Ordered Minimum Offer Price Rule (MOPR)**
  - FERC in Dec. 2019 issued a long-awaited order directing PJM to make changes to its capacity market rules to mitigate the negative impact of state subsidies on auction clearing prices
  - Currently, plants that receive state subsidies (renewables, IL/OH/NJ nuclear, some OH coal) can offer into the auction below their actual cost because they include the out-of-market (subsidy) revenue in their calculation. As a result, clearing prices can be suppressed and non-subsidized plants can be "priced out" of the market
- **FERC's order directs PJM to set a price floor for existing and new plants that is intended to reflect the true unsubsidized cost of each resource type**
  - Subsidized plants will no longer be able to include subsidies in their offers and suppress clearing prices



VRR- Variable Resource Requirements

Thanks

Any questions?

Emily Medine

emedine@evainc.com

412-421-2390

OUTLOOK FOR U.S. COAL

Prepared for :

Interstate Mining Compact Commission

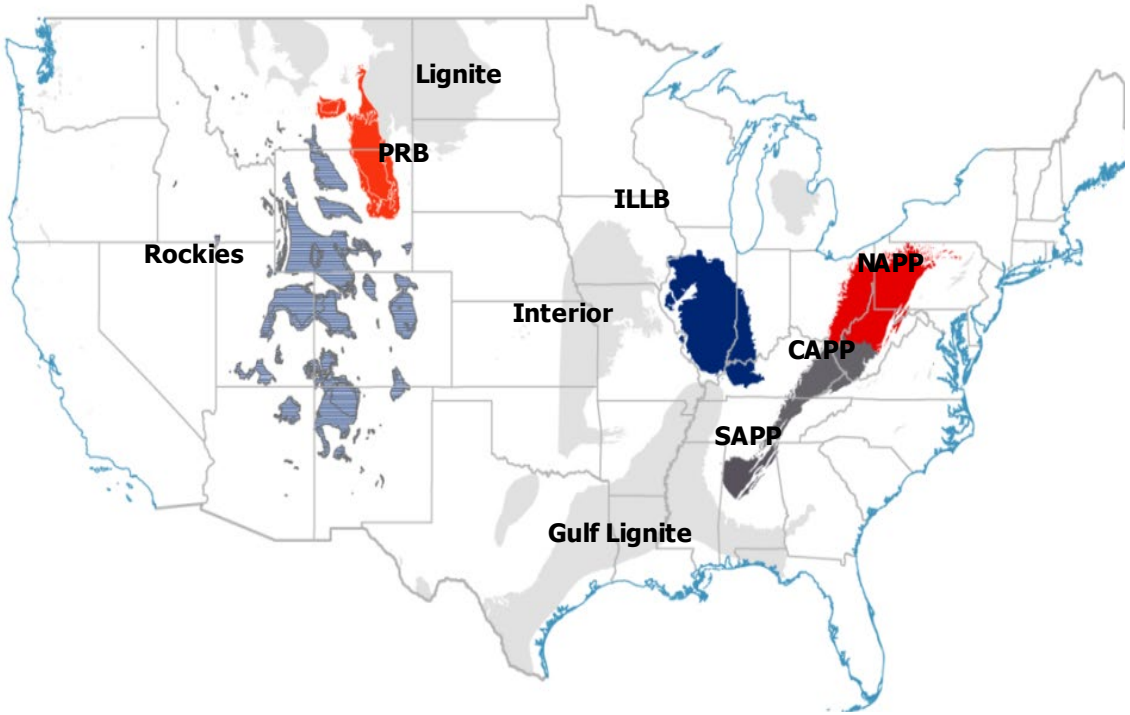
Energy Ventures Analysis, Inc.
1901 N. Moore Street,, Suite 1200 Arlington, VA 22209
(703) 276 8900
www.evainc.com

US COAL OUTLOOK HAS TURNED VERY NEGATIVE

- **While the coal market was poor in 2014, major factors have gotten much worse since then**
- **Increasing natural gas production is driving down prices**
  - Excess gas supply will displace coal burn in 2015 and beyond
- **World thermal coal market prices have collapsed**
  - US thermal coal exports must fall sharply in 2015
- **The US dollar continues to rise against other coal currencies**
  - Forces prices down in US dollars; other countries don't see decline
- **Retirements of coal-fired plants will hit in 2015 and 2016**
  - EPA MATS rule will cause plant retirements
- **EPA's carbon rule hangs over long-term decisions on coal plant investment**

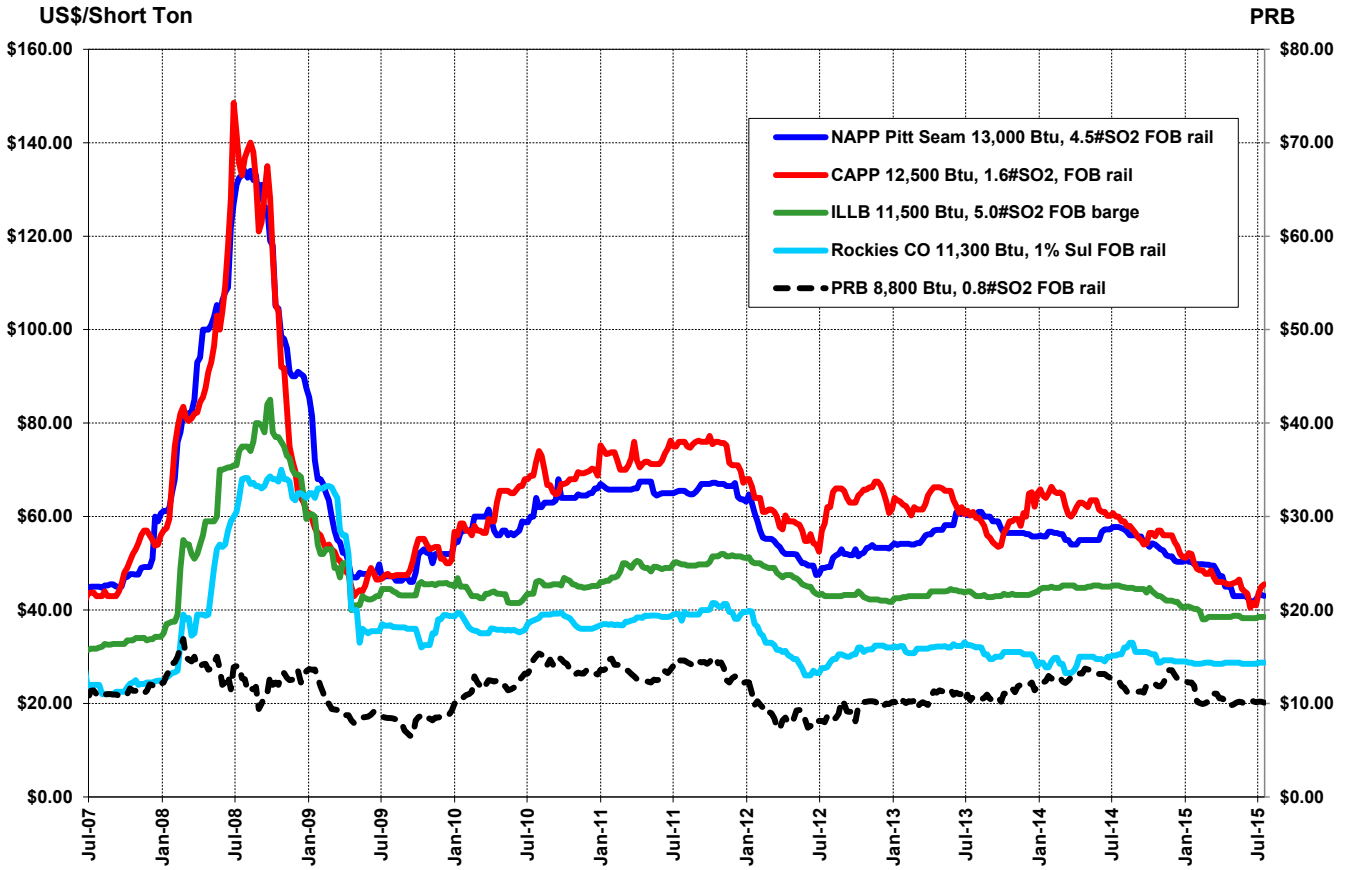
COAL PRODUCED THROUGHOUT THE US

MAJOR COAL SUPPLY BASINS IN THE U.S.



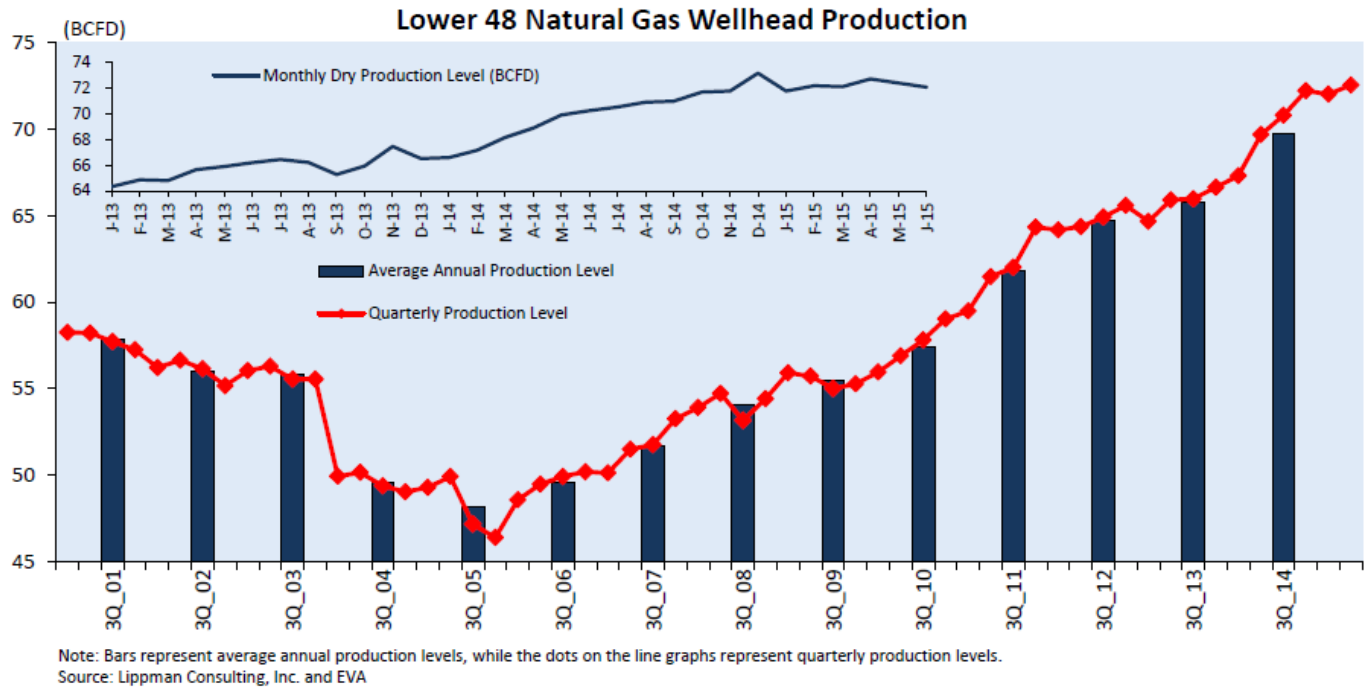
US COAL MARKET PRICES ARE FALLING

- **Since mid-2014, all regional prices are down 15% - 30%**
  - CAPP rail below $50; PRB down to $10 per ton



GAS SUPPLY KEEPS GROWING

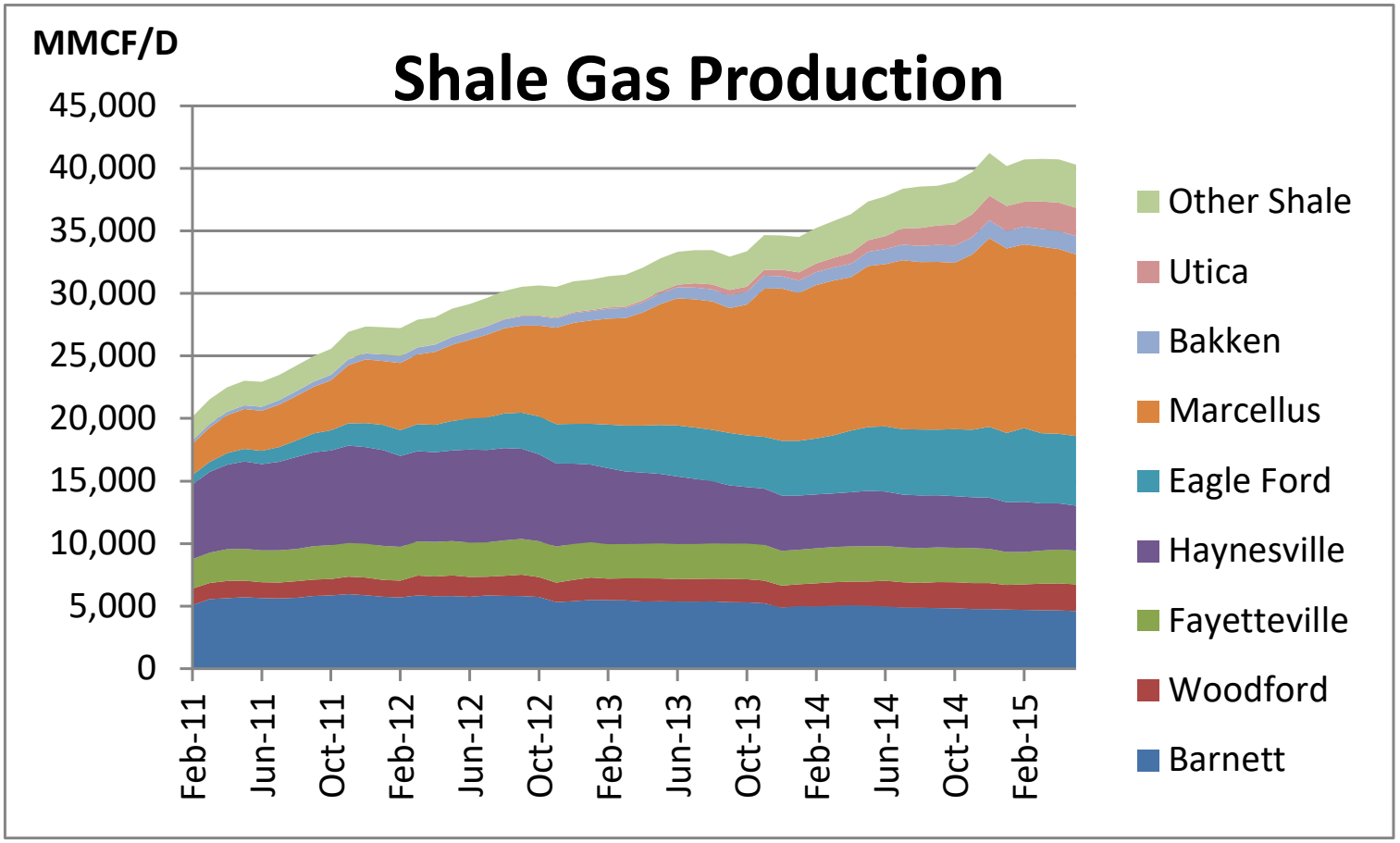
- **Marketable gas production approaching 70 BCFD**



Note: Bars represent average annual production levels, while the dots on the line graphs represent quarterly production levels.
Source: Lippman Consulting, Inc. and EVA

- Each additional 1.0 bcfd equals about 25 million TPY of coal burn

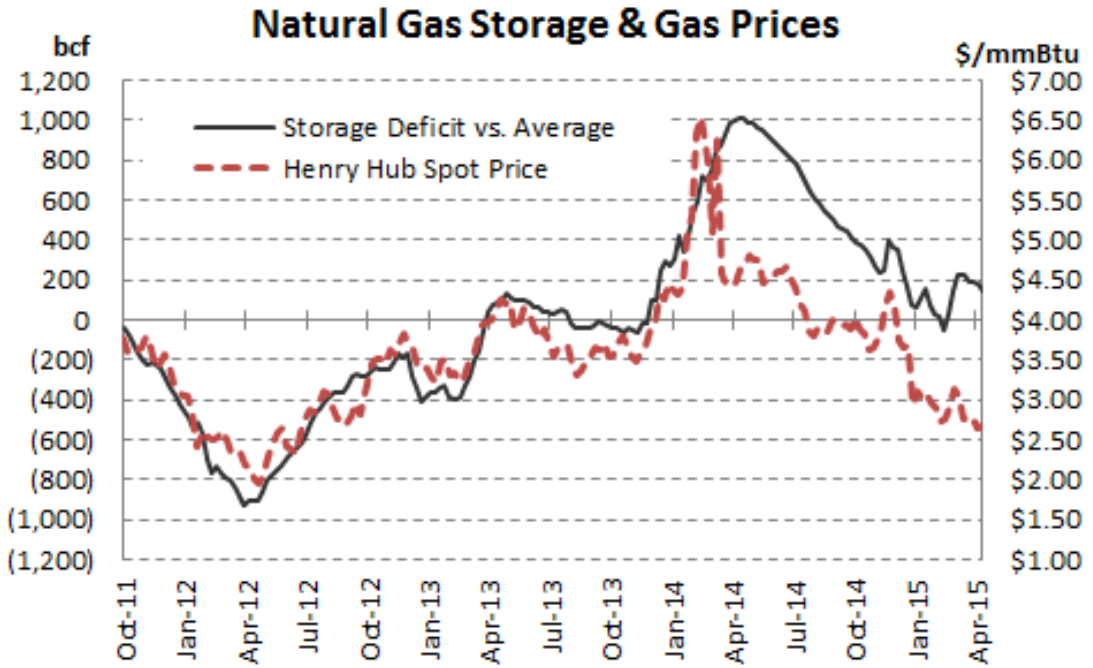
GROWTH IS DRIVEN BY GROWTH IN SHALE GAS PRODUCTION



- Largest growth is from Marcellus
- Eagle Ford is experiencing significant growth

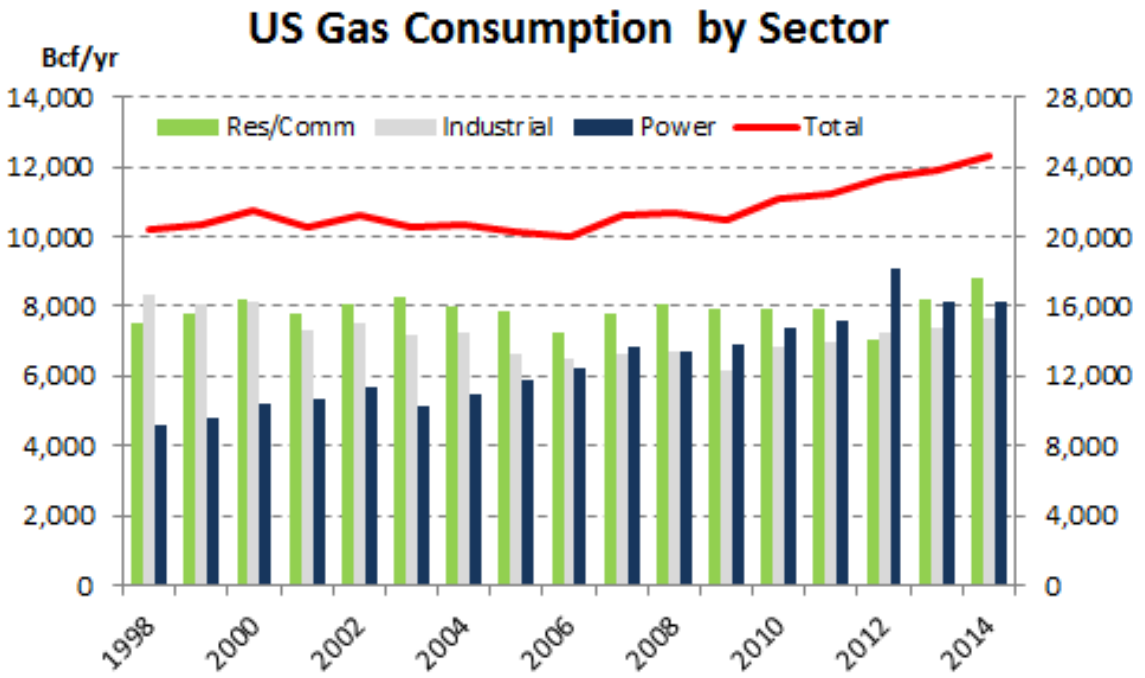
MARKETS EXPECT CONTINUED HIGH PRODUCTION

- **Balanced market price was about $4.00 per MMBtu at Henry Hub**
  - Above-normal storage would push prices down; below-normal would cause spike
- **Growing gas supply has changed the balanced-market price**
  - Storage is slightly below normal, but no price response
- **Is the new normal closer to $3.00 MMBtu price?**



ONLY NEAR-TERM GROWTH POTENTIAL IS IN POWER SECTOR

- **No long-term growth in residential and commercial demand**
  - Large winter swings with warm 2011-12 and cold 2013-14
- **Industrial demand growth steady at 200 – 300 bcf per year**
- **Only near-term growth opportunity for natural gas is in power generation because of availability of CCGTs.**
  - Power generation can swing 3 bcfd by displacing coal burn



BREAK-EVEN COAL VS GAS PRICING

Price at Which Gas Displaces Coal on the River in the Current Market

BREAK EVEN GAS PRICE for ILLB		
ILLB-L. BARGE_11,500 BTU_5.2# SO2		
FOB Barge	$/ton	$32.00
Barge	$/ton	$10.00
Enviro. Cost	$/ton	$1.00
Total Cost	**$/ton**	**$43.00**
	$/mmbtu	**$1.87**
	$/MWh	**$18.70**
Break Even Gas Price	**$/mmbtu**	**$2.67**

Price that Coal Could Sell at if Gas was $4.00 per MMBtu

BREAK EVEN COAL PRICE IF GAS IS $4.00		
ILLB-L. BARGE_11,500 BTU_5.2# SO2		
FOB Barge	$/ton	$53.40
Barge	$/ton	$10.00
Enviro. Cost	$/ton	$1.00
Total Cost	**$/ton**	**$64.40**
	$/mmbtu	**$2.80**
	$/MWh	**$18.70**
Gas Price	**$/mmbtu**	**$4.00**

EASTERN POWER GENERATION

- **Natural gas displaced huge amounts of coal in 2012**
  - Coal rebounded in 2013 & 2014 with cold weather and higher gas prices
  - Increased gas supply forcing a repeat in 2012

Eastern Power	January - December							Change 08-14	
GWh	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**GWh**	**%**
Coal	1,274,785	1,082,009	1,147,758	1,033,257	871,929	907,657	920,671	(354,114)	-27.8%
Natural Gas	334,480	384,901	459,730	512,238	638,524	562,820	570,433	235,953	70.5%
Oil	19,655	14,291	12,653	5,814	3,623	4,570	9,556	(10,099)	-51.4%
Pet Coke	8,016	6,869	7,500	6,367	4,056	6,267	5,300	(2,716)	-33.9%
Fossil Total	**1,636,936**	**1,488,070**	**1,627,641**	**1,557,676**	**1,518,132**	**1,481,314**	**1,505,960**	**(130,976)**	**-8.0%**
Nuclear	619,306	610,822	611,792	606,203	598,872	625,570	622,386	3,080	0.5%
Hydro	65,450	83,684	73,283	77,733	65,476	83,630	75,269	9,819	15.0%
Wind	5,818	10,122	14,761	18,257	22,666	29,124	31,578	25,760	442.8%
Solar	2	29	147	275	820	1,362	2,788	2,786	139300%
Biomass	18,280	18,408	19,291	18,865	19,335	20,562	22,874	4,594	25.1%
Pumped Storage	(6,930)	(5,441)	(6,205)	(6,257)	(5,363)	(4,876)	(5,833)	1,097	-15.8%
Other Gases	774	490	689	427	673	1,729	1,674	900	116.3%
Other	5,986	5,681	5,658	6,349	6,361	6,088	6,187	201	3.4%
Non-Fossil Total	**708,686**	**723,795**	**719,416**	**721,852**	**708,840**	**763,189**	**756,923**	**48,237**	**6.8%**
Total	**2,345,622**	**2,211,865**	**2,347,057**	**2,279,528**	**2,226,972**	**2,244,503**	**2,262,883**	**(82,739)**	**-3.5%**
Coal Burn ktons	605,042	519,892	549,041	500,871	427,236	446,161	445,044	(159,998)	-26.4%
Gas Burn bcfd	7.2	8.1	9.9	10.8	13.4	11.7	11.8		

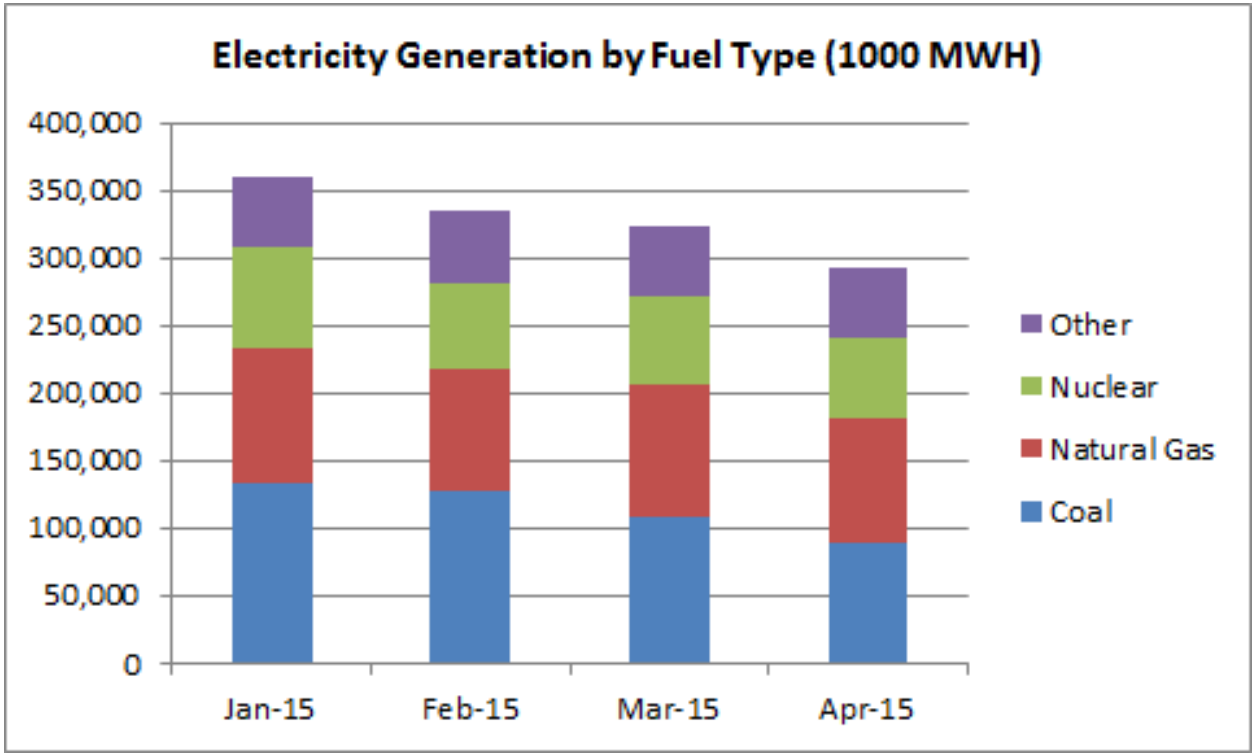
WESTERN POWER GENERATION

- **Subsidized wind & solar are displacing fossil generation**

Western Power	January - December							Change 08-14	
GWh	2008	2009	2010	2011	2012	2013	2014	GWh	%
Coal	692,010	657,191	678,092	682,874	626,712	660,625	649,353	(42,657)	-6.2%
Natural Gas	463,949	452,589	437,974	410,207	490,698	462,872	455,983	(7,966)	-1.7%
Oil	1,145	841	928	864	732	735	821	(324)	-28.3%
Pet Coke	4,641	4,604	4,803	6,466	3,306	5,035	5,158	517	11.1%
Fossil Total	**1,161,745**	**1,115,225**	**1,121,797**	**1,100,411**	**1,121,448**	**1,129,267**	**1,111,315**	**(50,430)**	**-4.3%**
Nuclear	186,905	188,032	195,174	184,004	170,461	163,445	174,677	(12,228)	-6.5%
Hydro	186,429	186,421	183,710	238,411	206,751	179,953	179,168	(7,261)	-3.9%
Wind	49,311	63,504	79,455	101,507	117,666	138,127	149,324	100,013	202.8%
Solar	857	862	1,055	1,451	3,328	7,331	14,988	14,131	1648.9%
Geothermal	14,605	14,841	15,020	15,092	15,299	15,497	16,376	1,771	12.1%
Biomass	7,620	8,191	8,533	7,819	8,252	8,676	9,294	1,674	22.0%
Pumped Storage	642	816	703	(164)	412	194	(376)	(1,018)	-158.6%
Other Gases	2,422	2,565	2,280	2,513	2,315	2,602	2,273	(149)	-6.2%
Other	957	710	920	1,098	1,056	1,025	982	25	2.6%
Non-Fossil Total	**449,748**	**465,942**	**486,850**	**551,731**	**525,540**	**516,850**	**546,706**	**96,958**	**21.6%**
Total	**1,611,493**	**1,581,167**	**1,608,647**	**1,652,142**	**1,646,988**	**1,646,117**	**1,658,021**	**46,528**	**2.9%**
Coal Burn ktons	430,696	408,705	421,084	426,891	392,359	409,533	403,015	(27,681)	-6.4%
Gas Burn bcfd	10.0	9.7	9.5	9.0	10.5	9.9	9.6		

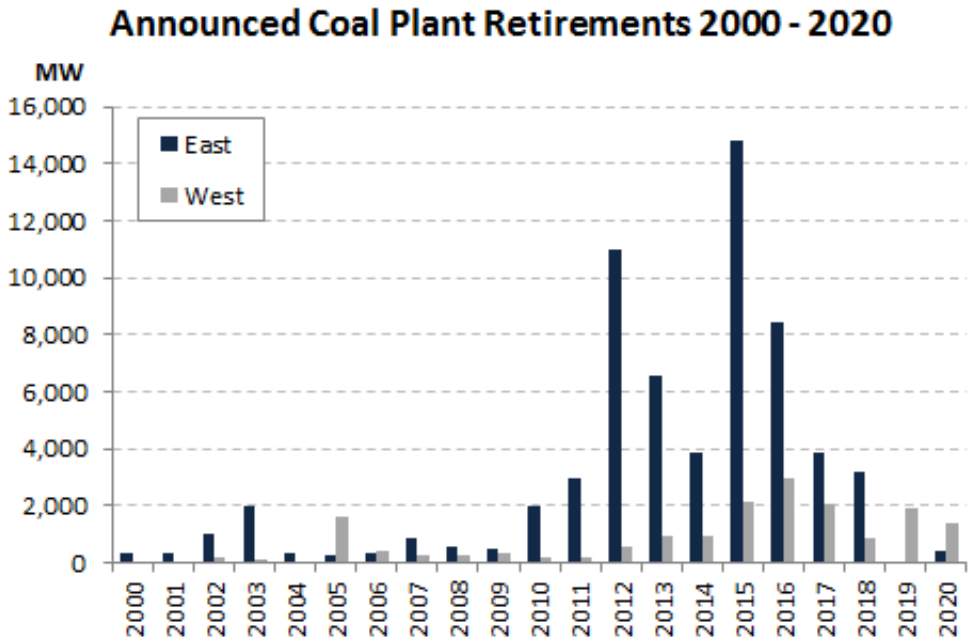
2015 GENERATION YTD

- In April 2015, for the first time, natural gas-fired generation was higher than coal generation.

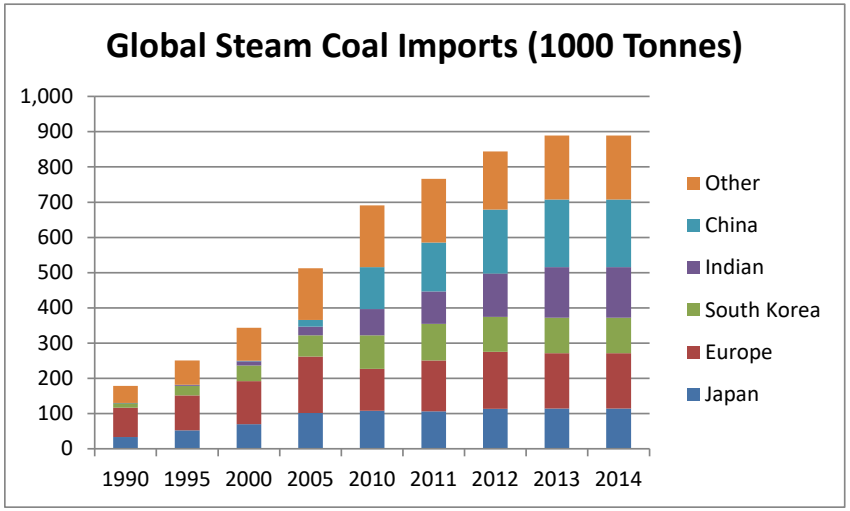


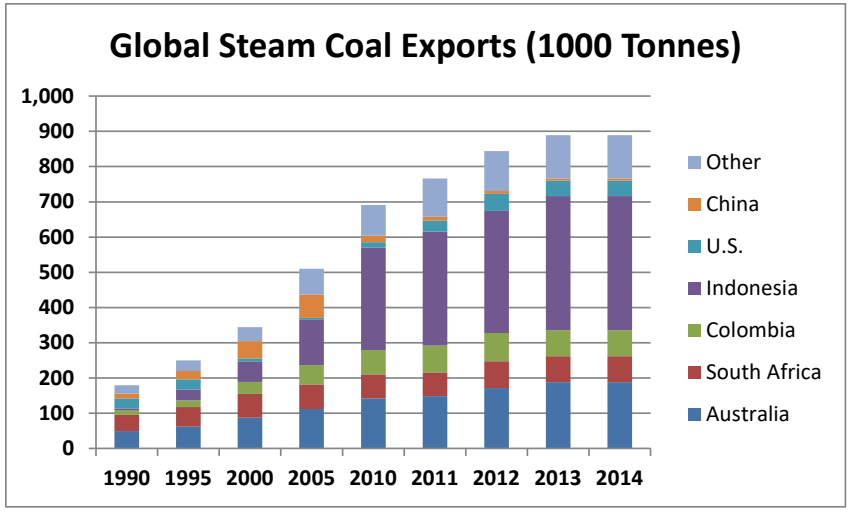
COAL-FIRED POWER PLANT RETIREMENTS

- **Announced retirements 2012 – 2020 equal 66 GW of a 317 GW coal fleet**
  - Plants retiring by 2020 burned 86 mm tons in 2014
- **MATS rule has greatest impact in the East**
  - Compliance dates of April 2015 and 2016 drives spike in retirements those years
  - Early retirements in 2012 and 2013 due to operating losses in weak markets
- **Regional haze is closing plants in the West**



GLOBAL STEAM COAL TRADE REMAINED STRONG THROUGH 2014

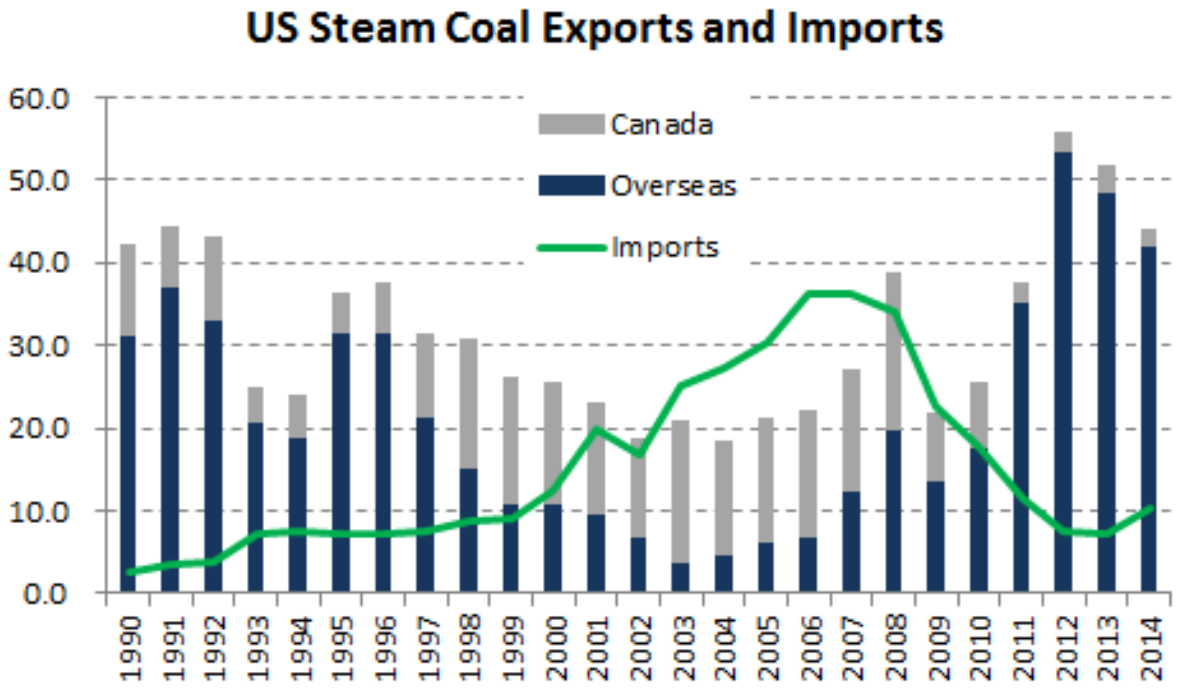




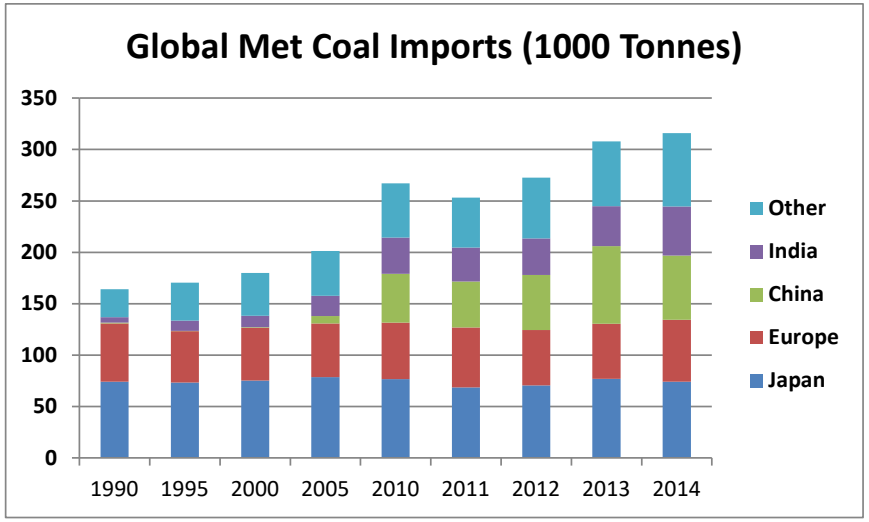
- Import growth is principally in Pacific markets although Europe remains strong.
- Export growth is principally from Indonesia, Australia and Russia
  - Colombia has increased but has been challenged in the last three years with domestic issues
  - US is the swing supplier

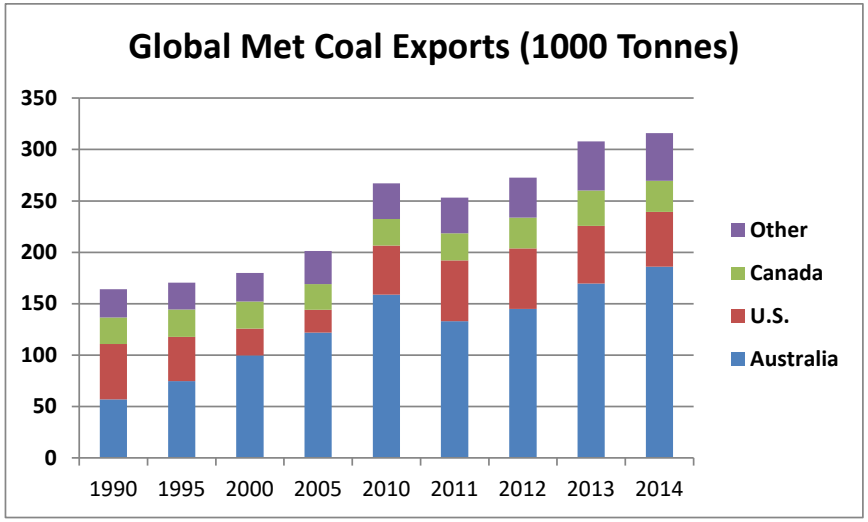
US EXPORTS TO WORLD THERMAL MARKETS

- US overseas steam coal exports collapsed through 2003 with strong dollar and growing supply from other countries
- Overseas exports surged in 2011 and 2012 on domestic surplus
- World markets will not absorb US surplus in 2015



GLOBAL COAL TRADE REMAINED STRONG THROUGH 2014

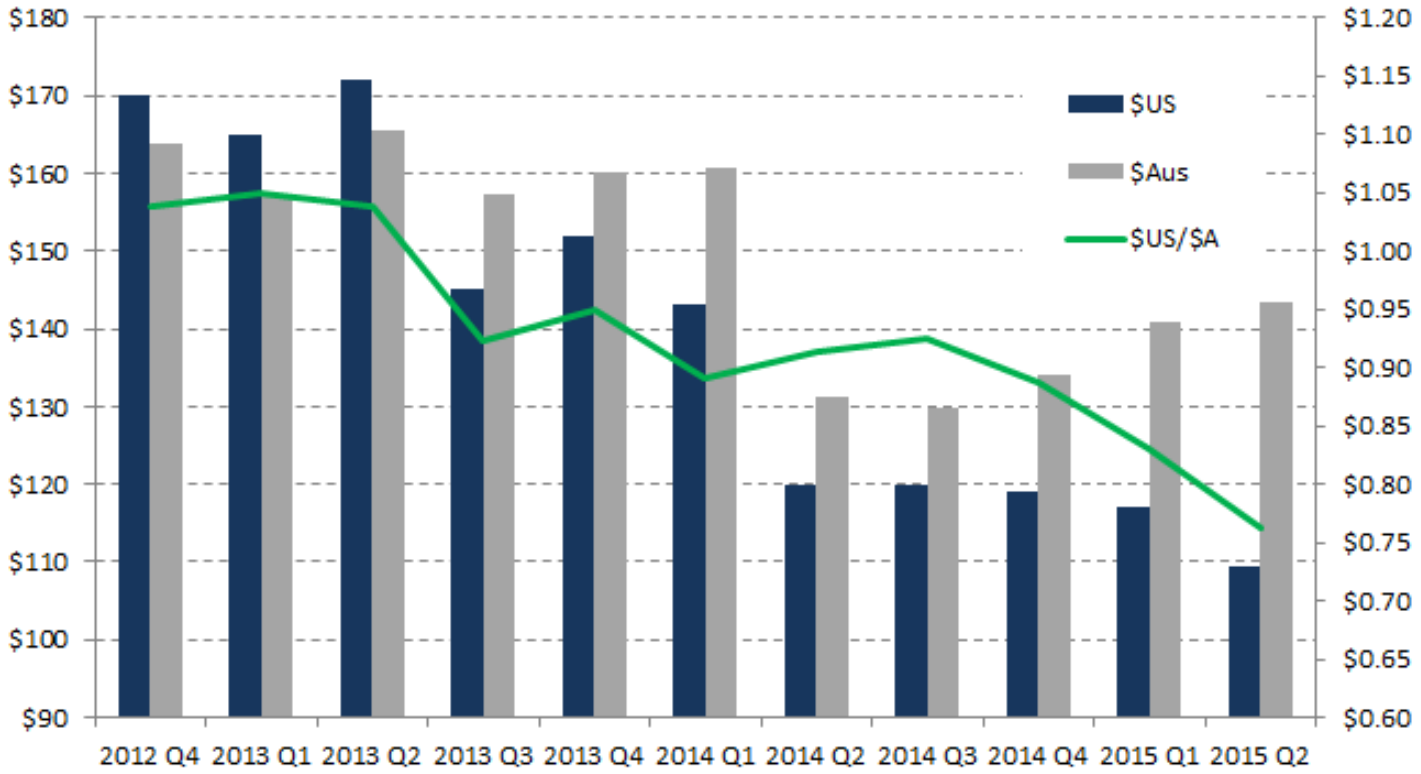




- Supply is dominated by Australia, with US as the swing supplier
- The supply disruption in 2011 due to flooding in Queensland resulted in a spike in global pricing which triggered massive investments both in Australia and the US
  - Australian exports are now stronger than ever
  - The strong US dollar compared to the Australian dollar have made Australian exports more competitive
- The significance of Chinese imports to the overall market is problematic.

IMPACT OF US CURRENCY EXCHANGE ON WORLD MET PRICES

- **Benchmark price had been flat in Australian dollars until 2014 Q2**
  - Collapse in 2014 Q2 shows excess supply as Australian exports recover from floods
- **Price has been rising in Australian dollars with weaker $A**
  - Price has fallen in USD from $120 to $109.50

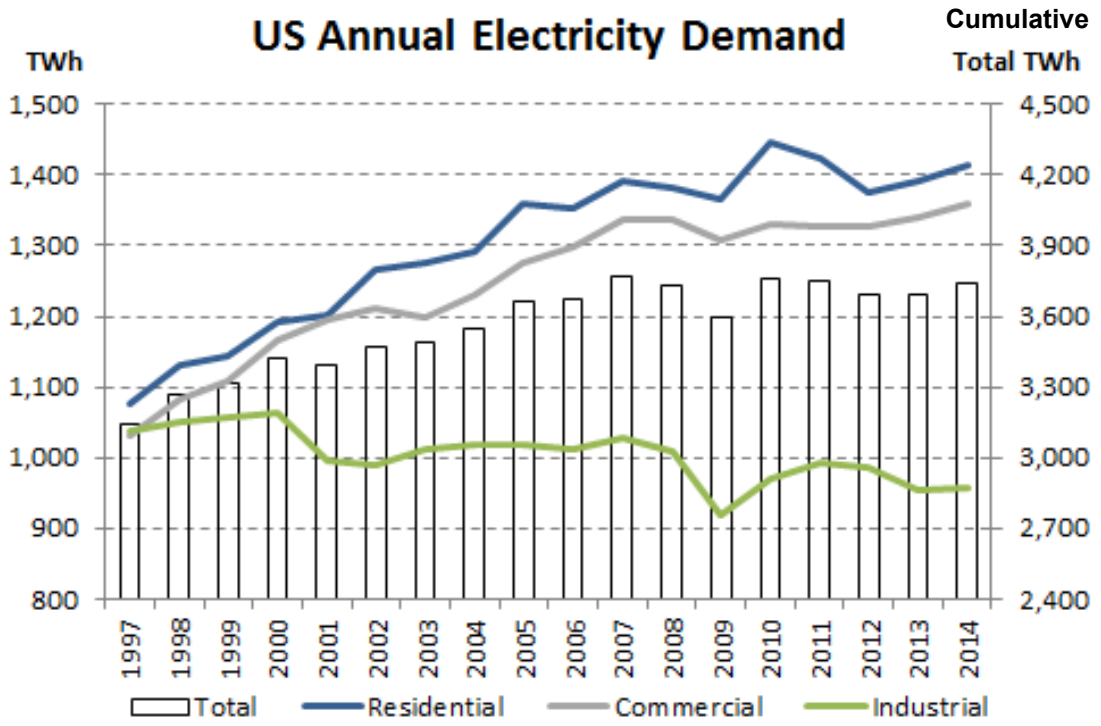


OUTLOOK FOR DOMESTIC POWER MARKETS

- **Low electricity demand growth**
- **Loss of market share for coal**
  - CCGT gas-fired plants are displacing coal generation
    - Impacts vary by basin: most PRB and ILB plants run when gas prices are above $4.00
  - Growth in subsidized non-fossil generation
- **Coal-fired plant retirements are driven by a combination of new EPA rules forcing retrofit capital investment and low gas and power prices**
  - New CCGT capacity is still being constructed while existing coal retires
- **Major new EPA rules forcing capital investment or retirements**
  - Mercury and Air Toxics Standard (MATS) takes effect in 2015 despite the fact that the Supreme Court remanded MATS in June.
  - Cross-State Air Pollution Rule (CSAPR) started in 2015; phase 2 in 2017
  - Regional Haze (BART) affecting western coal plants
  - New Source Review (NSR) litigation
  - Final Clean Power Plan (announced 8/3/2015) goes into effect in 2022

ELECTRICITY DEMAND GROWTH HAS VANISHED

- **No growth in electricity demand since 2007**
  - Total fell in 2011, 2012 and 2013; up 1.3% YTD Nov 2014 on cold winter
  - Industrial demand is 10% below 1997
- **Compound annual growth rates since 2006**
  - Residential – 0.6%; commercial – 0.6%; industrial – (0.7%); total – 0.2%



CLEAN POWER PLAN PROPOSED RULE

- **EPA's draft proposal was published June 18, 2014.**
  - The plan uses authority under Section 111(d) of the Clean Air Act to regulate existing power plant CO2 emissions by setting state-level emission reduction targets.
  - It seeks to achieve 30% power sector CO2 reductions from 2005 levels by 2030
- **The rule covers 3,104 qualifying fossil-fired units totaling over 700,000 MW of capacity.**
- **It stipulated that states must develop State Implementation Plans (SIPs) that meet CO2 emission rate limitations within one year of the final rule's release.**
  - States are eligible for extensions at EPA's approval or if they opt to participate in multi-state programs
- **The states were given the option to develop either a rate-based (#/MWh) or mass-based (tons of CO2 emissions) compliance strategy, though mass-based strategies are likely to be more prevalent because they are easier to enforce.**
  - The initial proposal contained only rate-based targets, but in November 2014 EPA released a methodology for translating rate-based targets into mass-based targets.
- **The EPA developed its emission limits by applying "4 Building Blocks" which it defined to be the Best System of Emission Reductions (BSER). The building blocks are:**
  - BB#1: Coal unit process efficiency improvements
  - BB#2: Gas unit re-dispatching
  - BB#3: Zero-carbon energy (renewables, nuclear)
  - BB#4: Energy efficiency
- **Once emission limits are established, states are ostensibly free to comply in any manner they choose.**

CLEAN POWER PLAN FINAL RULE

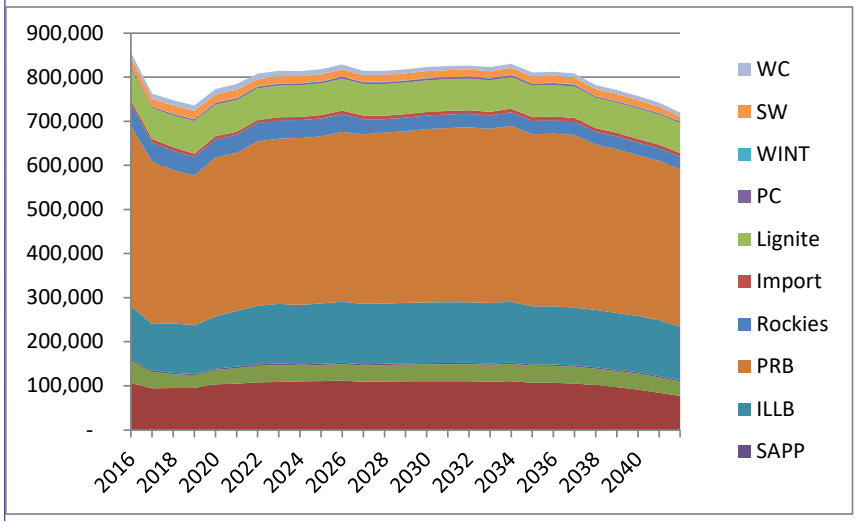
- **On August 3, 2015, the EPA released the final version of the Clean Power Plan, though it is not yet published in the Federal Register.**
- **Major changes from the 2014 proposal are as follows:**
  - Increased carbon reduction target to 32% from 30% by 2030
  - Delay of initial compliance to 2022 from 2020
  - Modification of Building Block 1 (heat rate improvements)
    - Efficiency improvements are now 4.3%, 2.1%, and 2.3% for the East, the West, and TX, respectively
    - In 2014 proposal, BB1 was set to 6%
  - Modification of Building Block 2 (NGCC re-dispatch)
    - Existing NGCCs can be re-dispatched at 75% CFs to achieve targets
    - In 2014 proposal, NGCCs were re-dispatched at 70% CFs
  - Modification of Building Block 3 (zero-carbon generation)
    - Existing and under-construction nuclear not counted in calculation
  - Elimination of Building Block 4 (energy efficiency)
  - Updated method to calculate source-specific emission performance rates

IMPACT OF FINAL CLEAN POWER PLANT RULE

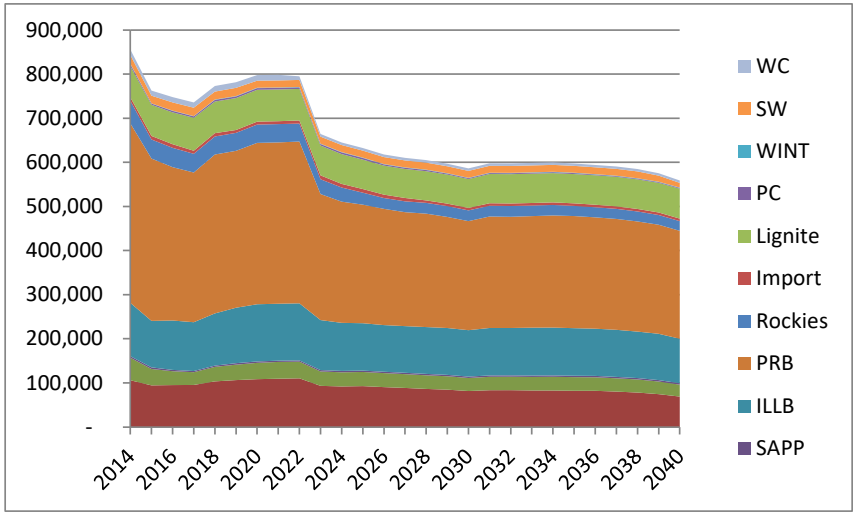
- **Independent analyses underway**
- **Expected results**
  - Impact on coal demand greater than previously forecasted
  - Distribution of impact different due to changes in target calculations.
    - Powder River Basin coal took the brunt under the Proposed Rule
    - Impact is expected to be more uniform across all supply regions in Final Rule
  - Lower growth in demand for natural gas with focus on renewables
- **Litigation Strategy**
  - Focus will continue to be to have the rule vacated long-term but stayed in the short-term to avoid another MATS situation

COAL BURN FOR ELECTRIC GENERATION UNDER PROPOSED CLEAN POWER PLAN RULE (1000 Tons)

No New Carbon

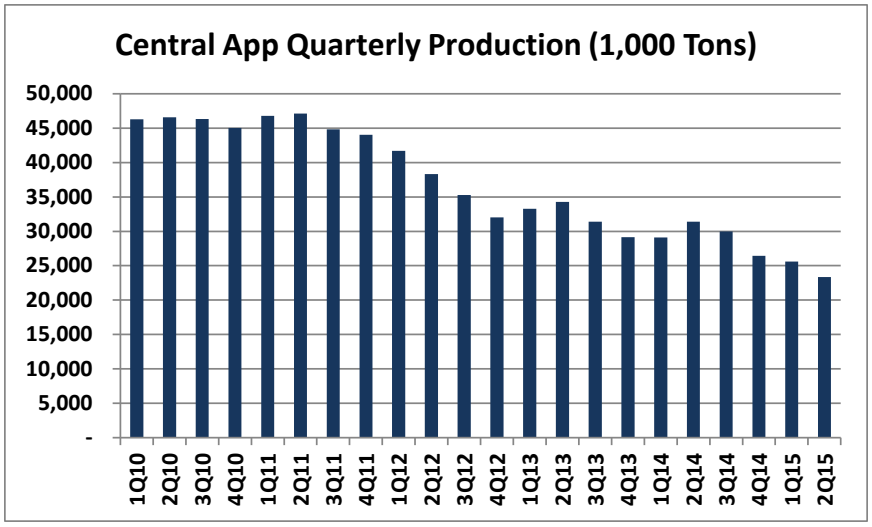


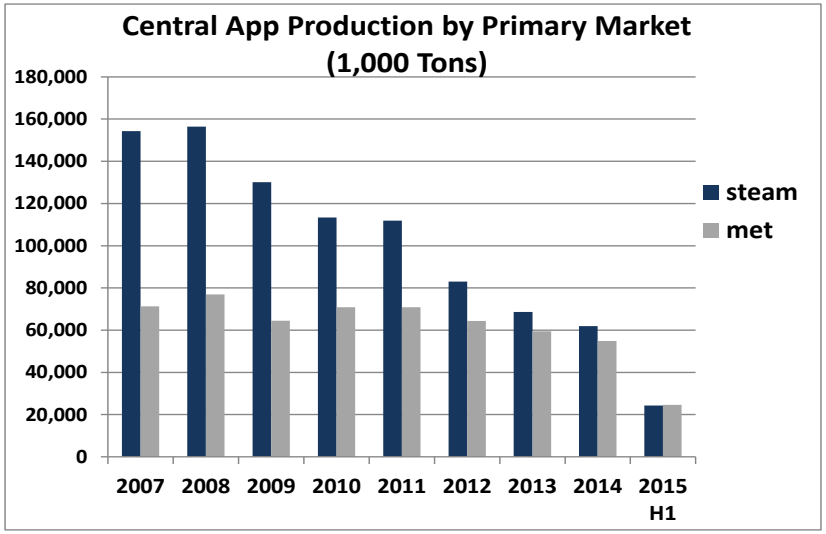
Clean Power Plan_2023



PRODUCTION IN CENTRAL APP IS CONTINUING TO FALL

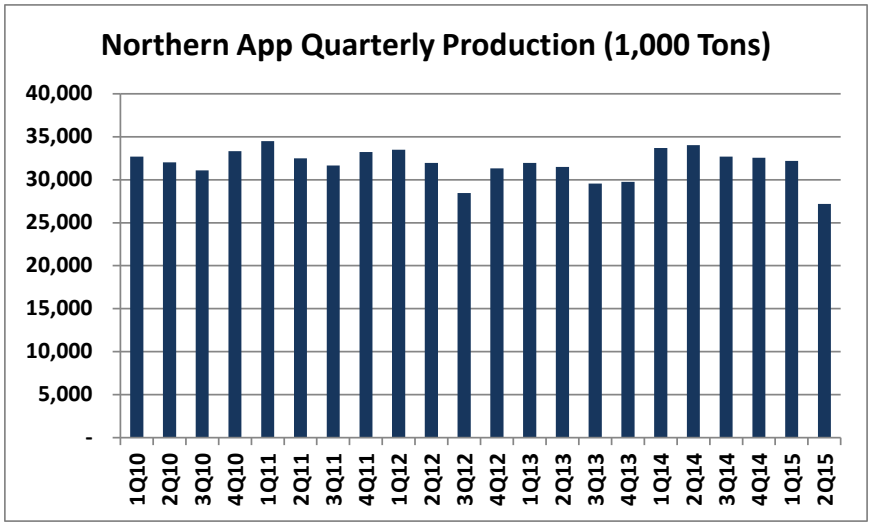
- Production cut in half from 233 million tons in 2008 to 116 million tons in 2014
  - H1 2015 production at 98 million ton annual rate
- Bankruptcies have started and are likely to continue.
- Major companies selling to independents backed by private equity
- Production costs reduced with lower wages and diesel prices
- CAPP increasingly reliant on metallurgical coal market

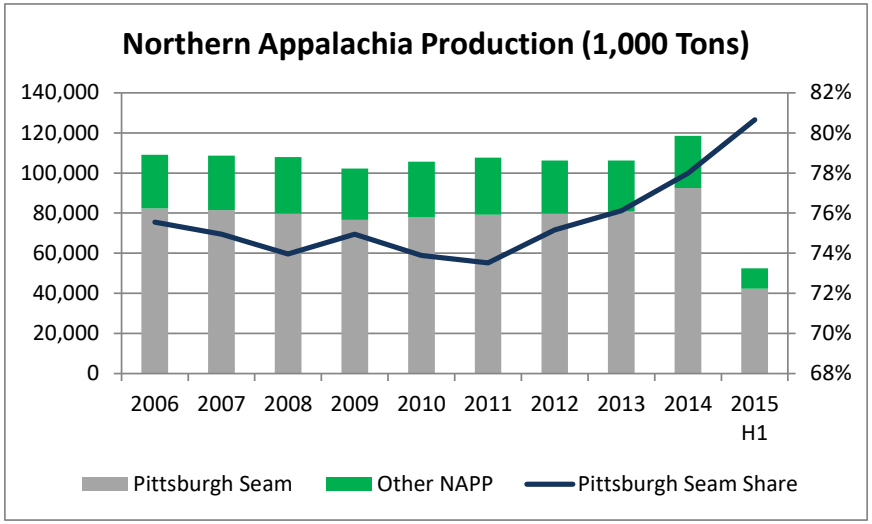




PRODUCTION IN NORTHERN APP COLLAPSED IN Q2 2015

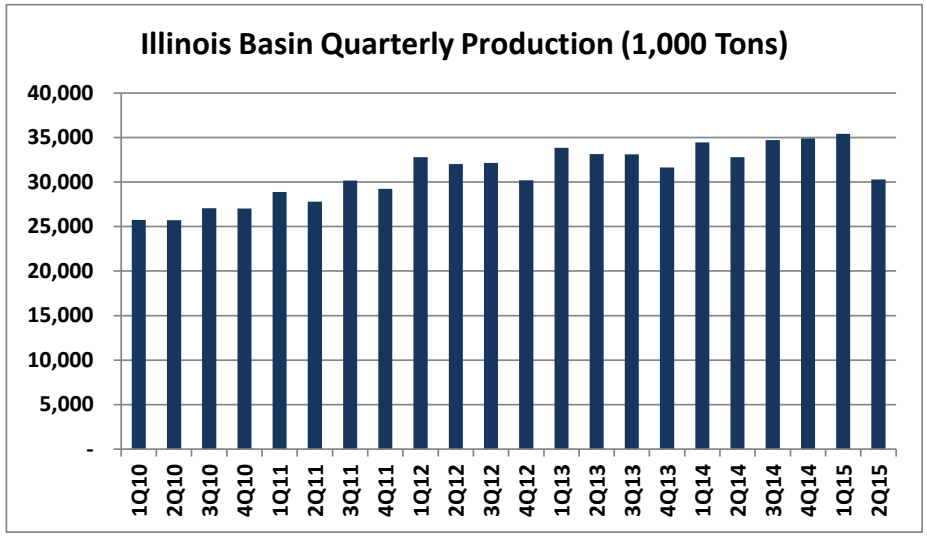
- Large reductions in Q2 2015 from Murray mines.
- Substantial reductions from others including Alpha (Cumberland and Emerald), Arch (Leer), Consol (Bailey, BMX and Enlow Fork), and Patriot Federal #2)
- Pittsburgh Seam dominant, non-Pittsburgh seam production at risk

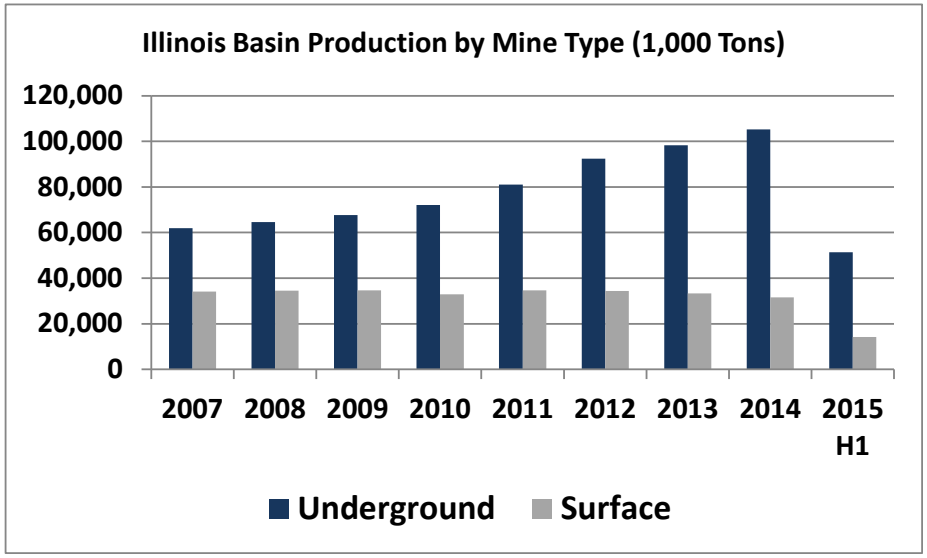




PRODUCTION IN ILLINOIS BASIN ALSO DROPPED IN Q2 2015

- Over a third of the quarterly reduction was due to Deer Run which was idled due to high carbon monoxide readings. Remaining reductions were from other Murray mines, Alliance and Peabody mines.
- High-cost mines cannot compete and are closing
  - Examples are Highland and Dodge Hill (Peabody); Prosperity (Sunrise)
- Illinois Basin expansions exceed domestic market demand
- Growth in market is electric generation and export when competitive





COAL INDUSTRY

- **Everything is for sale**
- **Few buyers**
  - Murray Energy has tripled its size with the acquisition of CONSOL's union properties and its investment in Foresight Energy.
  - Westmoreland most recently purchased Oxford Coal to allow it to become an MLP, then Buckingham coal, and most recently San Juan coal.
  - Alliance bought the remaining position in White Oak
  - In Central Appalachia two companies (Blackhawk Mining and Revelation Energy) have been busy acquiring distress properties looking to amass large reserve holdings at minimum costs.
- **Lots of Available Properties**
  - TECO Coal
  - Arch and Alpha are selling off their companies, piece by piece
  - Peabody has announced its desire to sell non-core properties both in the U.S. and Australia
  - Consol's owners are pressuring it to divest of its remaining coal assets

CLOSING THOUGHTS

- **Next two to three years are promising to be the most difficult two years in the coal industry's recent history**
- **Coal producers need to balance supply and demand but want the other guys to idle mines**
  - Cost of idling coal mines is high
  - Inability to respond to improved market in the future
  - Write-off of investment
- **Bankruptcies have just started**
  - Xinergy, Patriot, Walter, and Alpha are most recent bankruptcies
  - Others expected
- **Consolidation in coal industry likely to accelerate**
  - Foresight's sale to Murray was a surprise
  - Market cap for publically traded coal companies is so low, speculators/traders may jump in
  - MLP may trigger some restructuring or additional consolidation

IMPLICATIONS FOR RECLAMATION AND BONDING

- **Premature mine closings often increase reclamation**
- **Property sales are limited in part because of bonding requirements**
- **Lack of ability to bond may push some companies into Chapter 11 or Chapter 7**
- **Different bonding/reclamation models are needed to manage end of mine reclamation in a permanently declining market**

Questions

- **Emily Medine**
  - 412-421-2390 (Office)
  - 412-916-2930 (Cell)
  - emedine@evainc.com

OUTLOOK FOR COAL

Prepared for :

NS Economic Seminar

Norfolk, VA

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Energy Ventures Analysis, Inc.
1901 N. Moore Street,, Suite 1200 Arlington, VA 22209
(703) 276 8900
www.evainc.com

Outline

State of the Overall Market

Market Outlook

Domestic Coal Demand

Exports

Coal Basin Overview

Industry Issues

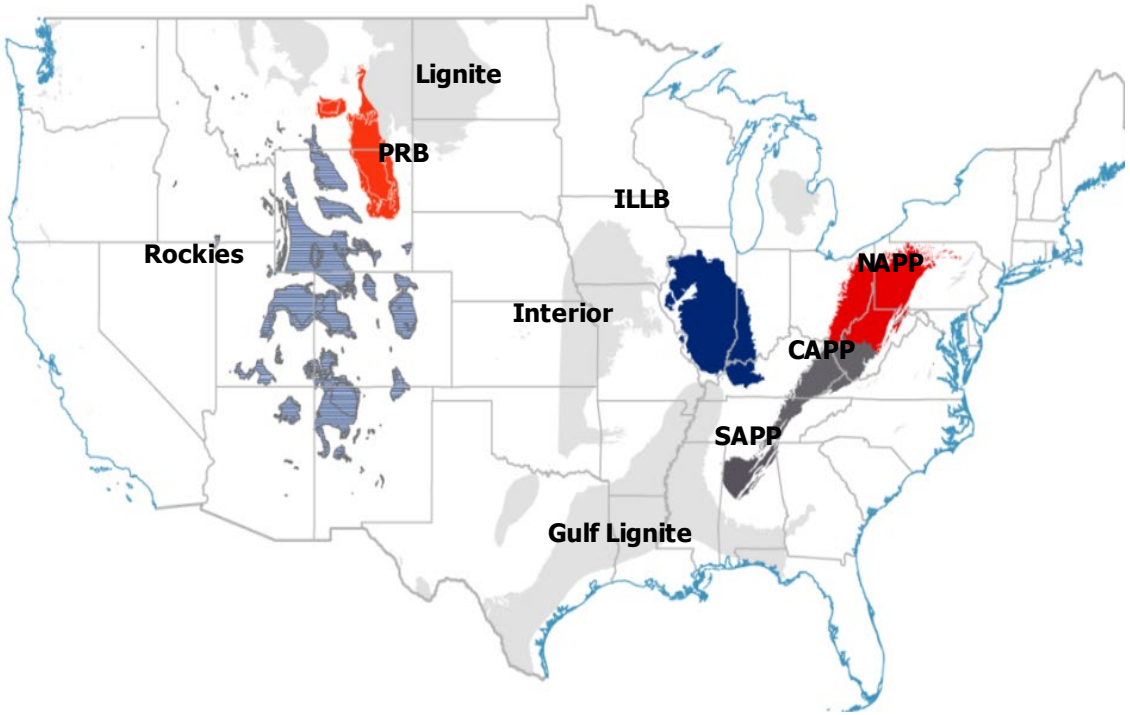
Closing Thoughts

US COAL OUTLOOK HAS TURNED VERY NEGATIVE

- **While the coal market was poor in 2014, major factors have gotten much worse since then**
- **Increasing natural gas production is driving down prices**
  - Excess gas supply will displace coal burn in 2015 and beyond
- **World thermal coal market prices have collapsed**
  - US thermal coal exports must fall sharply in 2015
- **The US dollar continues to rise against other coal currencies**
  - Forces prices down in US dollars; other countries don't see decline
- **Retirements of coal-fired plants will hit in 2015 and 2016**
  - EPA MATS rule will cause plant retirements
- **EPA's proposed carbon rule hangs over long-term decisions on coal plant investment**

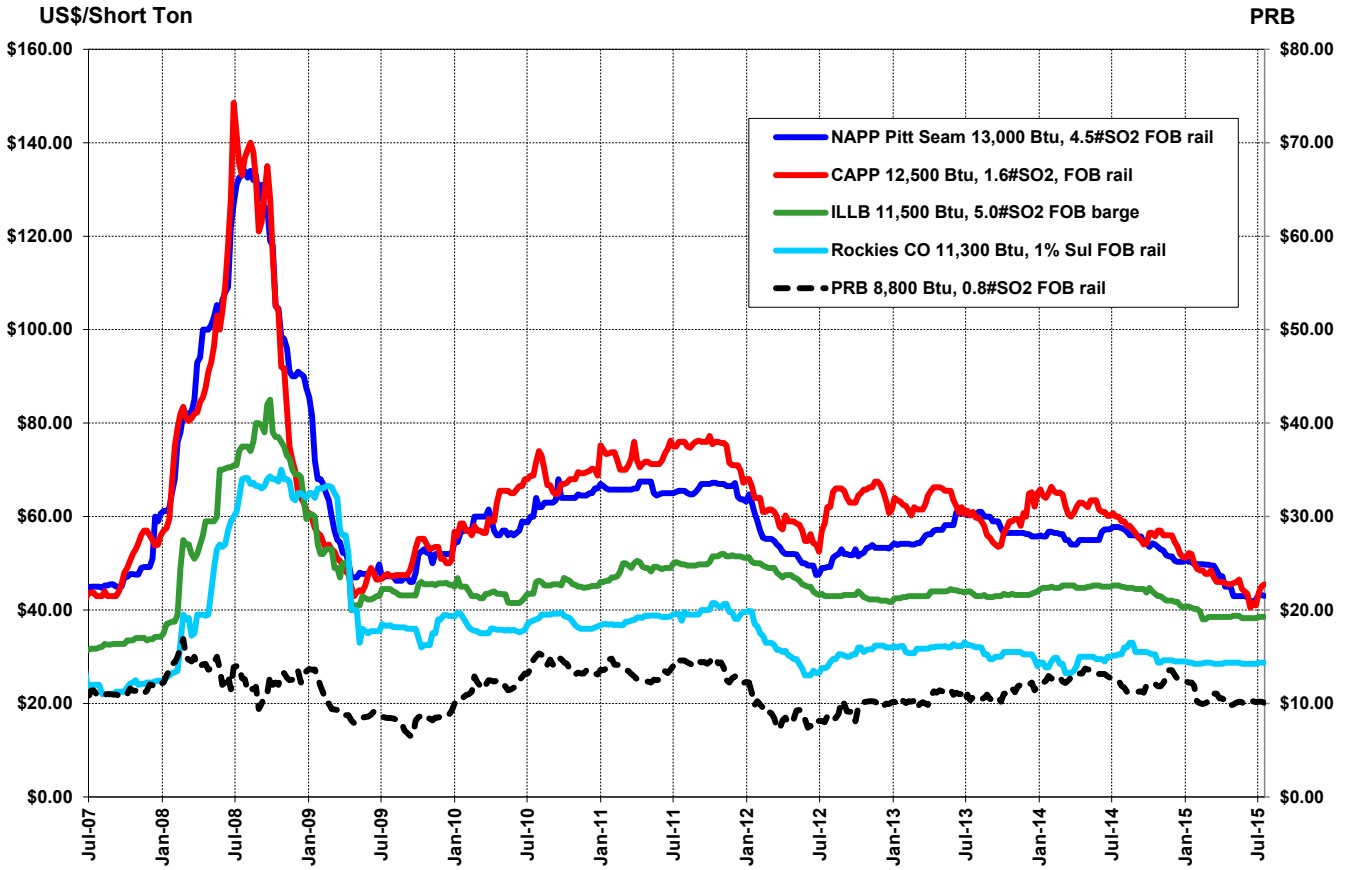
COAL PRODUCED THROUGHOUT THE US

MAJOR COAL SUPPLY BASINS IN THE U.S.



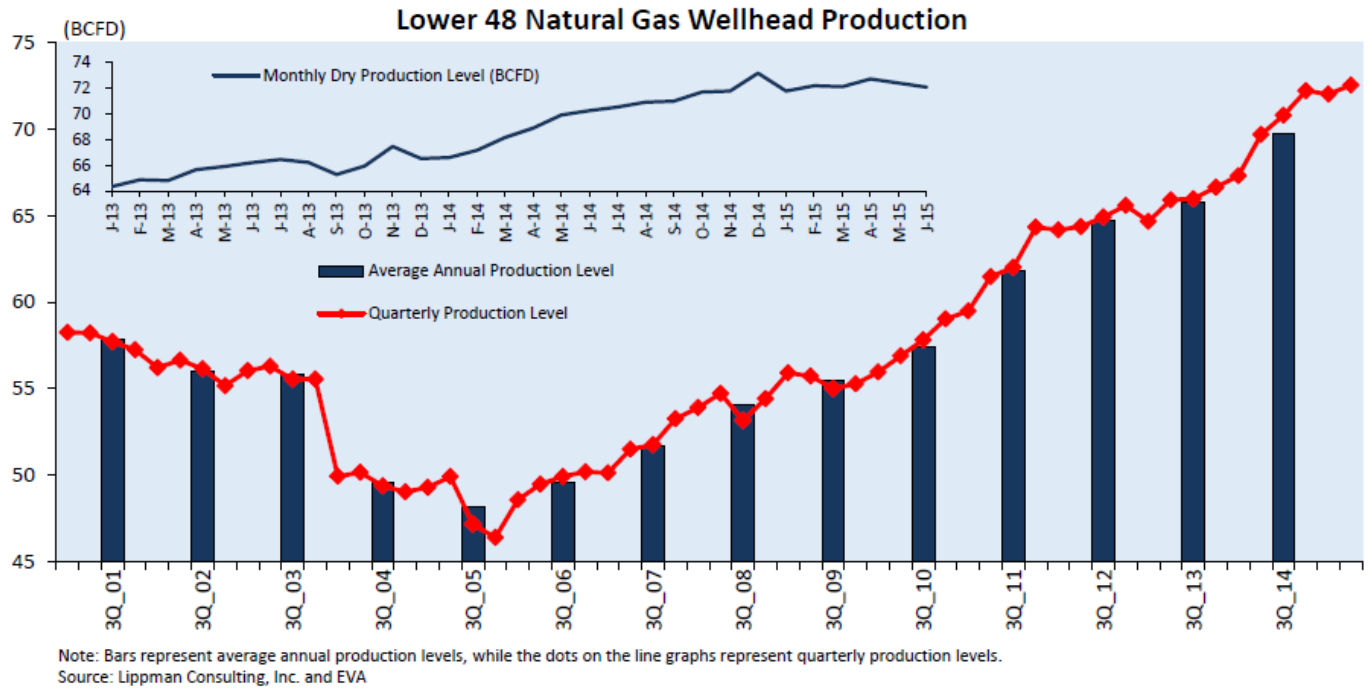
US COAL MARKET PRICES ARE FALLING

- **Since mid-2014, all regional prices are down 15% - 30%**
  - CAPP rail below $50; PRB down to $10 per ton



GAS SUPPLY KEEPS GROWING

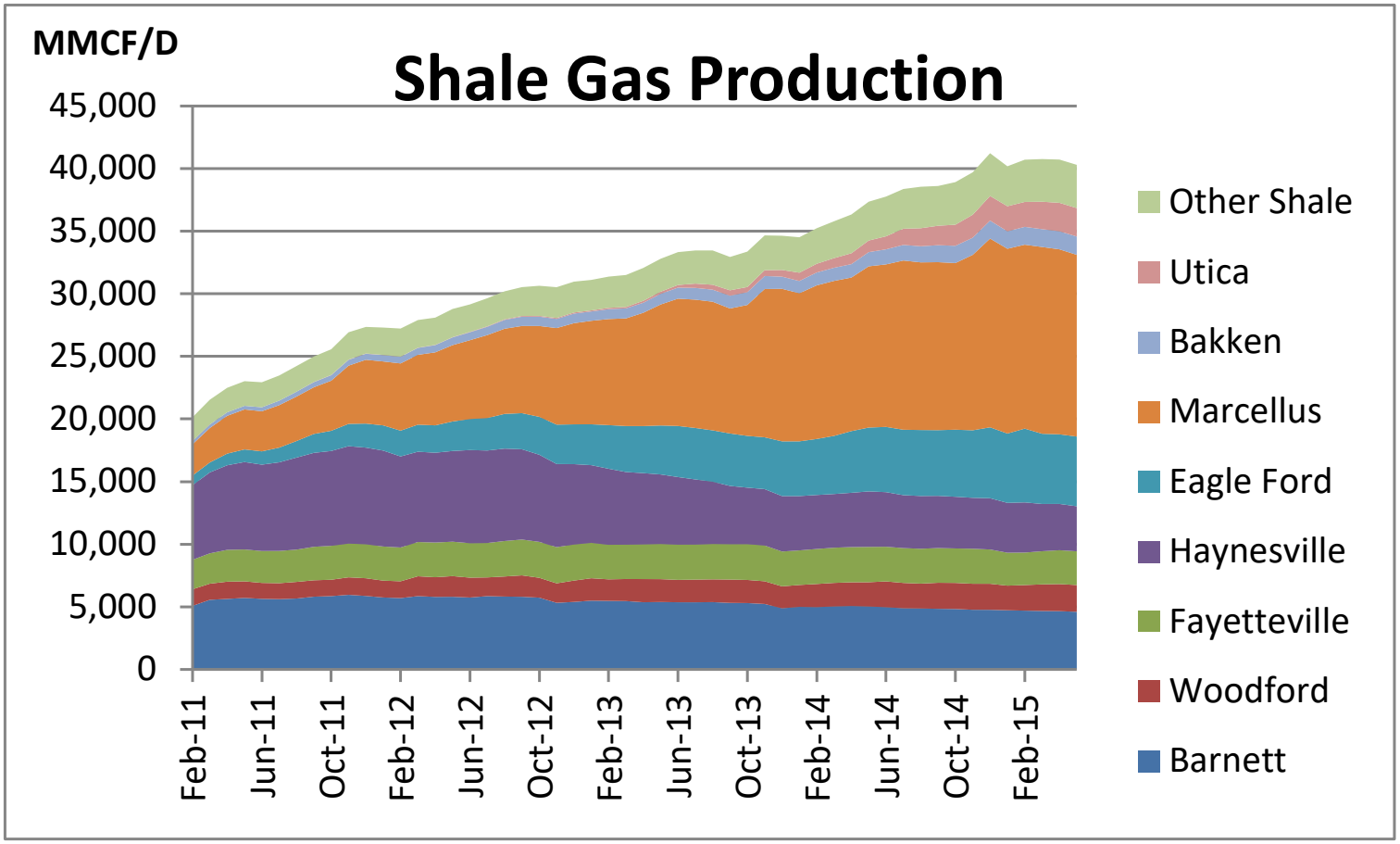
- **Marketable gas production approaching 70 BCFD**



Note: Bars represent average annual production levels, while the dots on the line graphs represent quarterly production levels.
Source: Lippman Consulting, Inc. and EVA

- Each additional 1.0 bcfd equals about 25 million TPY of coal burn

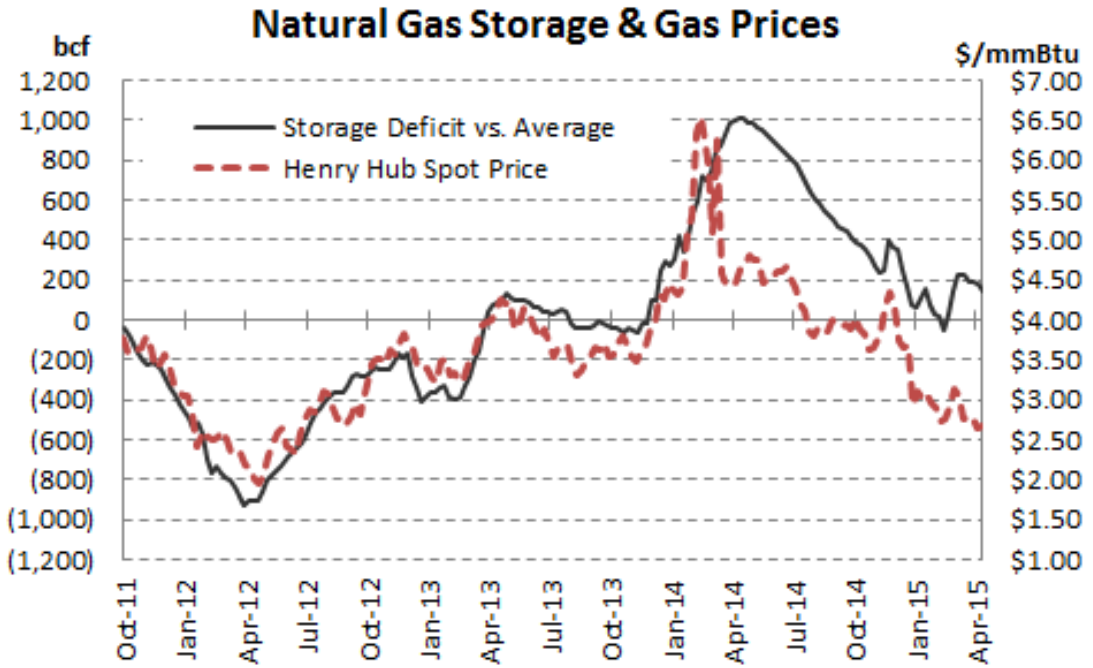
GROWTH IS DRIVEN BY GROWTH IN SHALE GAS PRODUCTION



- Largest growth is from Marcellus
- Eagle Ford is experiencing significant growth

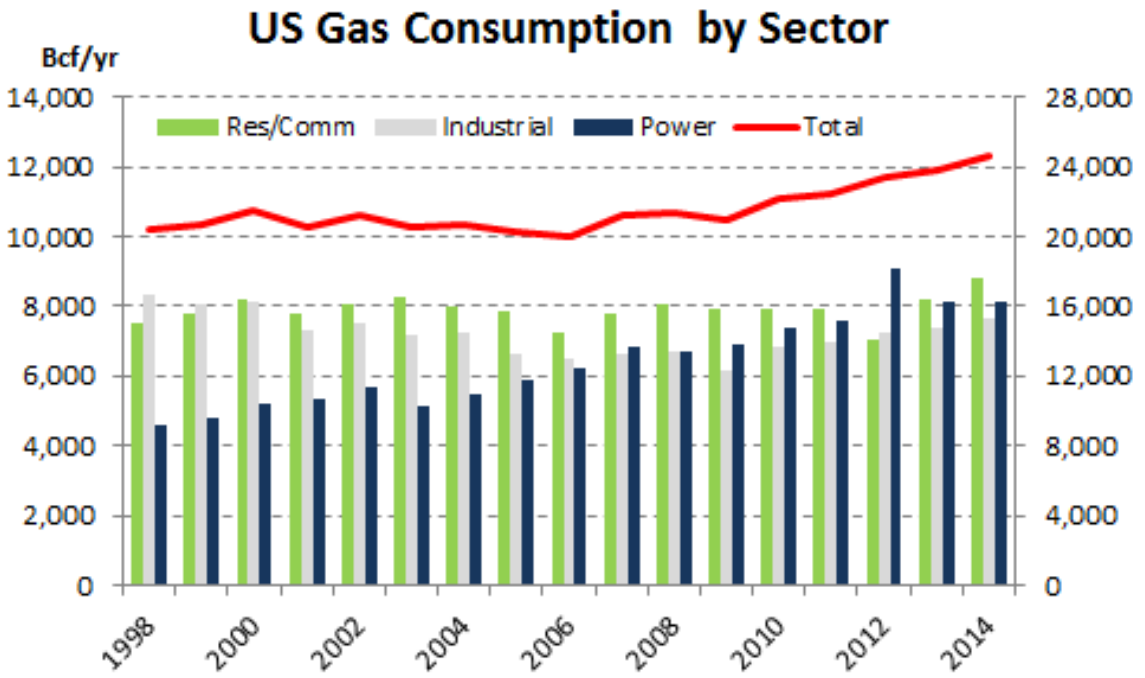
MARKETS EXPECT CONTINUED HIGH PRODUCTION

- **Balanced market price was about $4.00 per MMBtu at Henry Hub**
  - Above-normal storage would push prices down; below-normal would cause spike
- **Growing gas supply has changed the balanced-market price**
  - Storage is slightly below normal, but no price response
- **Is the new normal closer to $3.00 MMBtu price?**



ONLY NEAR-TERM GROWTH POTENTIAL IS IN POWER SECTOR

- **No long-term growth in residential and commercial demand**
  - Large winter swings with warm 2011-12 and cold 2013-14
- **Industrial demand growth steady at 200 – 300 bcf per year**
- **Only near-term growth opportunity for natural gas is in power generation because of availability of CCGTs.**
  - Power generation can swing 3 bcfd by displacing coal burn



BREAK-EVEN COAL VS GAS PRICING

Price at Which Gas Displaces Coal on the River in the Current Market

BREAK EVEN GAS PRICE for ILLB		
ILLB-L. BARGE_11,500 BTU_5.2# SO2		
FOB Barge	$/ton	$32.00
Barge	$/ton	$10.00
Enviro. Cost	$/ton	$1.00
Total Cost	**$/ton**	**$43.00**
	$/mmbtu	**$1.87**
	$/MWh	**$18.70**
Break Even Gas Price	**$/mmbtu**	**$2.67**

Price that Coal Could Sell at if Gas was $4.00 per MMBtu

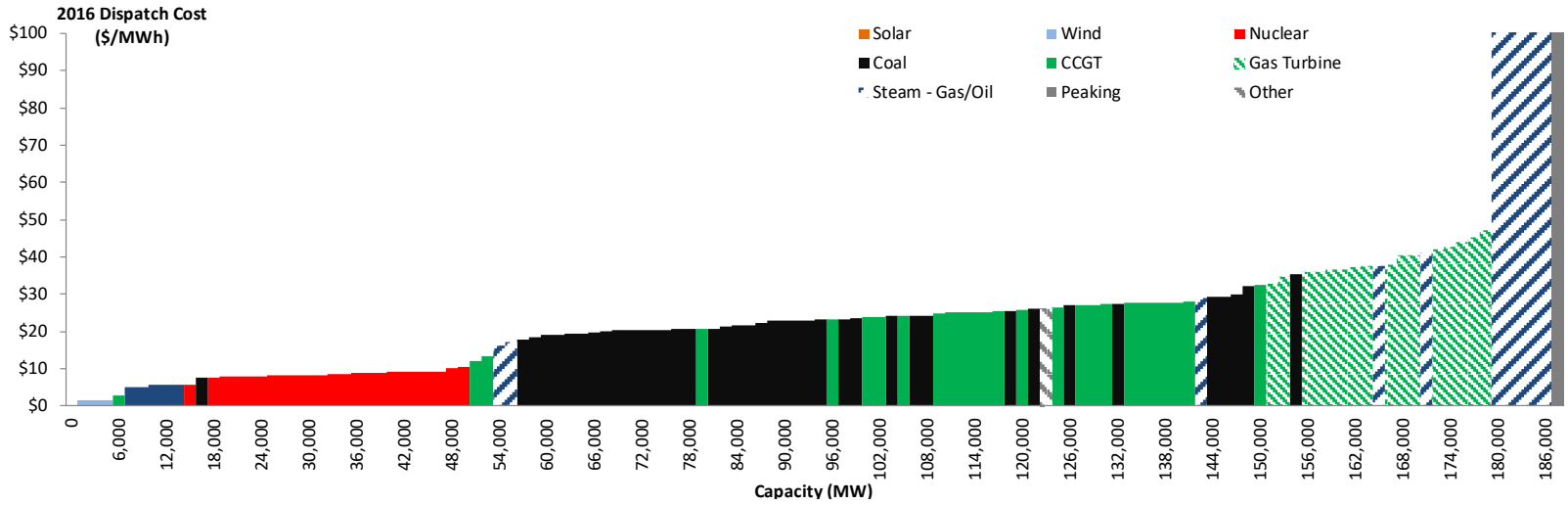
BREAK EVEN COAL PRICE IF GAS IS $4.00		
ILLB-L. BARGE_11,500 BTU_5.2# SO2		
FOB Barge	$/ton	$53.40
Barge	$/ton	$10.00
Enviro. Cost	$/ton	$1.00
Total Cost	**$/ton**	**$64.40**
	$/mmbtu	**$2.80**
	$/MWh	**$18.70**
Gas Price	**$/mmbtu**	**$4.00**

EASTERN POWER GENERATION

- **Natural gas displacing huge amounts of coal in 2012**
  - Coal rebounded in 2013 & 2014 with cold weather and higher gas prices
  - Increased gas supply will see a return to 2012 gas generation with a large drop in coal

Eastern Power	January - December							Change 08-14	
GWh	2008	2009	2010	2011	2012	2013	2014	GWh	%
Coal	1,274,785	1,082,009	1,147,758	1,033,257	871,929	907,657	920,671	(354,114)	-27.8%
Natural Gas	334,480	384,901	459,730	512,238	638,524	562,820	570,433	235,953	70.5%
Oil	19,655	14,291	12,653	5,814	3,623	4,570	9,556	(10,099)	-51.4%
Pet Coke	8,016	6,869	7,500	6,367	4,056	6,267	5,300	(2,716)	-33.9%
Fossil Total	**1,636,936**	**1,488,070**	**1,627,641**	**1,557,676**	**1,518,132**	**1,481,314**	**1,505,960**	**(130,976)**	**-8.0%**
Nuclear	619,306	610,822	611,792	606,203	598,872	625,570	622,386	3,080	0.5%
Hydro	65,450	83,684	73,283	77,733	65,476	83,630	75,269	9,819	15.0%
Wind	5,818	10,122	14,761	18,257	22,666	29,124	31,578	25,760	442.8%
Solar	2	29	147	275	820	1,362	2,788	2,786	139300%
Biomass	18,280	18,408	19,291	18,865	19,335	20,562	22,874	4,594	25.1%
Pumped Storage	(6,930)	(5,441)	(6,205)	(6,257)	(5,363)	(4,876)	(5,833)	1,097	-15.8%
Other Gases	774	490	689	427	673	1,729	1,674	900	116.3%
Other	5,986	5,681	5,658	6,349	6,361	6,088	6,187	201	3.4%
Non-Fossil Total	**708,686**	**723,795**	**719,416**	**721,852**	**708,840**	**763,189**	**756,923**	**48,237**	**6.8%**
Total	**2,345,622**	**2,211,865**	**2,347,057**	**2,279,528**	**2,226,972**	**2,244,503**	**2,262,883**	**(82,739)**	**-3.5%**
Coal Burn ktons	605,042	519,892	549,041	500,871	427,236	446,161	445,044	(159,998)	-26.4%
Gas Burn bcfd	7.2	8.1	9.9	10.8	13.4	11.7	11.8		

PJM STACK



- The sequence in which power plants operate is the dispatch order. Fuel and variable operating costs determine the dispatch order.
- Other factors also affect dispatch so as heat rates and operating constraints. For example, coal plants cycle only between minimum load and maximum load. Once a coal plant is taken off line, it will take several days to return to service.

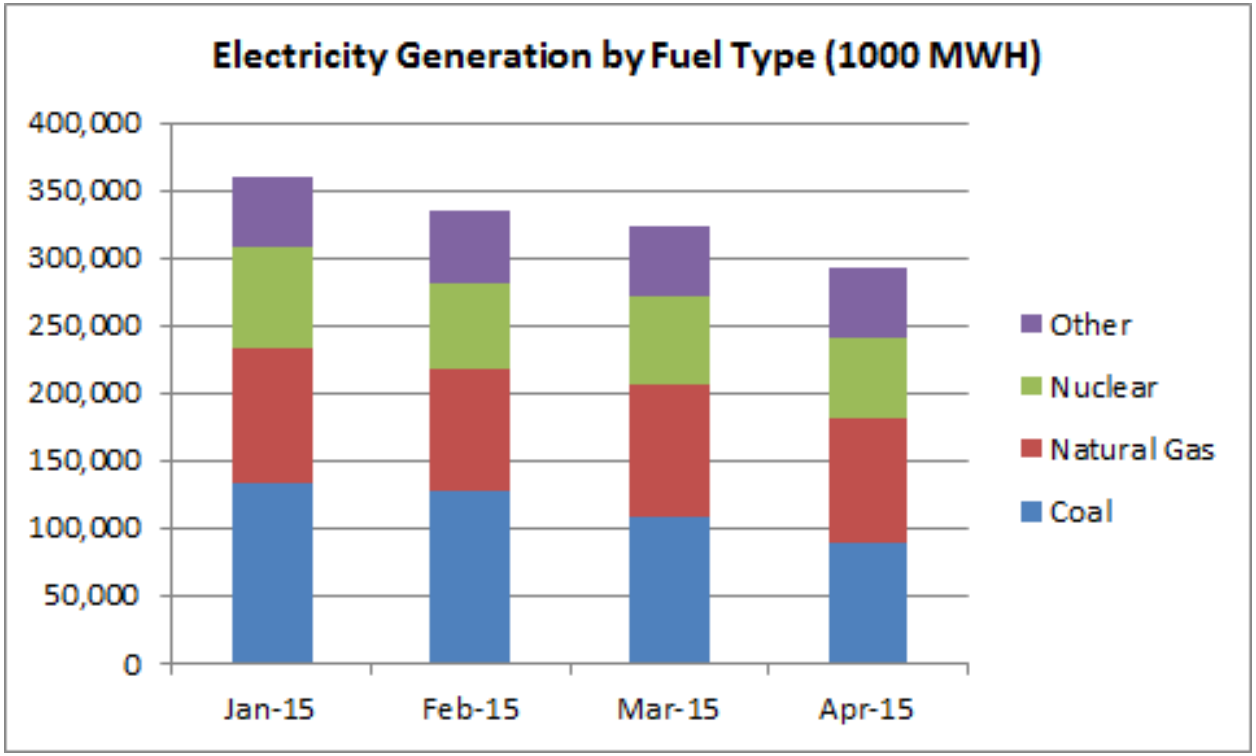
WESTERN POWER GENERATION

- **Subsidized wind & solar are displacing fossil generation**

Western Power	January - December							Change 08-14	
GWh	2008	2009	2010	2011	2012	2013	2014	GWh	%
Coal	692,010	657,191	678,092	682,874	626,712	660,625	649,353	(42,657)	-6.2%
Natural Gas	463,949	452,589	437,974	410,207	490,698	462,872	455,983	(7,966)	-1.7%
Oil	1,145	841	928	864	732	735	821	(324)	-28.3%
Pet Coke	4,641	4,604	4,803	6,466	3,306	5,035	5,158	517	11.1%
Fossil Total	**1,161,745**	**1,115,225**	**1,121,797**	**1,100,411**	**1,121,448**	**1,129,267**	**1,111,315**	**(50,430)**	**-4.3%**
Nuclear	186,905	188,032	195,174	184,004	170,461	163,445	174,677	(12,228)	-6.5%
Hydro	186,429	186,421	183,710	238,411	206,751	179,953	179,168	(7,261)	-3.9%
Wind	49,311	63,504	79,455	101,507	117,666	138,127	149,324	100,013	202.8%
Solar	857	862	1,055	1,451	3,328	7,331	14,988	14,131	1648.9%
Geothermal	14,605	14,841	15,020	15,092	15,299	15,497	16,376	1,771	12.1%
Biomass	7,620	8,191	8,533	7,819	8,252	8,676	9,294	1,674	22.0%
Pumped Storage	642	816	703	(164)	412	194	(376)	(1,018)	-158.6%
Other Gases	2,422	2,565	2,280	2,513	2,315	2,602	2,273	(149)	-6.2%
Other	957	710	920	1,098	1,056	1,025	982	25	2.6%
Non-Fossil Total	**449,748**	**465,942**	**486,850**	**551,731**	**525,540**	**516,850**	**546,706**	**96,958**	**21.6%**
Total	**1,611,493**	**1,581,167**	**1,608,647**	**1,652,142**	**1,646,988**	**1,646,117**	**1,658,021**	**46,528**	**2.9%**
Coal Burn ktons	430,696	408,705	421,084	426,891	392,359	409,533	403,015	(27,681)	-6.4%
Gas Burn bcfd	10.0	9.7	9.5	9.0	10.5	9.9	9.6		

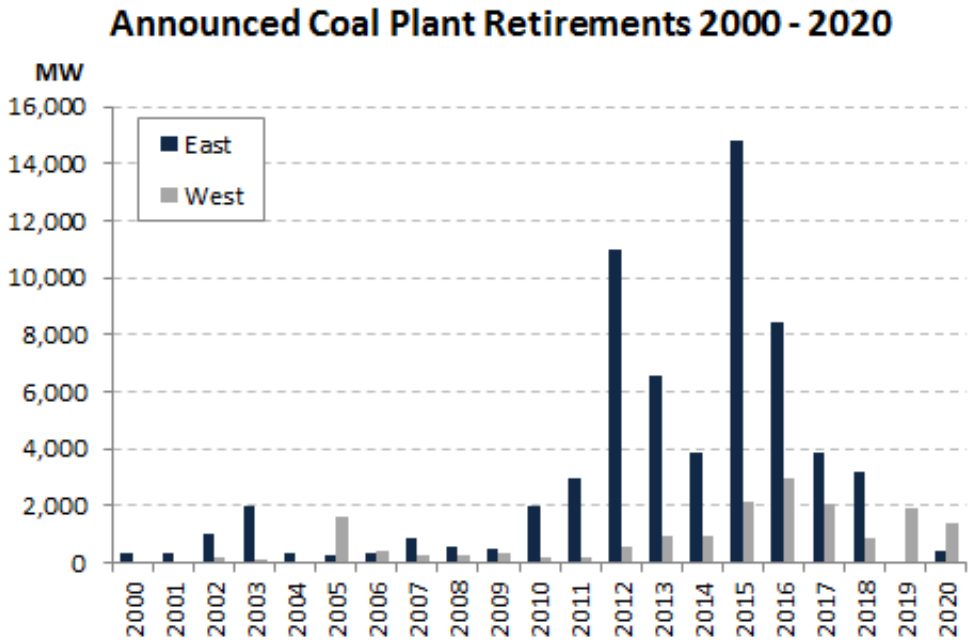
2015 GENERATION YTD

- In April 2015, for the first time, natural gas-fired generation was higher than coal generation.



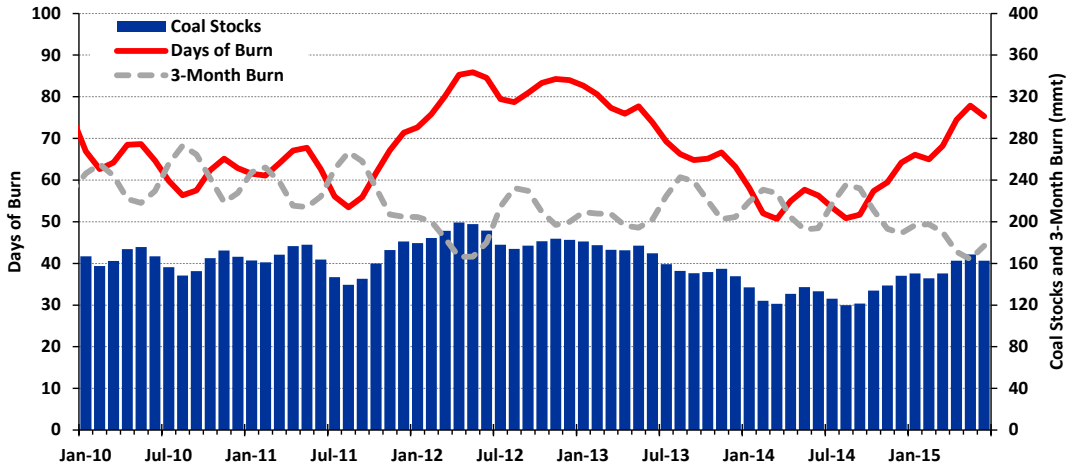
COAL-FIRED POWER PLANT RETIREMENTS

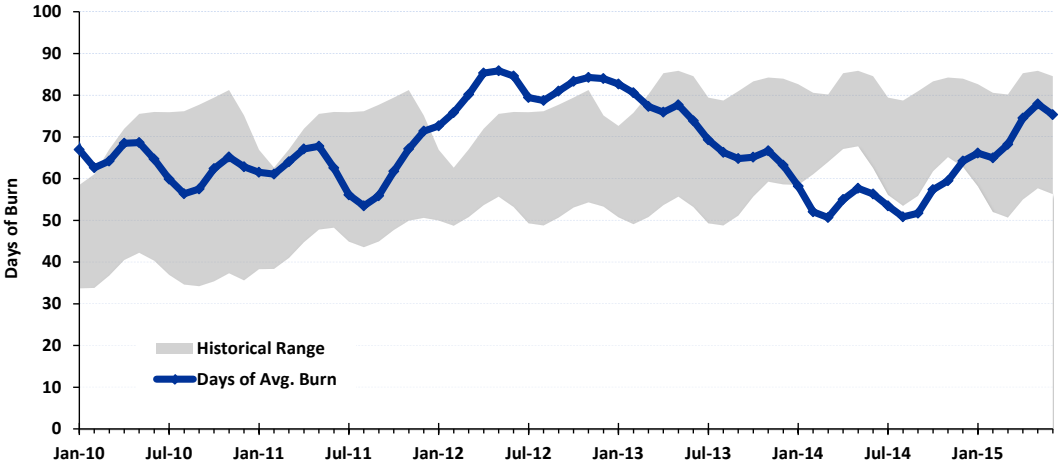
- **Announced retirements 2012 – 2020 equal 66 GW of a 317 GW coal fleet**
  - Plants retiring by 2020 burned 86 mm tons in 2014
- **MATS rule has greatest impact in the East**
  - Compliance dates of April 2015 and 2016 drives spike in retirements those years
  - Early retirements in 2012 and 2013 due to operating losses in weak markets
- **Regional haze is closing plants in the West**



CUSTOMER STOCKPILES ARE GROWING

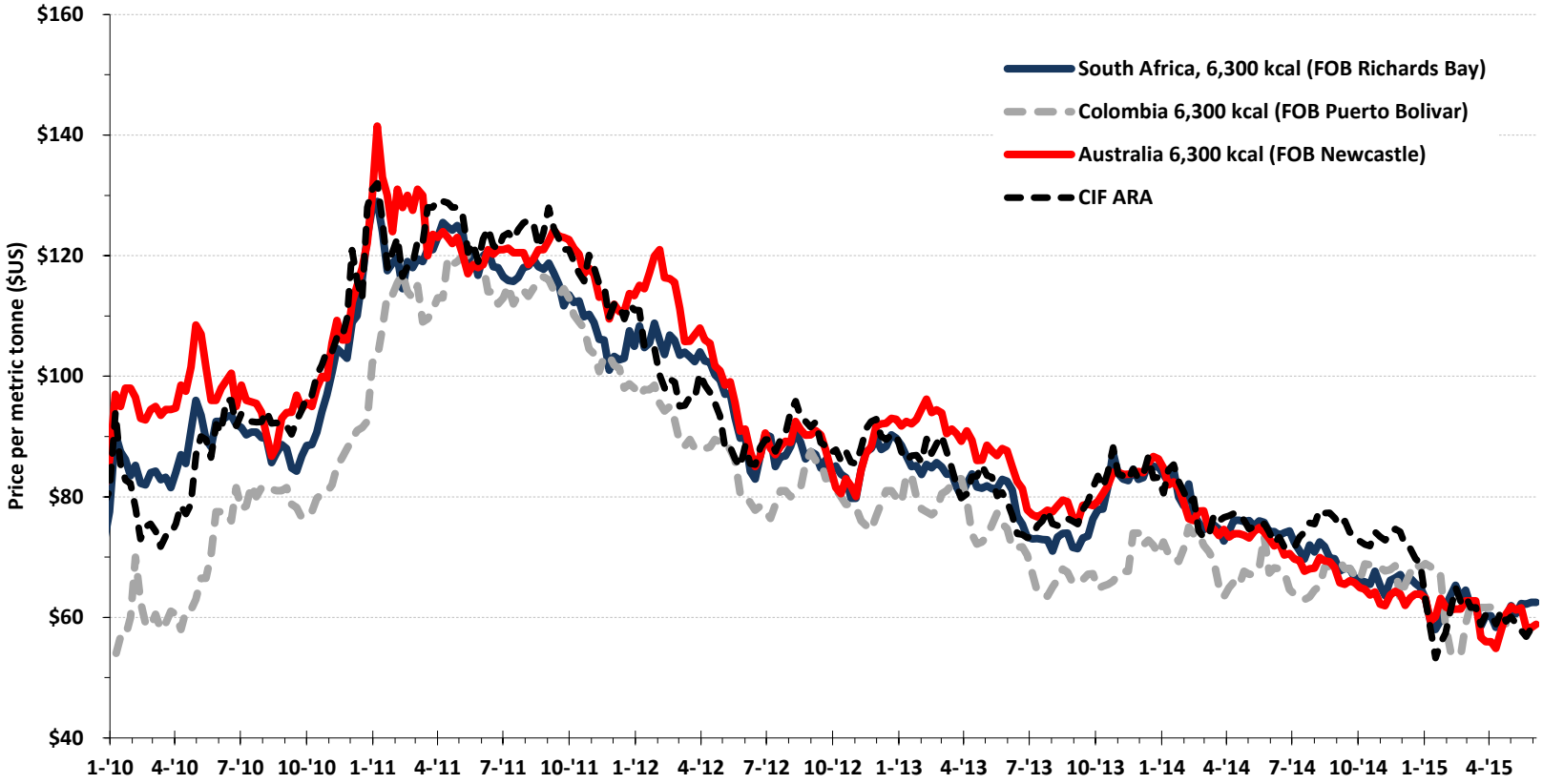
- EVA proprietary monthly survey of power company inventories
- Inventories were at 75 days of burn by end of June
  - 6 day decline from May due to hot weather
  - Inventory decline in 2013 and 2014 to burn of excess stocks from 2012
  - BNSF rail problems caused reduced burn of PRB coal to preserve stocks in 2014
  - Low gas prices causing inventory growth



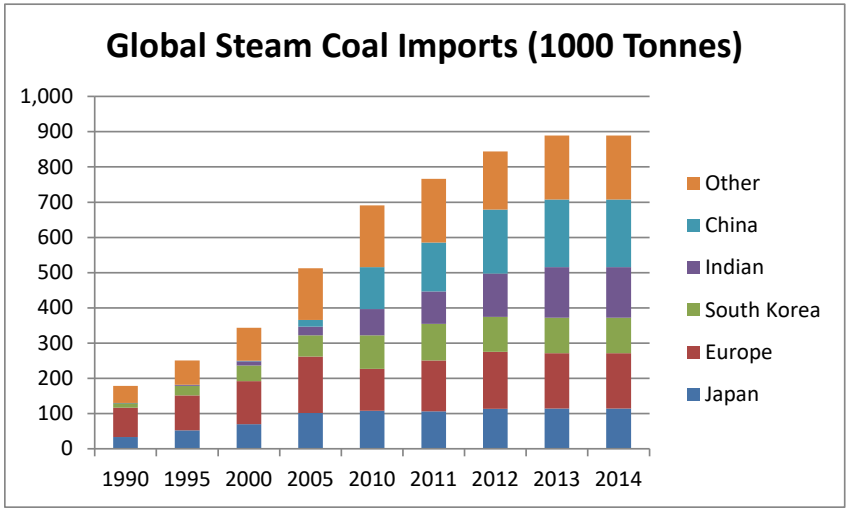


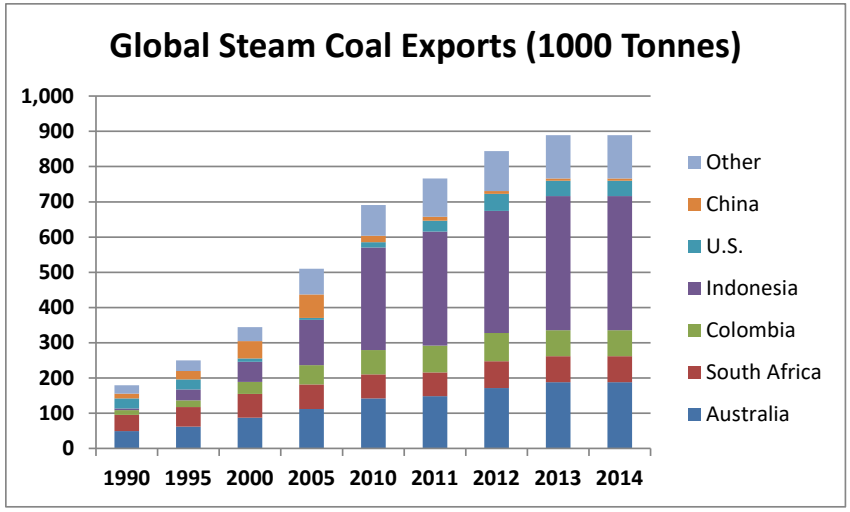
WORLD THERMAL COAL PRICES HAVE COLLAPSED

- **Delivered price to Europe (CIF ARA) has fallen to new lows**
  - Down from $74 at the end of November to below $60
  - Forward prices have plummeted, with Cal ‘18 still below $60



GLOBAL STEAM COAL TRADE REMAINED STRONG THROUGH 2014

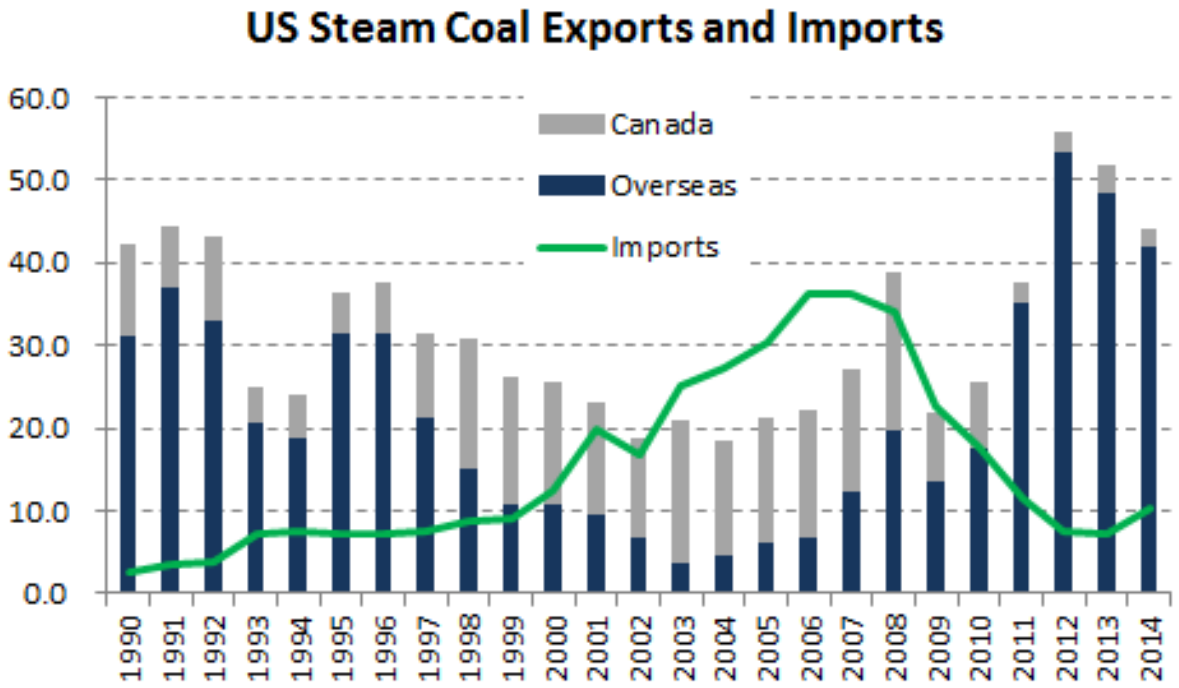




- Import growth is principally in Pacific markets although Europe remains strong.
- Export growth is principally from Indonesia, Australia and Russia
  - Colombia has increased but has been challenged in the last three years with domestic issues
  - US is the swing supplier

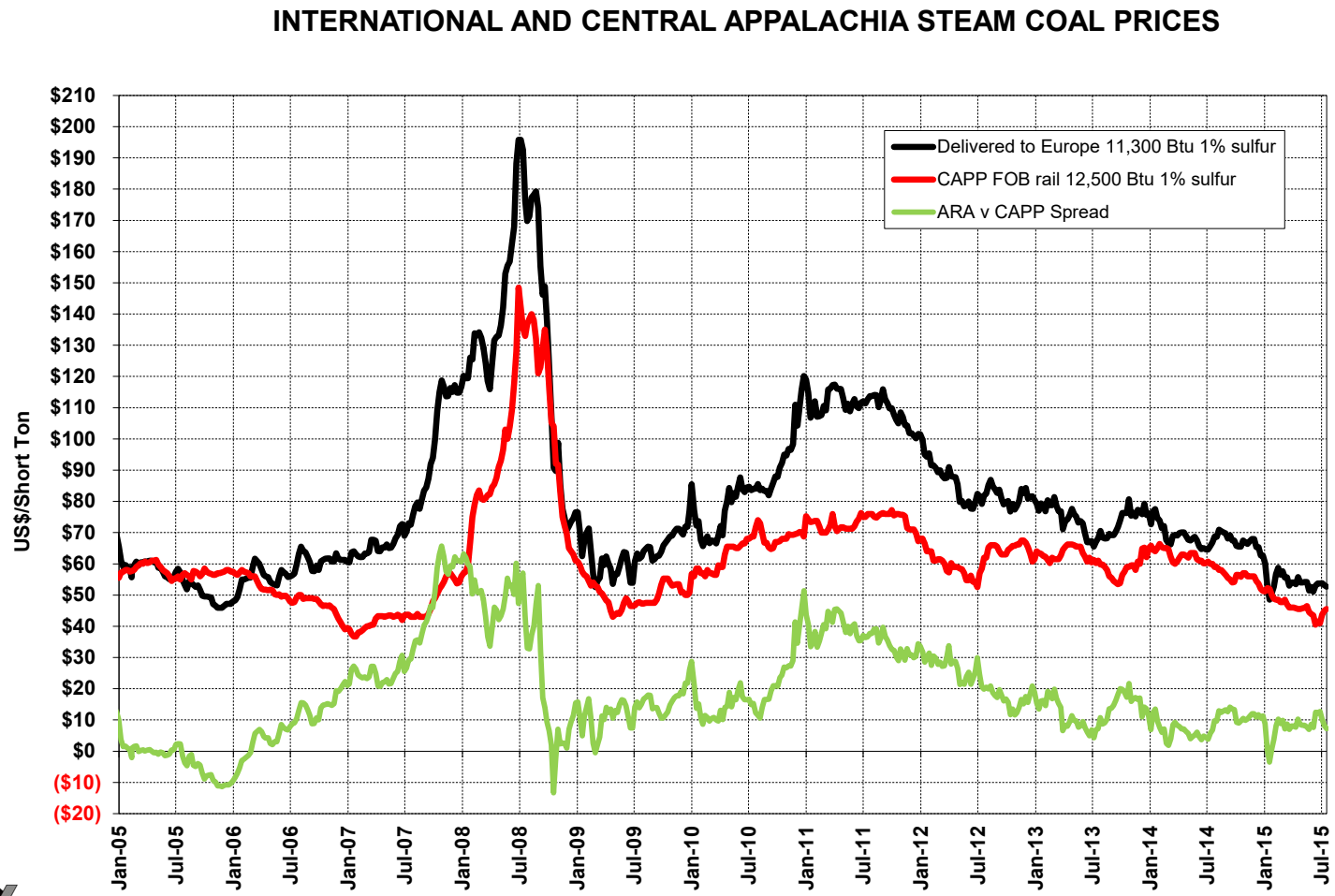
US EXPORTS TO WORLD THERMAL MARKETS

- US overseas steam coal exports collapsed through 2003 with strong dollar and growing supply from other countries
- Overseas exports surged in 2011 and 2012 on domestic surplus
- World markets will not absorb US surplus in 2015



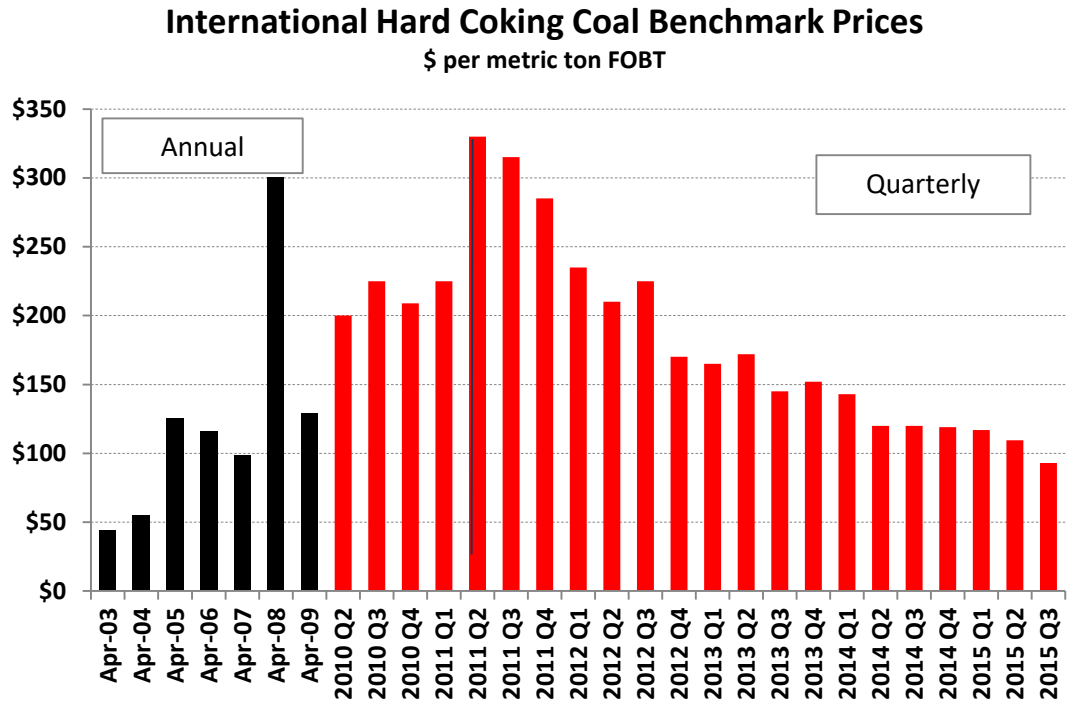
RELATIONSHIP BETWEEN ARA AND CAPP PRICES

- **Spread over $20 opens the arb; boosting exports and CAPP prices**
  - Spread fell to $0 in January but is back to $10 per ton

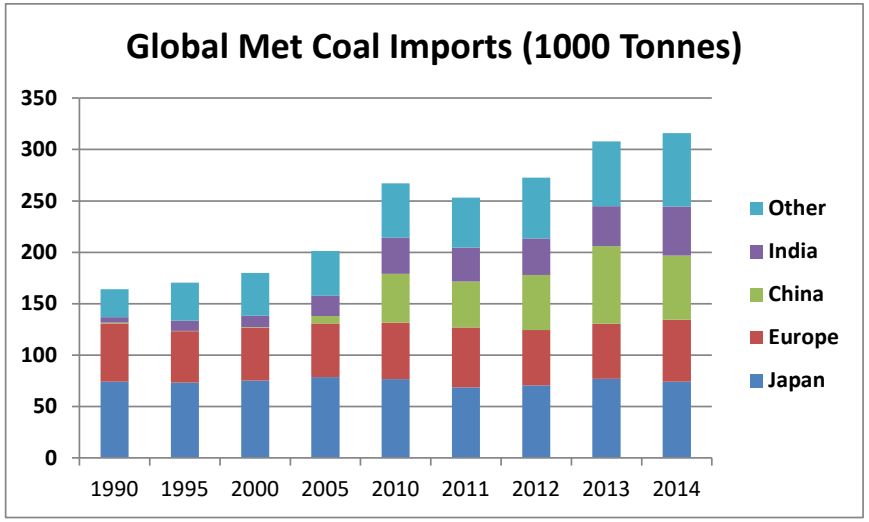


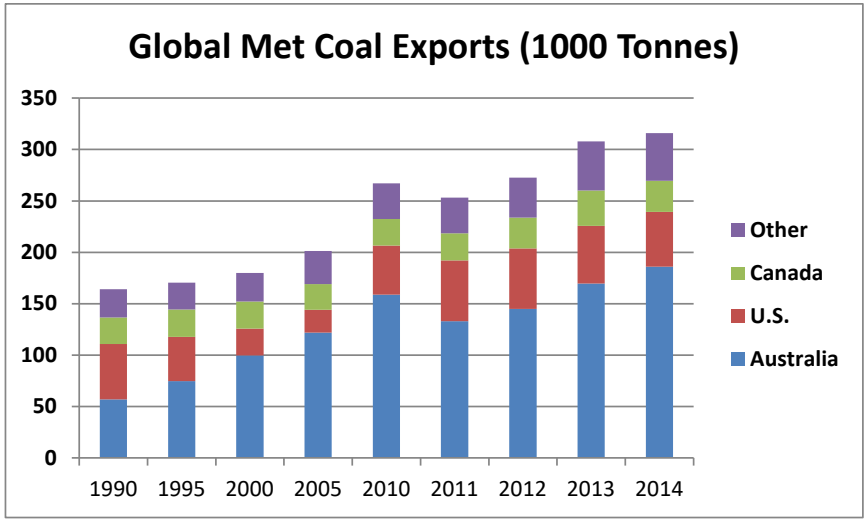
WORLD METALLURGICAL COAL PRICES

- **2014/2015 price collapse threatens viability of world coal exporters**
  - Prices spiked on supply limits in 2005, 2008 and 2011 due to Australian floods
  - Recovery and expansion of Australian met exports brought markets back in balance
  - Pressure on US producers to cut met coal production is intense



GLOBAL COAL TRADE REMAINED STRONG THROUGH 2014

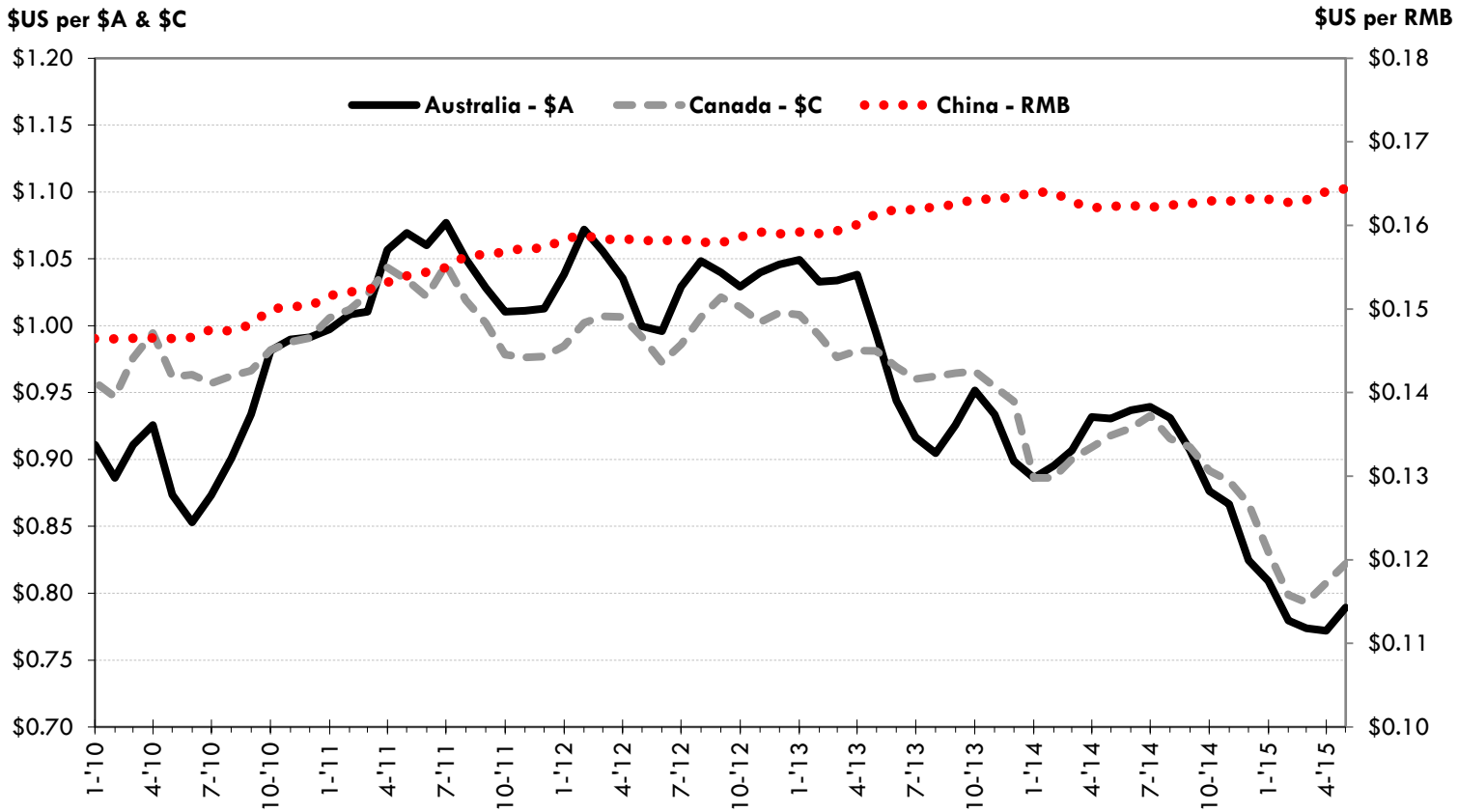




- Supply is dominated by Australia, with US as the swing supplier
- The supply disruption in 2011 due to flooding in Queensland resulted in a spike in global pricing which triggered massive investments both in Australia and the US
  - Australian exports are now stronger than ever
  - The strong US dollar compared to the Australian dollar have made Australian exports more competitive
- The significance of Chinese imports to the overall market is problematic.

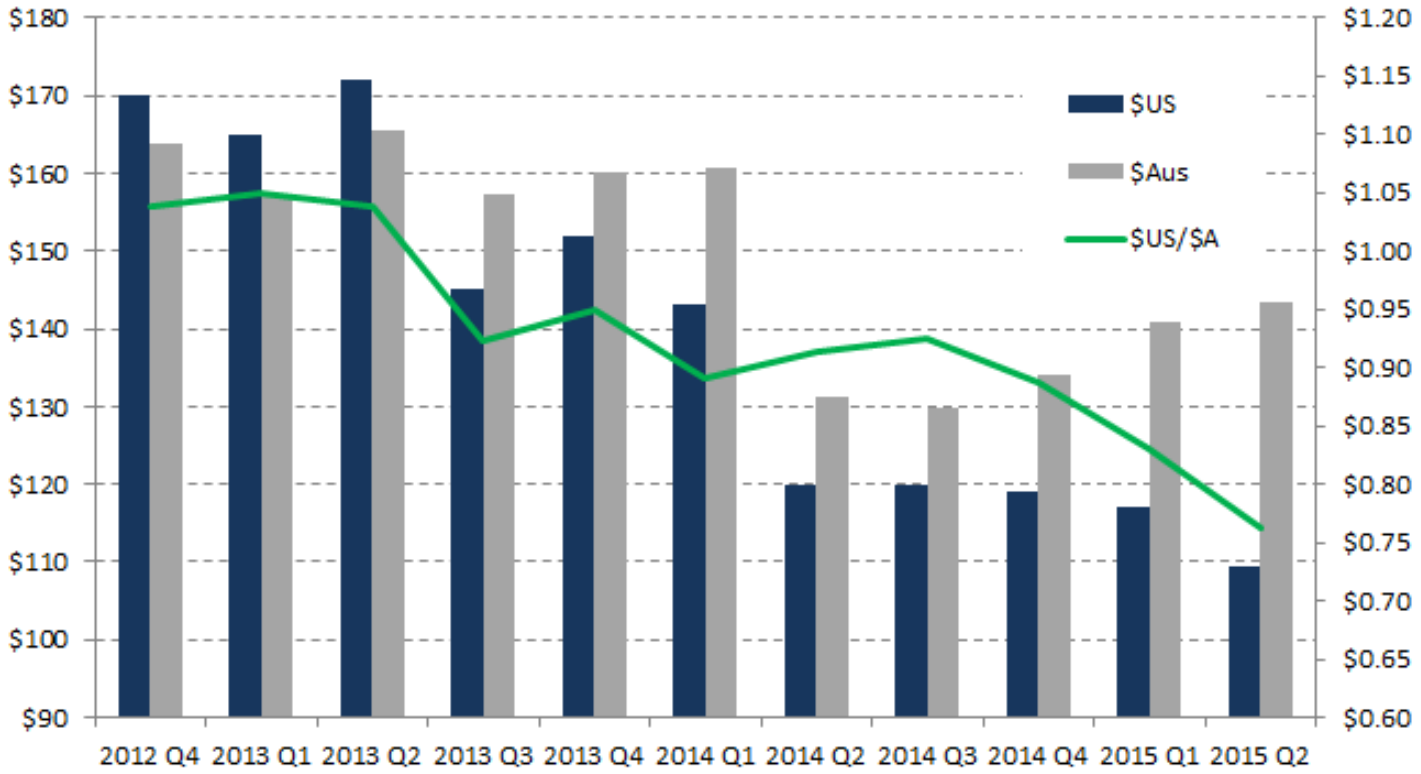
COMPETING METALLURGICAL COAL CURRENCIES

- The US dollar has strengthened vs. the $A and $C dollars
- However, the largest producer is China and the Renmimbi has increased



IMPACT OF US CURRENCY EXCHANGE ON WORLD MET PRICES

- **Benchmark price had been flat in Australian dollars until 2014 Q2**
  - Collapse in 2014 Q2 shows excess supply as Australian exports recover from floods
- **Price has been rising in Australian dollars with weaker $A**
  - Price has fallen in USD from $120 to $109.50



Outline

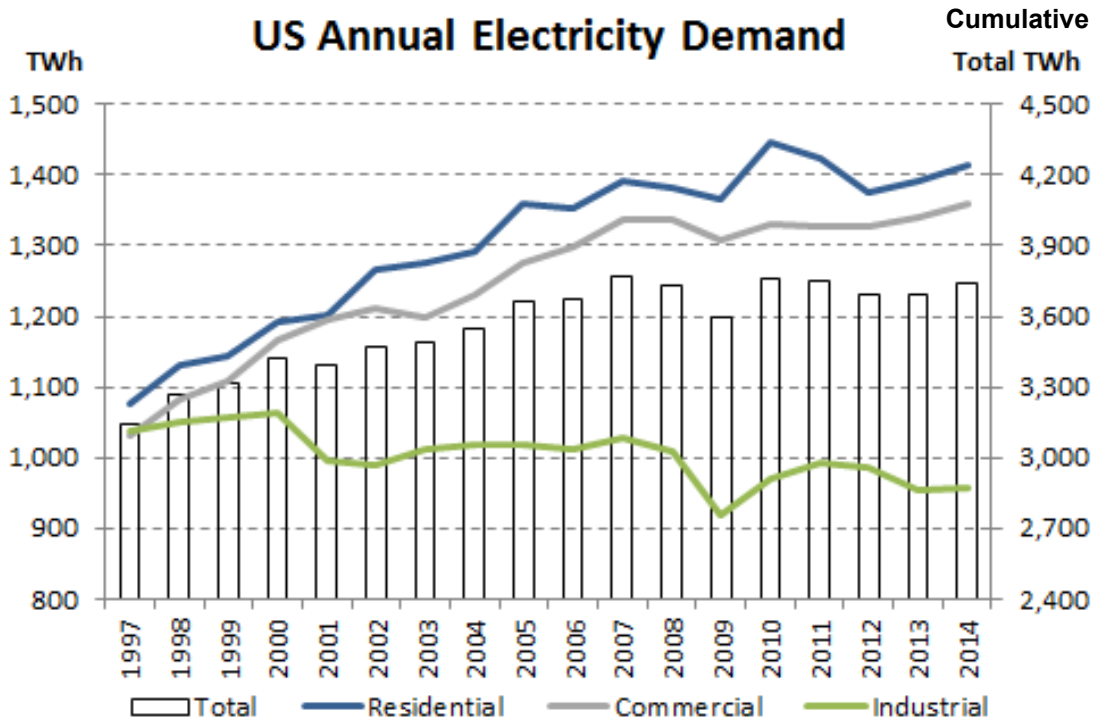
- State of the Overall Market
- **Market Outlook**
- Domestic Coal Demand
- Exports
- Coal Basin Overview
- Industry Issues
- Closing Thoughts

OUTLOOK FOR DOMESTIC POWER MARKETS

- **Low electricity demand growth**
- **Loss of market share for coal**
  - CCGT gas-fired plants are displacing coal generation
    - Impacts vary by basin: most PRB and ILB plants run when gas prices are above $4.00
  - Growth in subsidized non-fossil generation
- **Coal-fired plant retirements are driven by a combination of new EPA rules forcing retrofit capital investment and low gas and power prices**
  - New CCGT capacity is still being constructed while existing coal retires
- **Major new EPA rules forcing capital investment or retirements**
  - Mercury and Air Toxics Standard (MATS) takes effect in 2015 despite the fact that the Supreme Court remanded MATS in June.
  - Cross-State Air Pollution Rule (CSAPR) started in 2015; phase 2 in 2017
  - Regional Haze (BART) affecting western coal plants
  - New Source Review (NSR) litigation
  - New CO_2 limits proposed for existing plants under Clean Power Plan in 2020

ELECTRICITY DEMAND GROWTH HAS VANISHED

- **No growth in electricity demand since 2007**
  - Total fell in 2011, 2012 and 2013; up 1.3% YTD Nov 2014 on cold winter
  - Industrial demand is 10% below 1997
- **Compound annual growth rates since 2006**
  - Residential – 0.6%; commercial – 0.6%; industrial – (0.7%); total – 0.2%



EPA CARBON RULE TIMELINE

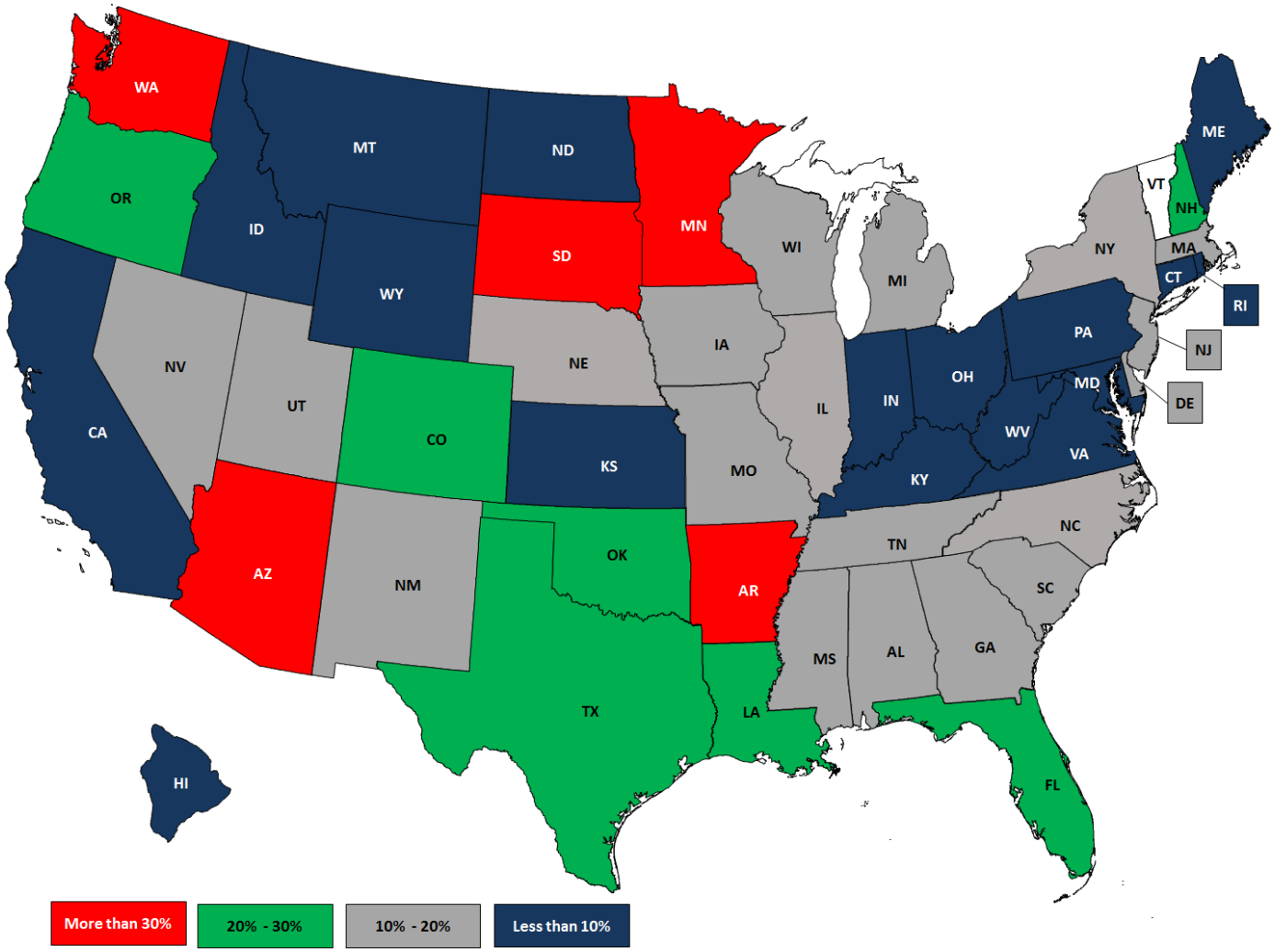
- **Proposed rules**
  - New plants: proposed April 2012; re-proposed January 2014
  - Existing plants: proposed June 18, 2014
  - Modified plants: proposed June 18, 2014
- **Compliance plan dates**
  - Summer 2015 – EPA proposed federal plan
  - Summer 2016 – due date for state compliance plans
    - Can be initial plans with request for 1- or 2-year extensions
  - Summer 2017 – state plans with 1-year extension
  - Summer 2018 – multi-state plans with 2-year extension
- **Final rules to be issued – Summer 2015 (Today?)**
  - Expect compliance date to be delayed
  - Other changes?

CARBON EMISSION LIMITS FOR EXISTING PLANTS

- **"Clean Power Plan" (CPP) would limit CO_2 emission rates from existing fossil fuel plants for each state**
- **Target is to reduce emissions from existing fossil fuel plants by 30% from 2005 – 18% from 2012**
  - Emissions were already much lower in 2012 than 2005 because of a huge increase in generation from natural gas, which displaced higher-emitting coal generation
  - Natural gas prices were very low in 2012 because of a mild winter which created a gas surplus
- **Emission limits would take effect in 2020**
  - Further emissions reductions to be achieved by 2030

STATE EMISSION REDUCTION LEVELS

- **States in red and green must achieve greatest cuts**



BUILDING BLOCK 1: COAL UNIT EFFICIENCY

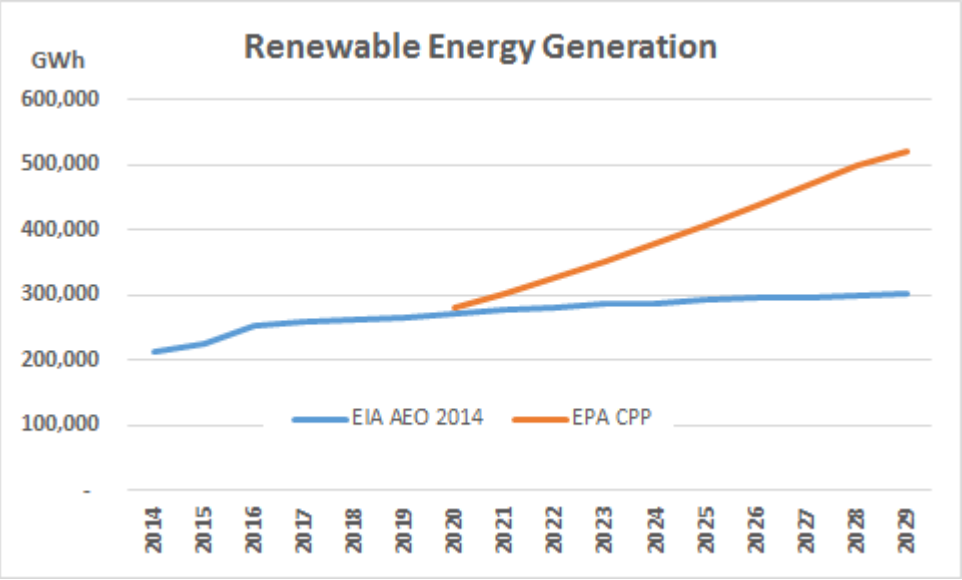
- **EPA's analysis that coal units can improve efficiency by 6% across the entire fleet is a flawed analysis**
  - Assumes plants are not run efficiently today and can cut emissions 4% at no cost by adopting "best practices" per Sargent & Lundy study
  - Assumes another 2% reduction can be met by making capital investments to improve efficiency at $100/kW
- **Sargent & Lundy filed comments of proposed rule, stating this is not what its study said**
- **EPA statistical study of existing coal units was flawed**
  - Analyzed variation in heat rates of existing coal units
  - Assumed only reasons for variations were elevation and capacity factor, which accounted for 28% of difference
  - Assumed all other differences were due to poor practices
    - Actually, plant design and fuel type account for largest variation

BUILDING BLOCK 2: DISPATCH OF NGCC UNITS

- **EPA's assumes that the entire fleet of NGCC units can run at a 70% capacity factor**
  - All of the increased generation assumed to displace coal
  - Accounts for most of required emission reductions
- **EPA ignores how power plants actually operate**
  - Demand for electricity varies during day, week and season
  - Coal units cannot be turned off at night and operate by day
  - Gas units must be turned down at night to keep coal on
    - Even in 2012 when gas prices were low, NGCC ran at only 52%
    - Increased generation from renewables will increase problem
  - Only solution would be to retire coal plants and replace them with new NGCC plants – much higher costs

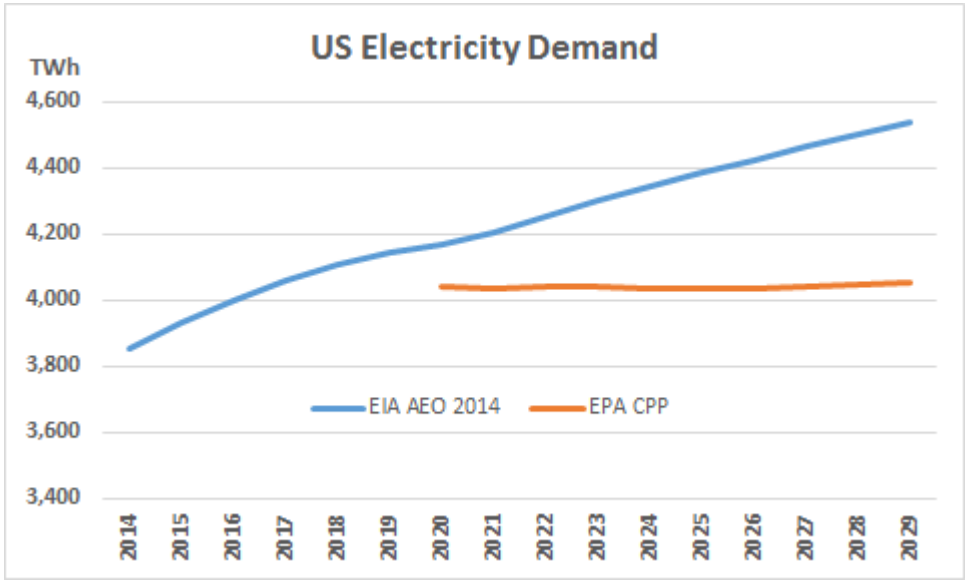
BUILDING BLOCK 3: INCREASE RENEWABLES

- **EPA applies regional growth factor for renewable power based upon state renewable portfolio standards of other states in the census region**
  - State RPS include sources not qualified for EPA credit
- **EPA assumes compound annual growth rate of 7.1%**
  - EIA Annual Energy Outlook projects 1.2% annual growth



BUILDING BLOCK 4: ENERGY EFFICIENCY

- **EPA assumes electricity demand (EE) can be reduced up to 1.5% annually from baseline growth rate**
  - Compounded annually starting in 2017
  - Baseline EIA demand growth forecast includes EE
  - EIA Annual Energy Outlook projects 0.9% annual growth



PROBLEMS WITH ACHIEVING EMISSION REDUCTIONS

- **Each building block is a very aggressive assumption**
  - Calculating emission limits when each assumption is aggressive is not "flexible"; it is unrealistic
  - Only way to meet limits is to replace many coal units with construction of new NGCC units (not limited by rules)
- **Timing of compliance is immediate in 2020**
  - Individual state plans are required to be submitted by June 2016; approved in 12 months (mid-2017)
  - 2020 compliance is an 18% reduction in emission rates from 2012
  - Power industry requires long lead times to make changes
  - Not enough time to build new NGCC units to replace coal

EPA's COST OF COMPLIANCE WITH CARBON RULES

- **Cost of new source standards assumed minimal**
  - Blocks building new coal plants; none being built now
- **EPA cost estimates for CPP are:**
  - State compliance costs $7.4 billion in 2020; $8.8 billion in 2030
  - Energy price increases in 2020 compared to base case:
    - Electricity: 6% - 7%
    - Natural gas: 9% - 12%
  - Assumes costs shrink because electricity demand will fall
  - Excludes impact of gas price increase on economy
- **Climate benefits not much larger than costs**
  - 2020 climate benefits $4.7 - $25 billion per year
  - Other "co-benefits" from reduced emissions from coal (SO_2 and NOx) $19 - $42 billion per year
    - Emissions now 80% lower than 1989 due to acid rain, CAIR rules
    - Projected to be 90% lower without CPP; 93% lower with CPP

HOW WILL STATES COMPLY WITH THE CPP?

- **Emission reductions will be a challenge for states to meet.**
- **Only real solution is to build new NGCC plants to replace existing coal plants**
- **Cost to replace existing coal with new NGCC is large**
  - Includes pipelines and transmission
  - Declines over time as coal units reach retirement age
- **EVA studied combined impact of CPP and other EPA regulations on power industry**
  - Measured changes from 2012 to 2020 in energy costs
- **Cost impact in constant 2012 dollars**
  - Electricity costs increase $98 billion annually
  - Natural gas costs increase $75 billion annually
  - Household utility bills would increase $293 per year
- **Major differences from EPA cost study:**
  - CPP will require widespread retirement of coal-fired plants
  - Construction of new NGCC plants will be required
  - Natural gas used for power generation will increase 26%
- **Grid is not capable of meeting 2020 limits reliably**

Outline

- State of the Overall Market
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- **Domestic Coal Demand**
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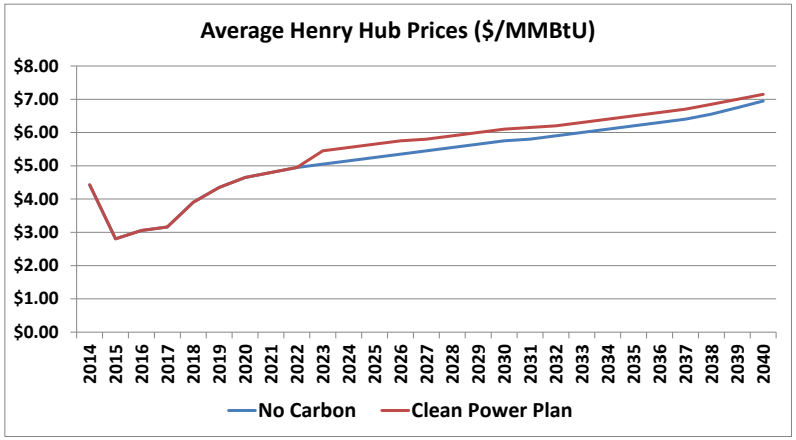
NATURAL GAS PRICE FORECAST

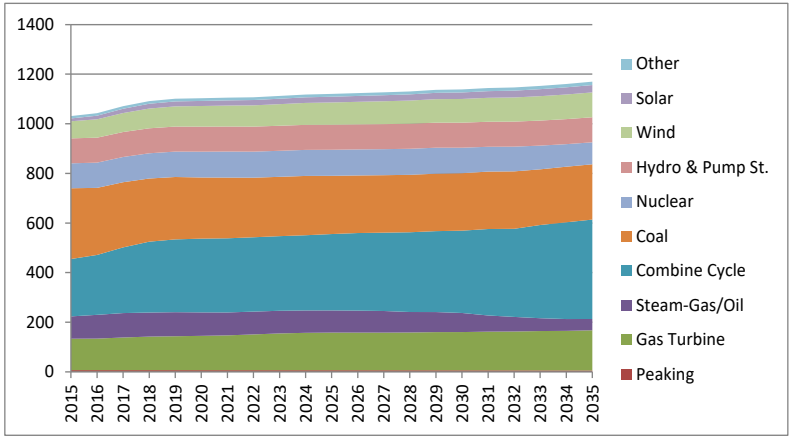


- Market prices are expected to remain low through 2017
- Consequences are both short- and long-term
- Short-term means lower coal generation as CCGT's dispatch ahead of coal
- Long-term means more coal capacity may be retired

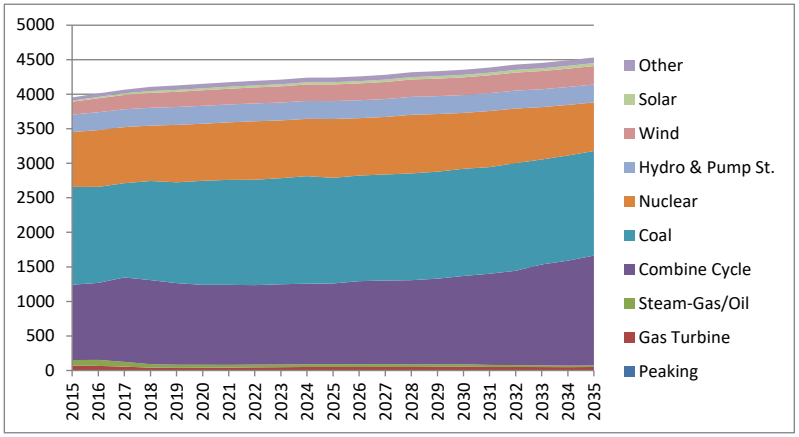
CAPACITY AND GENERATION

No New Carbon

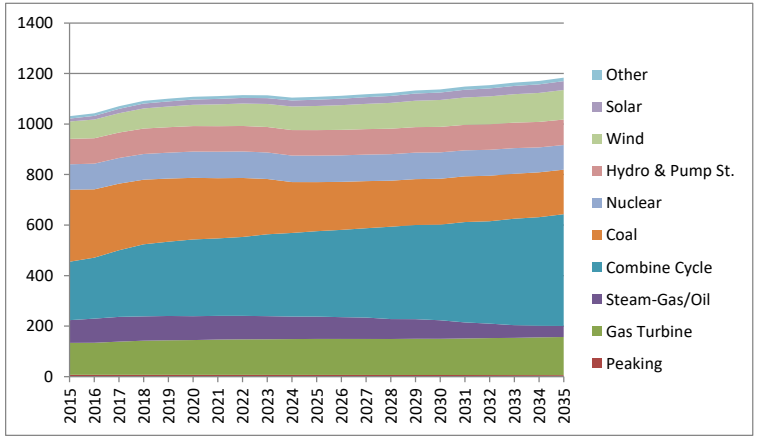
Capacity (GW)

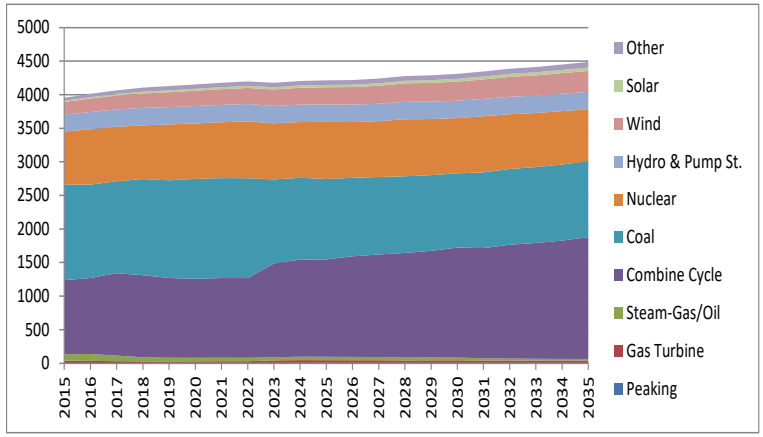


Generation (GWH)



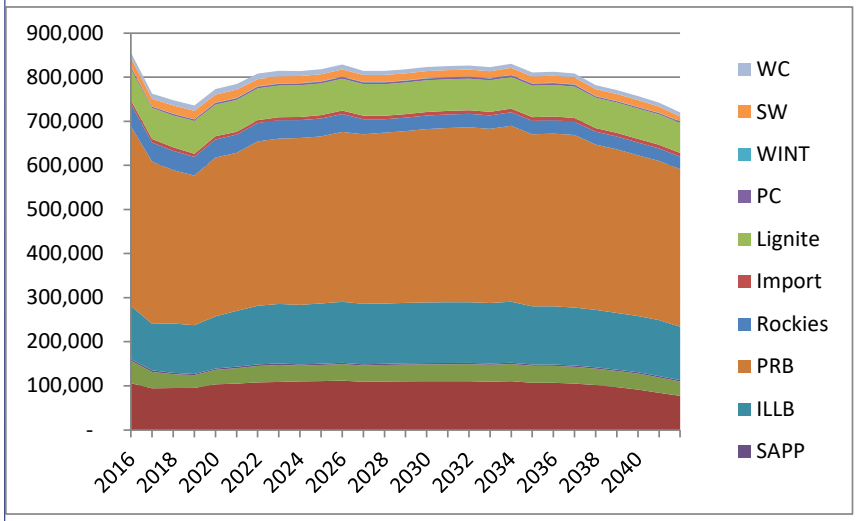
Clean Power Plan_2023





COAL BURN FOR ELECTRIC GENERATION (1000 Tons)

No New Carbon



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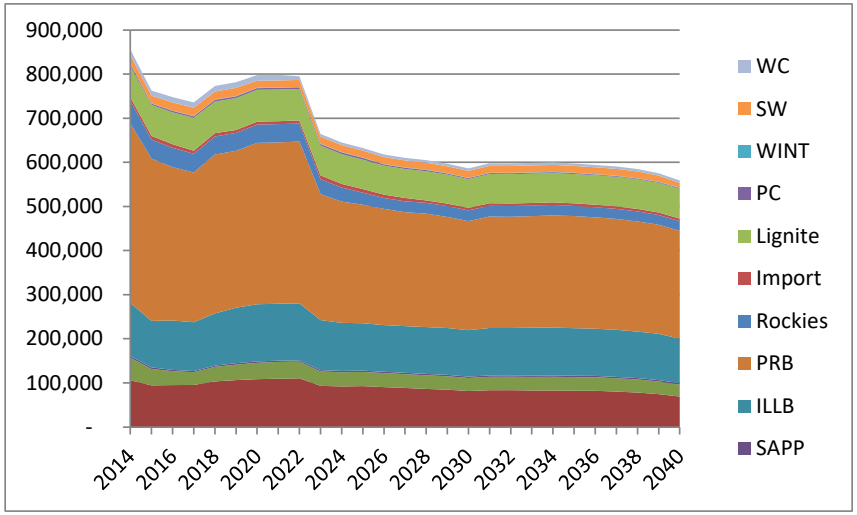

Outline

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EXPORT FORECAST (Million Tons)

EXPORTS	2013	2014	2015	2020	2025	2030	2035	2040
EXPORT METALLURGICAL								
Northern Appalachia	10.7	9.5	8.9	8.2	8.2	7.3	7.3	7.3
Central Appalachia	39.9	36.4	32.3	28.6	27.6	26.6	25.6	24.5
Southern Appalachia	10.5	11.7	10.0	8.9	8.9	8.9	8.9	8.9
Illinois Basin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Powder River Basin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rockies	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lignite and Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total U.S. Coal	**61.3**	**57.6**	**51.2**	**45.7**	**44.7**	**42.8**	**41.7**	**40.7**
EXPORT STEAM								
Northern Appalachia	4.2	3.5	9.3	1.1	1.2	1.2	1.2	1.2
Central Appalachia	14.4	9.9	5.2	3.3	3.0	2.0	2.0	2.0
Southern Appalachia	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Illinois Basin	17.9	11.6	10.1	9.4	9.8	9.8	9.8	9.8
Powder River Basin	9.7	5.8	5.6	9.5	37.5	41.4	41.4	41.4
Rockies	17.0	12.8	9.4	13.7	13.7	13.7	13.7	13.7
Lignite and Other	0.7	0.6	0.0	0.6	0.6	0.6	0.6	0.6
Total U.S. Coal	**63.8**	**44.1**	**39.6**	**37.5**	**65.7**	**68.6**	**68.6**	**68.6**
TOTAL EXPORTS								
Northern Appalachia	14.9	13.0	18.2	9.3	9.4	8.5	8.5	8.5
Central Appalachia	54.4	46.3	37.5	31.9	30.6	28.6	27.6	26.5
Southern Appalachia	10.5	11.8	10.0	8.9	8.9	8.9	8.9	8.9
Illinois Basin	17.9	11.6	10.1	9.4	9.8	9.8	9.8	9.8
Powder River Basin	9.7	5.8	5.6	9.5	37.5	41.4	41.4	41.4
Rockies	17.1	12.8	9.4	13.7	13.7	13.7	13.7	13.7
Lignite and Other	0.7	0.6	0.0	0.6	0.6	0.6	0.6	0.6
Total U.S. Coal	**125.1**	**101.7**	**90.8**	**83.2**	**110.4**	**111.4**	**110.4**	**109.3**

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- Exports depend upon the relative strength of the US dollar. Long-term forecast reflects parity between U.S. and Australian dollar.
- Export levels depend upon the successful development of at least one west coast terminal.
- River business is tied primarily to exports from Illinois Basin although other regions could move through NOLA.

Outline

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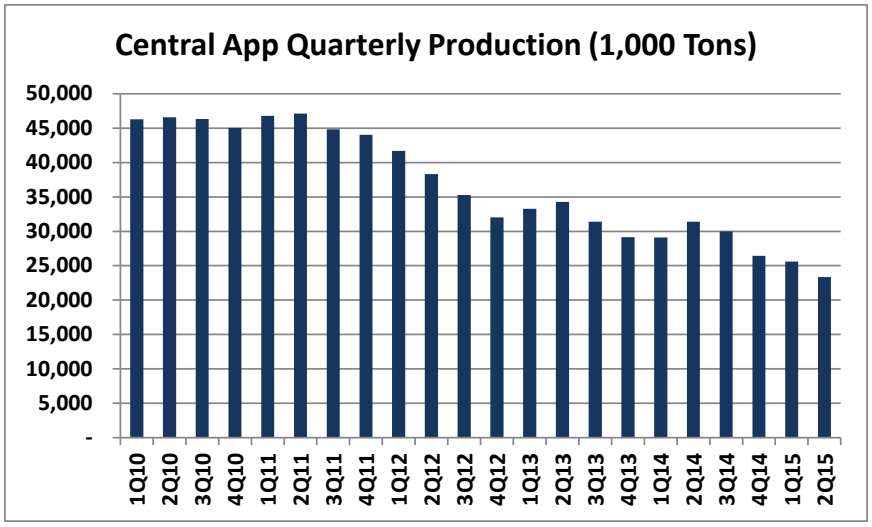
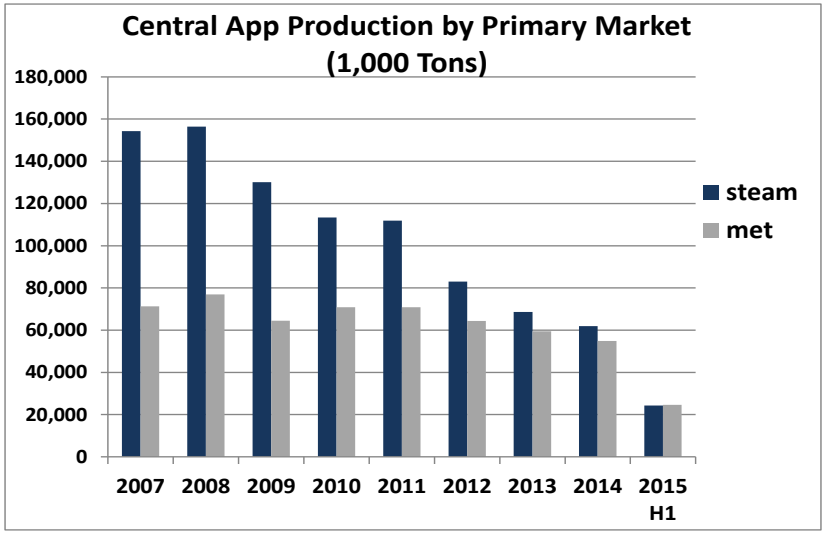
PRODUCTION IN CENTRAL APP IS CONTINUING TO FALL

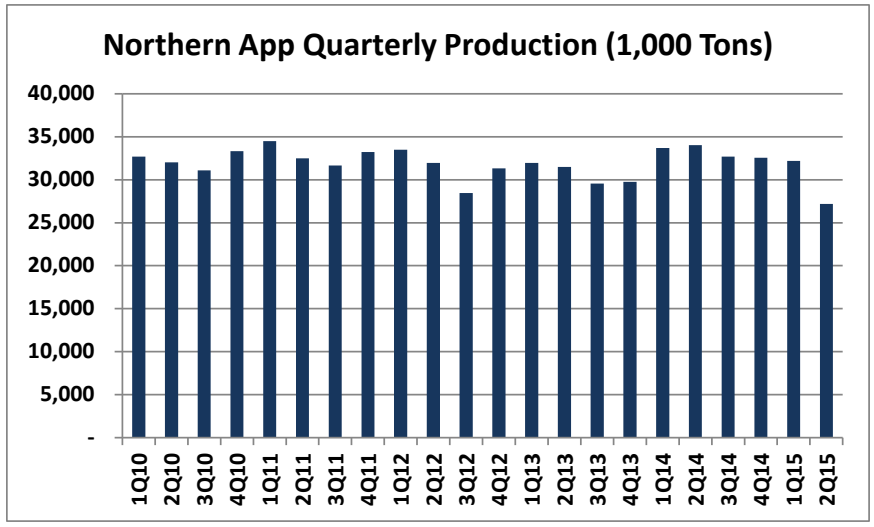
- Production cut in half from 233 million tons in 2008 to 116 million tons in 2014
  - H1 2015 production at 98 million ton annual rate
- Bankruptcies have started and are likely to continue.
- Major companies selling to independents backed by private equity
- Production costs reduced with lower wages and diesel prices
- CAPP increasingly reliant on metallurgical coal market

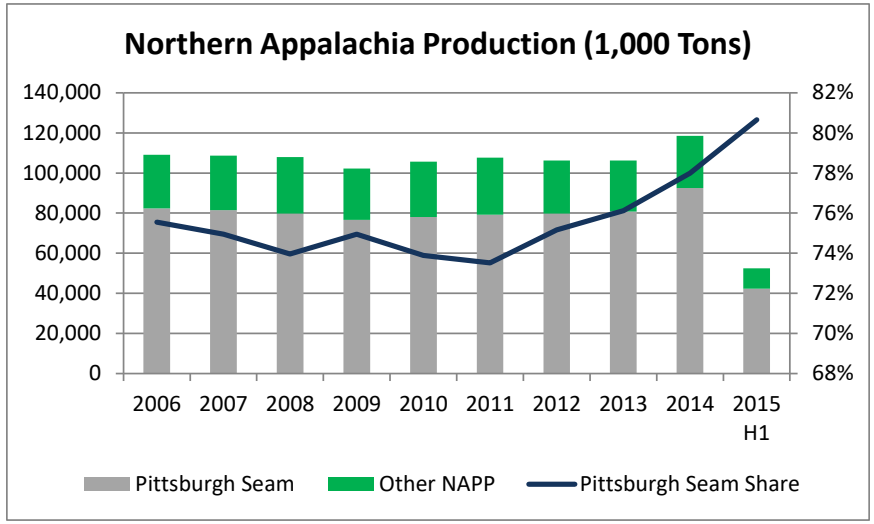




PRODUCTION IN NORTHERN APP COLLAPSED IN Q2 2015

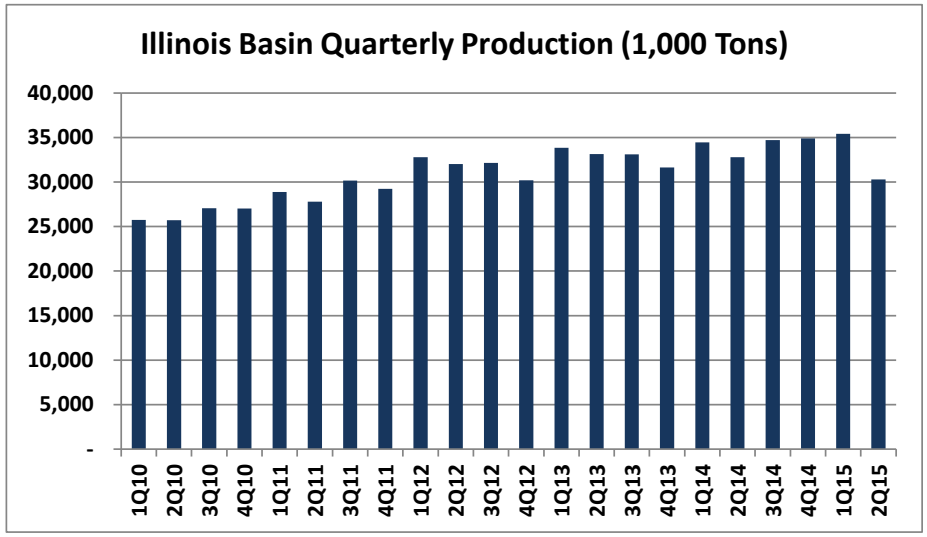
- Large reductions in Q2 2015 from Murray mines.
- Substantial reductions from others including Alpha (Cumberland and Emerald), Arch (Leer), Consol (Bailey, BMX and Enlow Fork), and Patriot Federal #2)
- Pittsburgh Seam dominant, non-Pittsburgh seam production at risk

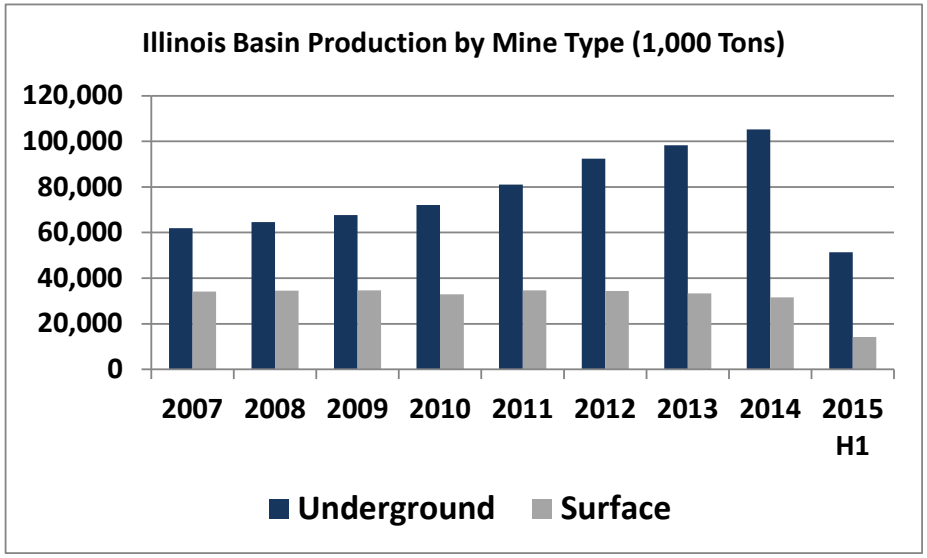




PRODUCTION IN ILLINOIS BASIN ALSO DROPPED IN Q2 2015

- Over a third of the quarterly reduction was due to Deer Run which was idled due to high carbon monoxide readings. Remaining reductions were from other Murray mines, Alliance and Peabody mines.
- High-cost mines cannot compete and are closing
  - Examples are Highland and Dodge Hill (Peabody); Prosperity (Sunrise)
- Illinois Basin expansions exceed domestic market demand
- Growth in market is electric generation and export when competitive





Outline

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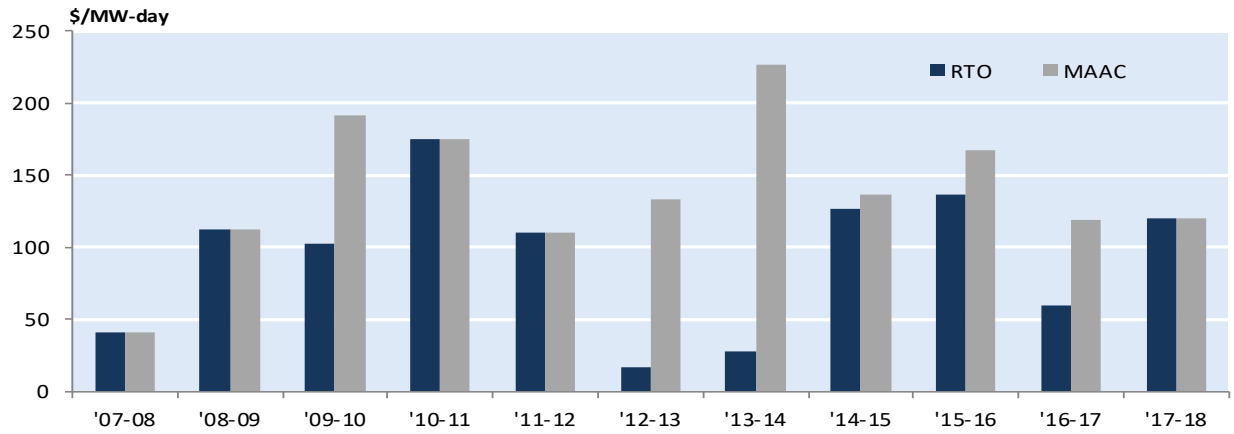
SOME UTILITIES AND MERCHANTS ARE ABANDONING COAL

- **Generators are not incented to maintain coal assets in the current market**
  - For deregulated generation, recovery of capital investments in pollution control technology is not guaranteed
  - For regulated generation, depreciated coal assets do not produce the same earnings as new gas-fired combined cycle plants
- **Capacity auctions are not adequately valuing coal (although this could change)**

PJM Capacity Auction Results



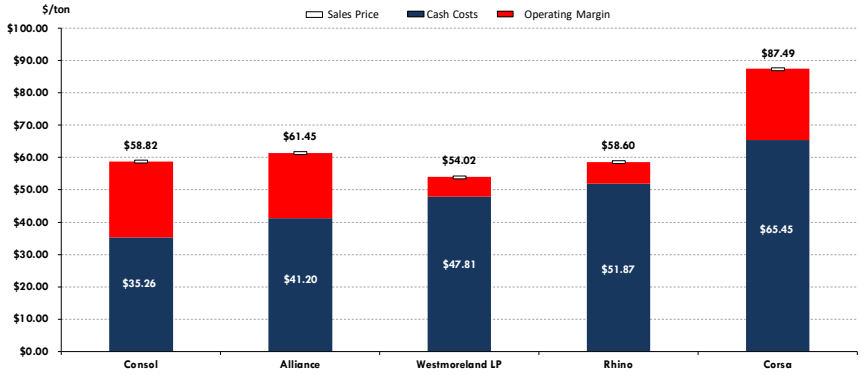
- **Several deregulated generators are trying to receive state support for maintaining a number of its coal plants through Purchased Power Agreements (PPAs)**

TRADITIONAL COAL INDUSTRY IS LOSING INTEREST

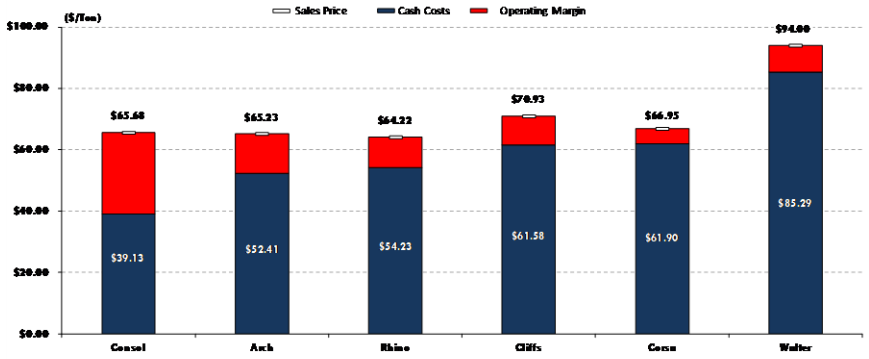
- **Everything is for sale**
- **Few buyers**
  - Murray Energy has tripled its size with the acquisition of CONSOL's union properties and its investment in Foresight Energy.
  - Westmoreland most recently purchased Oxford Coal to allow it to become an MLP, then Buckingham coal, and most recently San Juan coal.
  - Alliance bought the remaining position in White Oak
  - In Central Appalachia two companies (Blackhawk Mining and Revelation Energy) have been busy acquiring distress properties looking to amass large reserve holdings at minimum costs.
- **Lots of Available Properties**
  - TECO Coal
  - Arch and Alpha are selling off their companies, piece by piece
  - Peabody has announced its desire to sell non-core properties both in the U.S. and Australia
  - Consol's owners are pressuring it to divest of its remaining coal assets

FINANCIAL PERFORMANCE IN Q1 2015 WAS MIXED

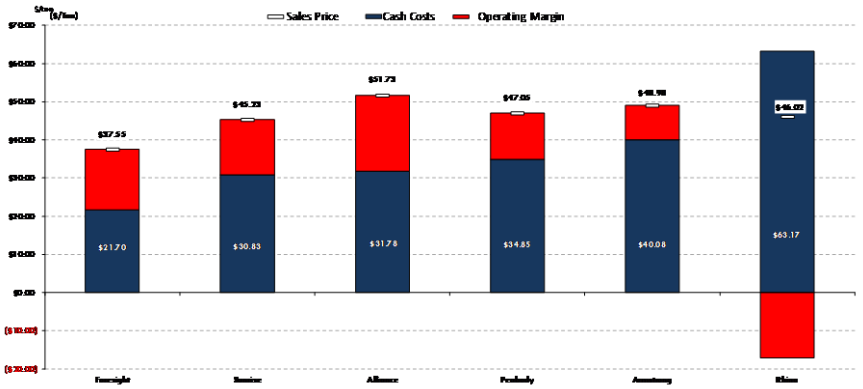
Northern App



Central App



Illinois Basin



- Most publicly traded coal companies had positive margins through Q1 due to older higher price contracts
- As these contracts roll off, the combination of little and lower price business is very problematic.
- Producers have been busy cutting costs

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CLOSING THOUGHTS

- **Next two to three years are promising to be the most difficult two years in the coal industry's recent history**
- **Coal producers need to balance supply and demand but want the other guys to idle mines**
  - Cost of idling coal mines is high
  - Inability to respond to improved market in the future
  - Write-off of investment
- **Bankruptcies have just started**
  - Xinergy, Patriot, and Walter are most recent bankruptcies
  - Alpha is likely to be next
  - Arch reportedly can hang on through 2015
- **Consolidation in coal industry likely to accelerate**
  - Foresight's sale to Murray was a surprise
  - Market cap for publically traded coal companies is so low, speculators/traders may jump in
  - MLP may trigger some restructuring or additional consolidation

COAL MARKET WILL SURVIVE

- Even in the most aggressive cases, demand by electric generators does not fall below 400 million tons
- Clean Power Plan is unlikely to survive court challenges. Just not clear whether it will be easy or hard to get there and how much damage will be done
- The global seaborne (traded) market exceeds 1.0 billion tonnes and will continue growing. U.S. coals are competitive when the U.S. dollar is close to parity with the Australian dollar

Appendix C

BART	Best Available Retrofit Techology (Regional Haze)
BCF	Billion Cubic Feet
BCFD	Billion Cubic Feet per Day
CAIR	Clean Air Interstate Rule
CAPP	Central Appalachia Coal Supply Region (EKY, SWV, VA and TN)
CCGT	Combined Cycle Gas Turbine (same as NGCC)
CCS	Carbon Capture and Storage
CIF ARA	Cost including Insurance and Freight to Amesterdam-Rotterdam-Antwerp
CPP	Clean Power Plan
CSAPR	Cross State Air Pollution Rule
GWH	Gigawatt-Hours
ILLB	Illinois Basin Coal Supply Region (IL, IN, and WKY)
MATS	Mercury and Air Toxics Standard
MMBtu	Million British Thermal Units
MWH	Megawatt-Hour
NAPP	Northern Appalachia Coal Supply Region (PA, OH, NWV)
NGCC	Natural Gas Combined Cycle (same as CCGT)
NSPS	New Source Performance Standards (Criteria Air Pollutants)
NSR	New Source Review (air)
PJM	A regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia
PRB	Powder River Basin Coal Supply Region (portions of WY and MT)

ROLE OF LIFE CYCLE ANALYSIS OF CARBON EMISSIONS IN INTEGRATED RESOURCE PLANS

Indiana Utility Regulatory Commission

2019 IRP Contemporary Issues Technical Conference

April 15, 2019

ENERGY VENTURES ANALYSIS

1901 N. Moore St., Suite 1200
Arlington, VA 22209

(703) 276 8900
www.evainc.com

ABOUT ENERGY VENTURES ANALYSIS

Energy Ventures Analysis is an energy consulting firm located in Arlington, Virginia. Since 1981, EVA has been publishing supply, demand, and price forecasts as part of its FUELCAST subscription service for the electric power, coal, natural gas, petroleum, renewable, and environmental sectors.

EVA's cutting-edge expertise in energy market, economic, financial, and operation management matters has led our firm to international recognition. For over three decades, our innovative insights have helped our clients make confident, informed investment and operational decisions to maximize value and spur financial growth.

Our clients include:

- power & natural gas utilities
- fuel producers
- fuel transporters
- commodity traders
- regulators
- financial institutions

OUTLINE

- Why carbon is different than other air emissions
- Current approach IRP approach to consideration of carbon emissions
- What is LCA analysis?
- How LCA analysis can be incorporated into the IRP process
- Is LCA a best practice?

WHY CARBON IS DIFFERENT

- **Greenhouse Gas (GHG) emissions, like CO2, have significantly different behavior in the atmosphere than other air emissions.**
  - GHG emissions such as CO2, have long residence times in the atmosphere and are distributed globally.
- **Most of the CO2 produced is "stored" in the atmosphere and accumulates over time.**
  - Approximately, 65-80% of the CO2 released into the atmosphere is absorbed by the oceans over 200 years.
  - The balance remains in the atmosphere over an even greater period of time.
- **Carbon management therefore is a marathon not a sprint**
  - The issue is total carbon emissions over the life of assets, not simply emission rates, emission intensity or annual loadings associated with the generator alone.

CURRENT APPROACH TO CONSIDERATION OF CARBON

- **Some utilities elect to consider carbon in their IRPs whether or not states require them to do so**
- **This consideration can be based upon carbon specific metrics or through environmental metrics that previously were applied to criteria air pollutants.**
- **The environmental metrics used in current Indiana IRPs are carbon emission rates (#/MMBtu), carbon intensity (#/MWH), *or* inside-the-fence carbon emissions over the IRP period.**
- **These are consistent with prior considerations of sulfur dioxide (SO2), nitrogen oxides (NOx), and particulate matter (PM) emissions, as these pollutants have local and regional impacts but not global ones.**
- **As carbon differs from these other pollutants, emission rates and/or total emissions do not reflect the long residence times for carbon.**
- **Therefore, this historic approach may distort the carbon contributions of alternative resource plans.**

LIFE CYCLE ANALYSIS

- **In recent years, life cycle analysis (LCA) has become the norm. The National Energy Technology Laboratory (NETL) which is part of the U.S. Department of Energy (DOE) national laboratory system, performs and sponsors a range of energy and environmental research and development. NETL alone lists over 100 publications related to its work in LCA on its website, a number of which focus on the LCA of new natural gas plants. In a 2015 report, NETL explains its adoption of LCA analysis as follows:**
  - *In recent years, the National Energy Technology Laboratory (NETL) has been using life cycle analysis (LCA) as a new and innovative way to analyze and compare different power production and transportation fuel production pathways. By using LCA, NETL has integrated a holistic approach to comparing energy production pathways instead of solely considering combustion emissions at energy conversion facilities (i.e., power plant or fuels refinery).*
- **In determining the contribution of carbon, it is important to consider upstream emissions.**
- **For a new combined cycle gas turbine (CCGT), the upstream portion includes the production of natural gas through its distribution to the consumer. The downstream portion includes the operation of the power plant and the transmission and distribution of electricity to the consumer. The sum of these emissions over the forecasted life of the plant comprise the life cycle emissions for the plant.**

HOW LCA CAN BE INCORPORATED INTO TO THE IRP PROCESS

- **LCA analyses can be used to compare the carbon profiles of alternative resource plans.**
- **This is important is it allows a comparison of the carbon profile of (a) an existing carbon generator with a limited life followed by renewables to (b) a new carbon generator with a likely 35 plus year life.**
- **LCA analyses also appropriately consider upstream emissions as well as inside-the-fence emissions.**

IS LCA BEST PRACTICE?

Some state resource planning requirements explicitly include an LCA requirement

Georgia

- **Subject 515-3-4 INTEGRATED RESOURCE PLANNING**
- **Rule 515-3-4-.02. Definitions**
- Utility Cost Test: An analytic test which considers only the direct utility economics of resource options. A resource option is cost effective under the utility cost test when **present value life cycle benefits exceed present value life cycle costs**, evaluated at a market discount rate. Direct benefits equal the direct avoided costs multiplied by the energy/capacity supplied by the resource option. Direct costs equal the utility cost of installing the resource option plus the utility's operating costs.

Delaware

- **TITLE 26 PUBLIC UTILITIES DELAWARE ADMINISTRATIVE CODE 1 Public Service Commission 3010 Integrated Resource Planning for the Provision of Standard Offer Service by Delmarva Power & Light Company**
- 6.1.4 Include a current evaluation, detailing and giving consideration to environmental benefits and externalities associated with the utilization of specific methods of energy production. This evaluation need not be based on original research by the Company and may rely on published research and peer reviewed scientific and/or medical studies commonly available. **To the extent that any reliable, relevant peer reviewed published research and scientific and/or medical studies commonly available include life cycle analyses encompassing energy extraction, transport, generation and/or use, the Company shall include such research and studies in its evaluation.**

INDIANA ADMINISTRATIVE CODE ENCOURAGES BEST PRACTICES

- **Indiana code, as stated in 170 IAC 4-7, as amended which provides such guidelines as to content of an IRP.**
- **With respect to environmental considerations, Indiana code includes environmental considerations under "contemporary issues" and states that utilities should use "contemporary methods" to evaluate. Contemporary methods is defined as "any methodological aspect involved with developing an IRP that represents the best practice of the electric industry to improve the quality of an IRP analysis."**

Thanks

Contact Info:

Emily Medine

emedine@evainc.com

412-421-2390

OUTLOOK FOR COAL MARKETS

May 11, 2023

ENERGY VENTURES ANALYSIS
8045 Leesburg Pike, Suite 200
Vienna, VA 22182
(703) 276 8900
www.evainc.com

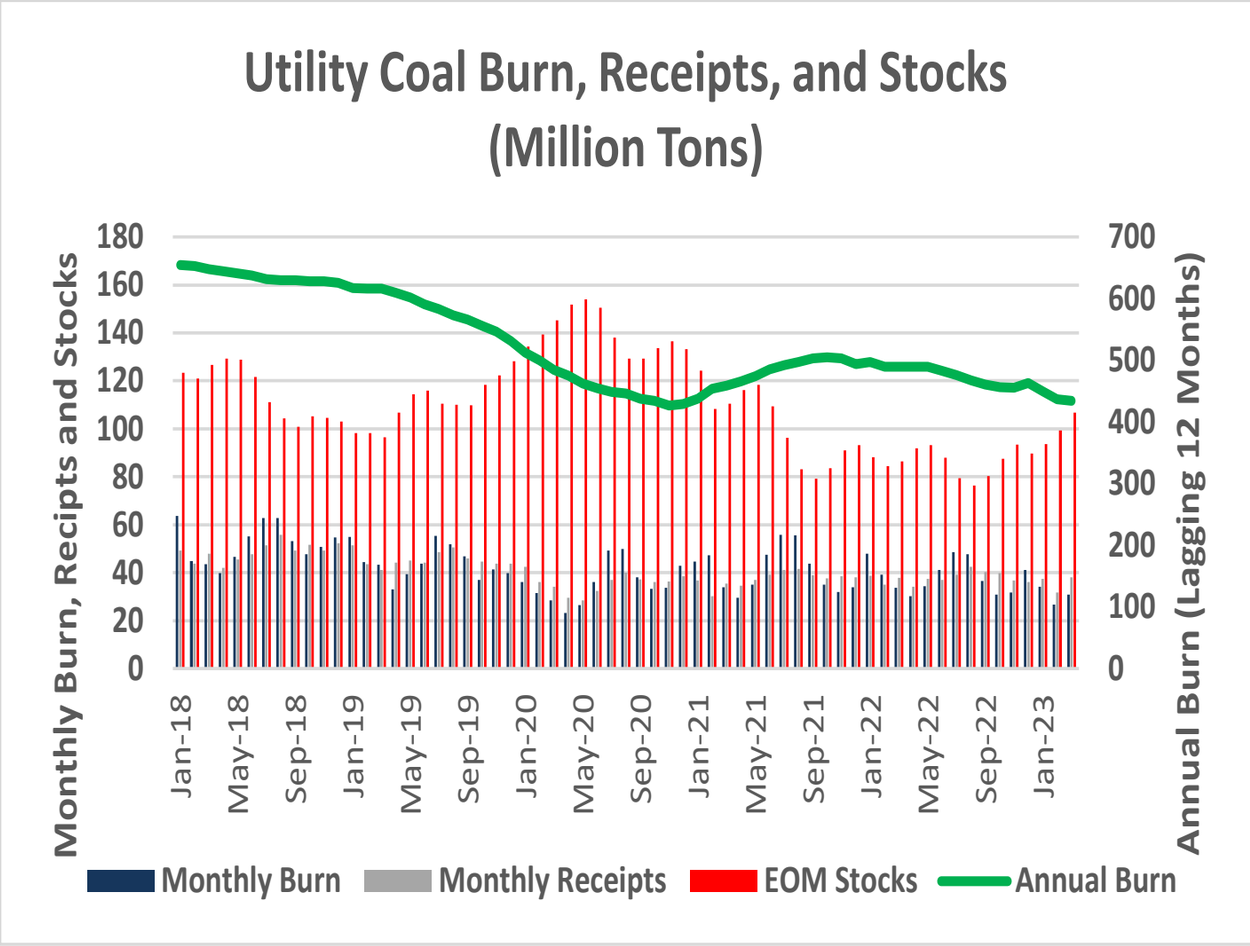
OUTLINE

1. WHAT HAPPENED?
2. SHORT-TERM OUTLOOK
3. FACTORS THAT CAN INFLUENCE SHORT-TERM DOMESTIC OUTLOOK
4. FACTORS THAT WILL AFFECT EXPORT MARKET
5. CLOSING THOUGHTS

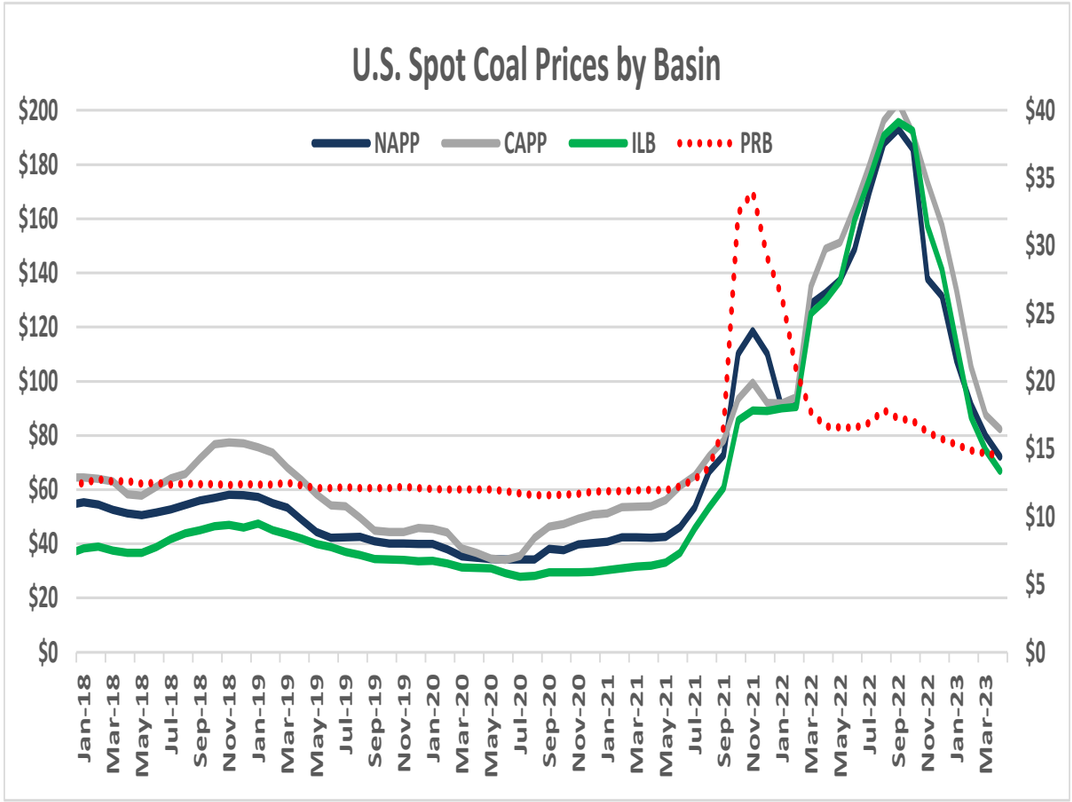
PERFECT STORM OR PERFECT NIGHTMARE?

- **COVID**
- **Russian Invasion of Ukraine**
- **Severe Weather Events**

COVID CAUSED A DECLINE IN UTILITY BURN



PRICES JUMPED WHEN THERE WAS INADEQUATE SUPPLY TO MEET HIGHER DOMESTIC AND GLOBAL DEMAND

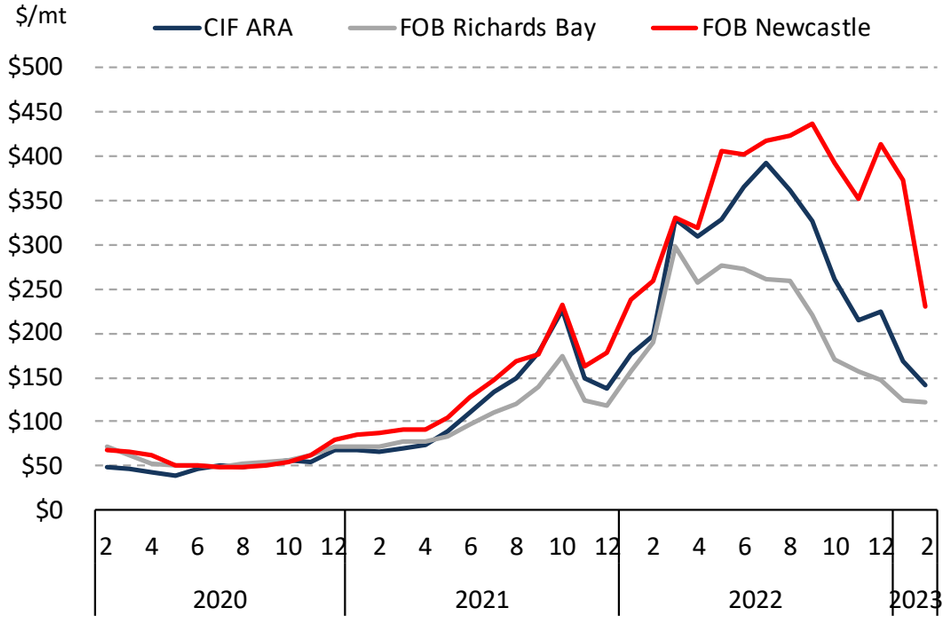


RUSSIAN INVASION OF UKRAINE AFFECTED GLOBAL COAL SUPPLY

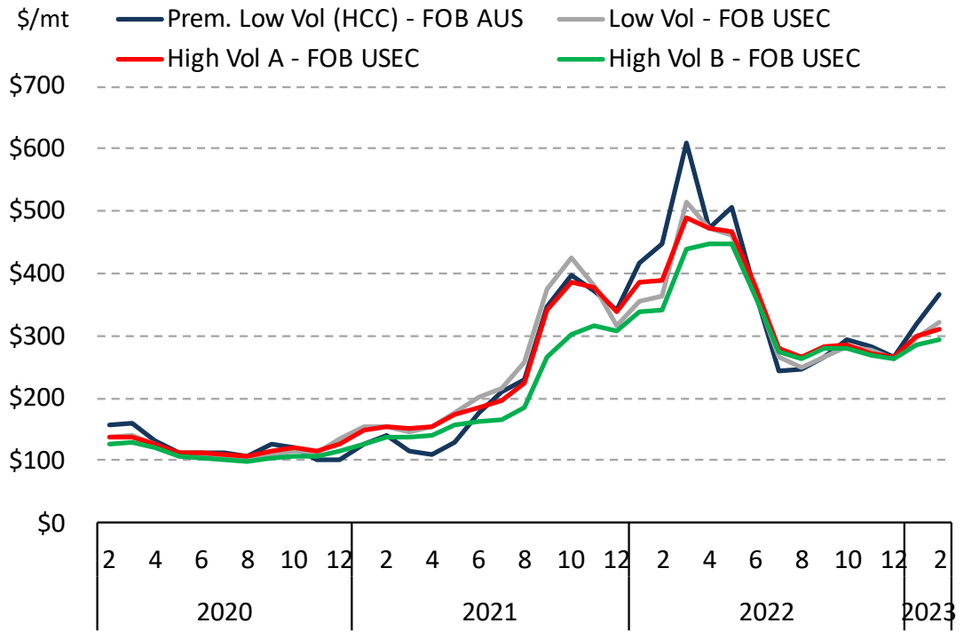
- **Russia's War On Ukraine changed world energy and coal markets – especially because world energy markets were already tight due to the recovery from the pandemic**
  - Russia is the third-largest exporter of met and thermal coal and dominates the world anthracite market
- **The ban on Russian coal imports spread quickly across the European Union, USA, and J-K-T democracies in Asia**
- **U.S. metallurgical coal prices rose quickly to the netback for world prices**
- **U.S. thermal coal exports were limited by port and rail capacity, but grew**
  - Baltimore is full; Hampton Roads is limited by rail service; but New Orleans can handle increased exports
- **U.S. coal production for 2022 was limited but increased exports because of reduced domestic power burn**

GLOBAL PRICING ALSO AFFECTED

World thermal coal prices - 6,000 kcal

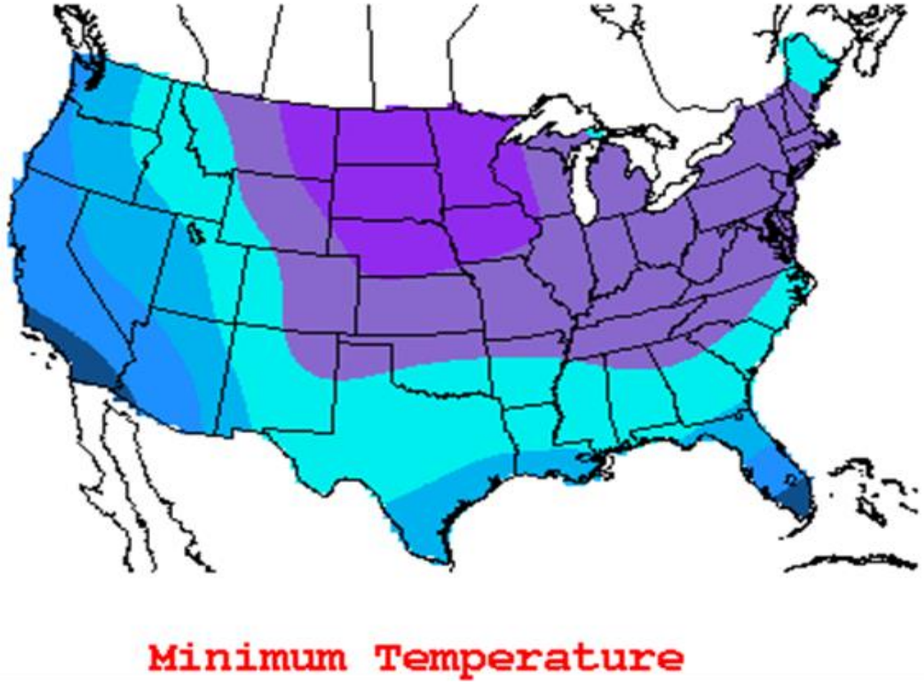


World met coal prices

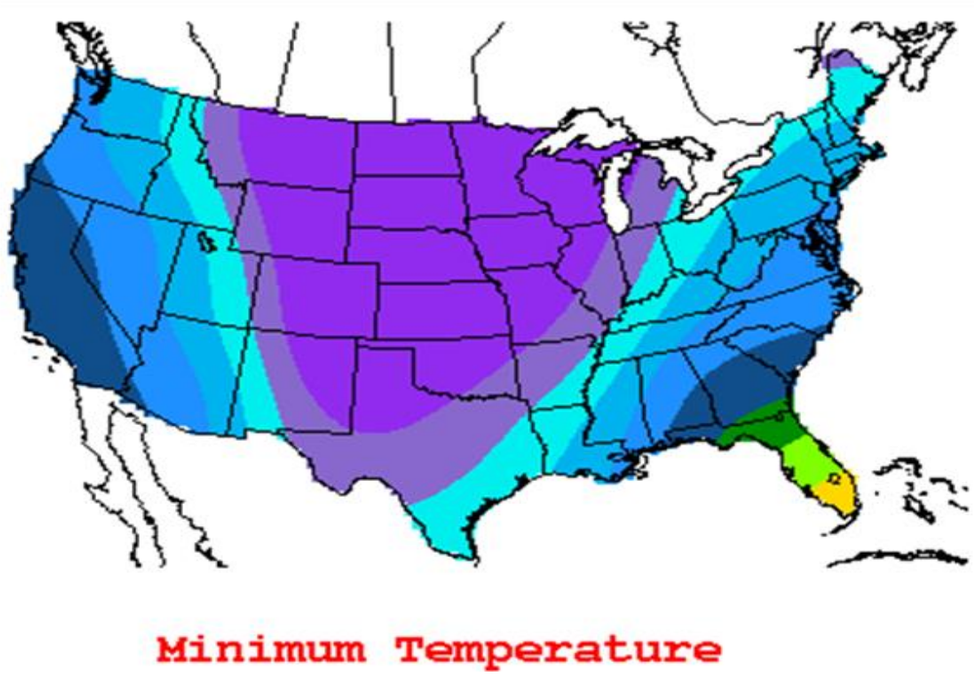


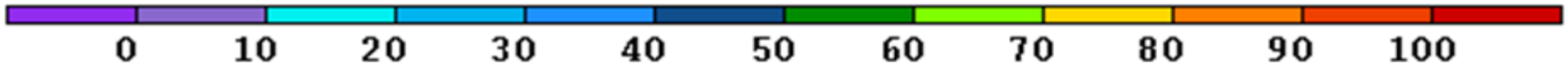
WINTER STORMS URI AND ELLIOTT EXPOSED CONCERNS ABOUT THE GRID

Winter Storm Elliott
Dec 24, 2022



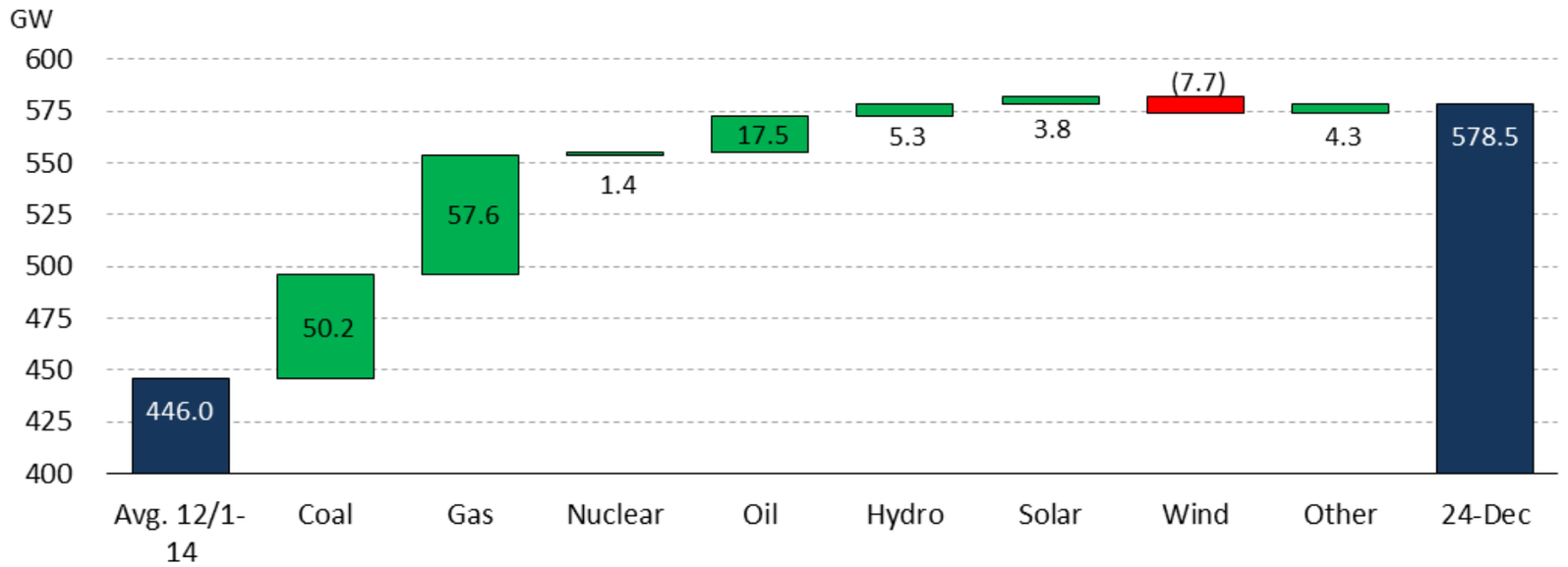
Winter Storm Uri
Feb 15, 2021





ELLIOTT FINDINGS

Net generation increase by fuel type during winter storm Elliott



Source: EIA Hourly Grid Monitor

- **Increased fossil fuel generation supplied the additional electricity needed during Winter Storm Elliott, while also balancing out the highly variable wind generation output in various regions during the storm**
- **Coal, natural gas, and oil combined for over 95% of the increased electric generation during Winter Storm Elliott**
  - Coal accounted for 38% of the increase, natural gas for 43%, and oil for 13%

SHORT-TERM OUTLOOK

- Forecast demand and supply
- Forecast prices
- Domestic Met coal
- Steam Coal Exports
- Met Coal Exports

SUMMARY OF COAL SUPPLY AND DEMAND FORECAST

US Coal Supply (mmt)	2022	2023	2024	2025	2026
Northern Appalachia	87.7	91.5	91.5	86.1	82.3
Central & Southern App.	69.9	70.2	70.1	69.6	69.5
Illinois Basin	78.1	78.4	78.7	75.7	72.1
Powder River Basin	258.5	276.7	276.1	253.9	225.0
Rockies	39.8	40.0	38.8	34.2	31.2
Lignite and Other*	58.0	52.5	51.5	50.8	50.4
Imports	3.4	2.4	2.3	2.5	2.8
Total Supply	**595.4**	**611.6**	**609.0**	**572.7**	**533.5**

**Includes LIG,WINT,SW,ANT,AK*

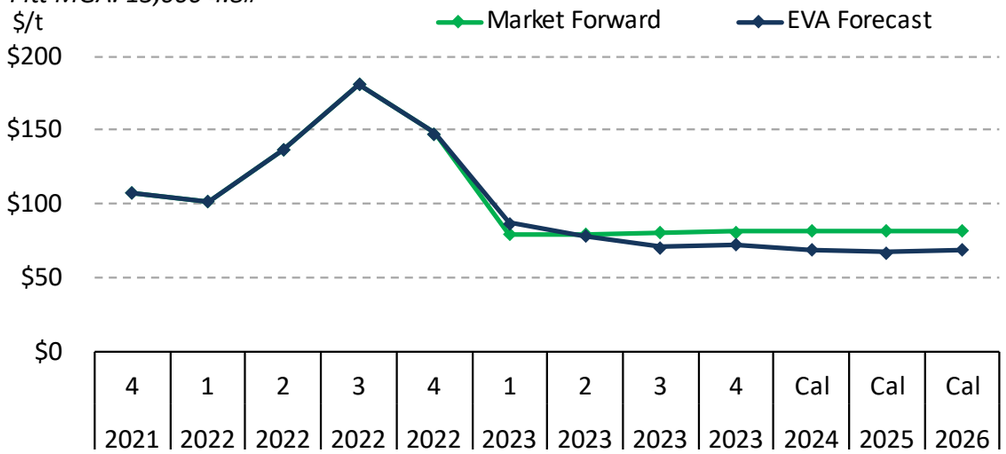
US Coal Demand (mmt)	2022	2023	2024	2025	2026
Electric Burn	461.1	460.9	448.8	412.5	372.7
Electric Receipts	454.7	465.3	451.0	413.1	371.1
Stockpile Change	*(2.1)*	*4.4*	*2.2*	*0.6*	*(1.8)*
Coke Ovens	16.9	15.6	15.7	15.7	15.2
Comm./Indust.	26.9	25.9	25.5	25.1	24.4
Domestic Receipts	**500.4**	**508.8**	**494.2**	**455.9**	**412.6**
Export Metallurgical	46.1	53.0	58.6	59.0	60.8
Export Steam	44.7	49.5	56.0	57.5	59.5
Export Other*	0.6	0.5	0.5	0.5	0.5
Total Exports	**91.4**	**103.0**	**115.1**	**117.1**	**120.9**
Total Demand	**591.8**	**611.8**	**609.4**	**573.0**	**533.5**

**Includes Lignite & Anthracite*

PRICE FORECAST

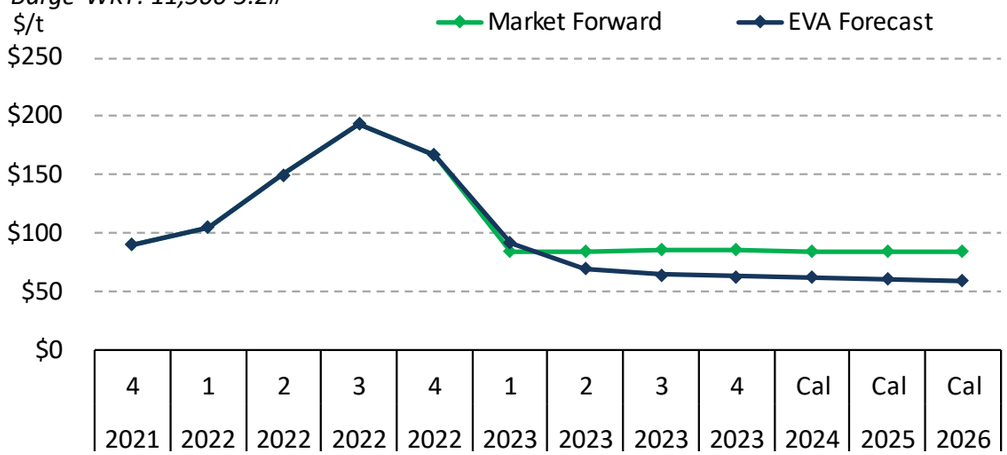
NAPP price forecast

Pitt MGA: 13,000 4.8#



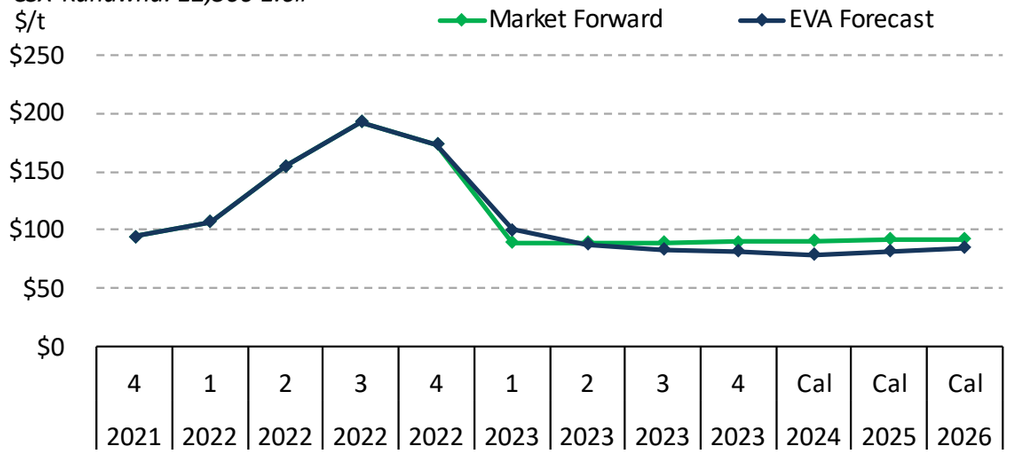
ILB price forecast

Barge-WKY: 11,500 5.2#



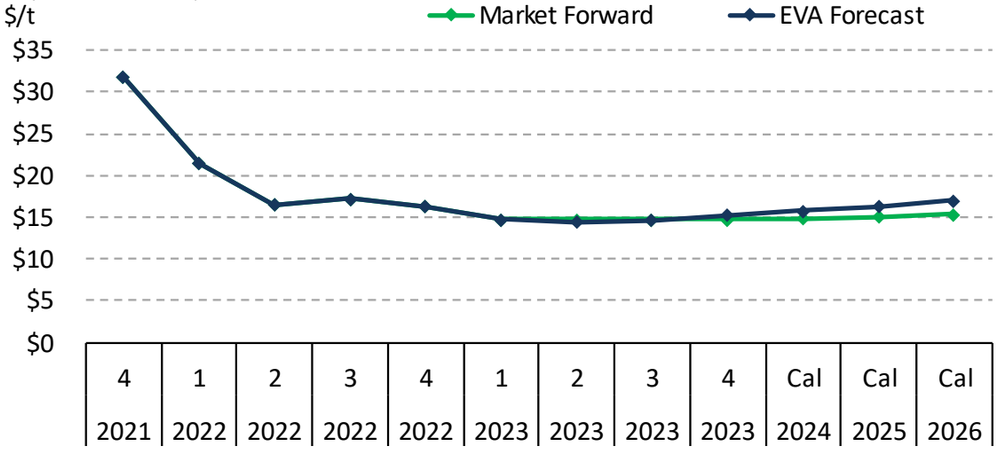
CAPP price forecast

CSX-Kanawha: 12,500 1.6#



PRB price forecast

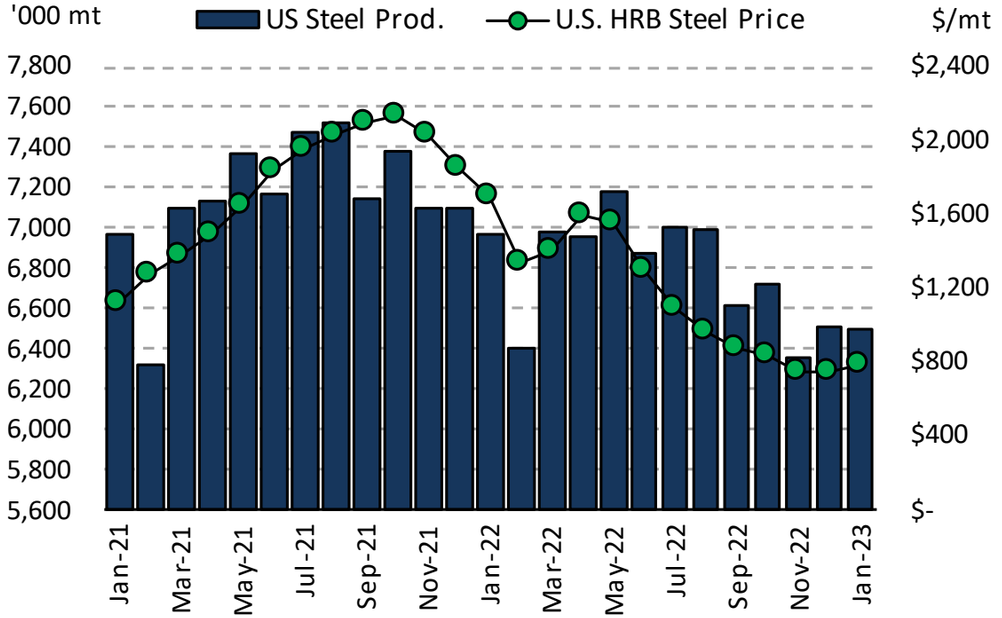
BN/UP-Gillette: 8,800 0.8#



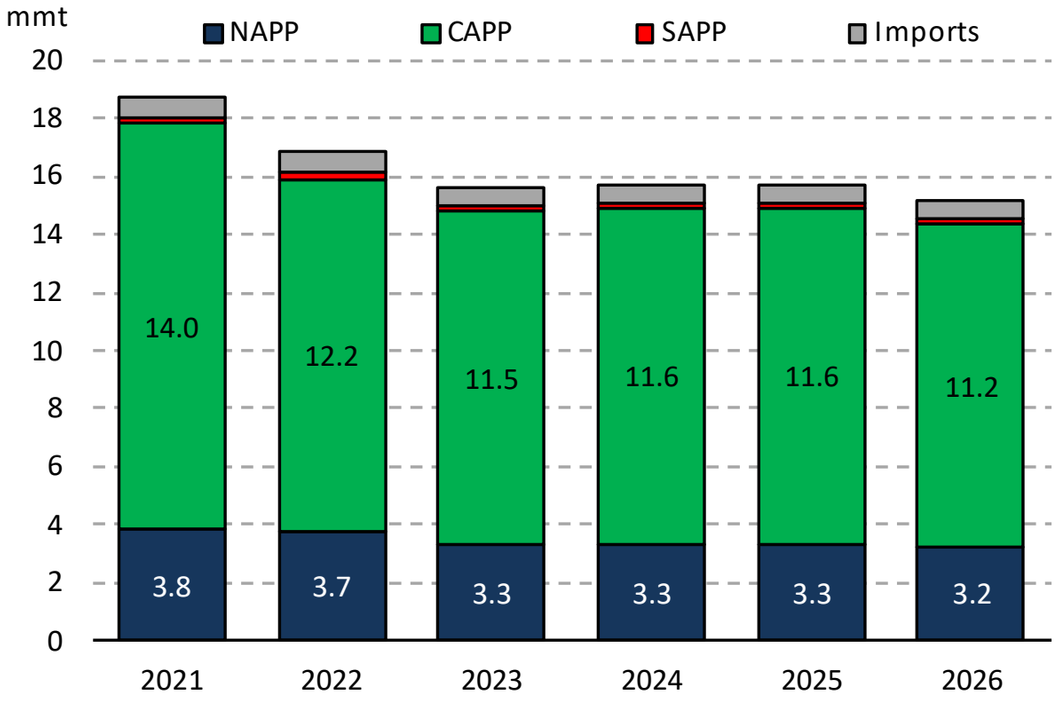
DOMESTIC METALLURGICAL COAL DEMAND WILL TREND DOWN DESPITE STRONG STEEL MARKET

- **U.S. steel production slipped in 2022 after a strong recovery in late 2021, but steel prices began to turn around to start 2023 and idled blast furnaces have restarted**
- **Closure of 3 coke batteries at US Steel's Clairton plant and uncertainty surrounding Granite City blast furnaces has domestic met coal demand on a flat to declining trajectory in the 3-year outlook**

U.S. steel production & hotrolled band steel price



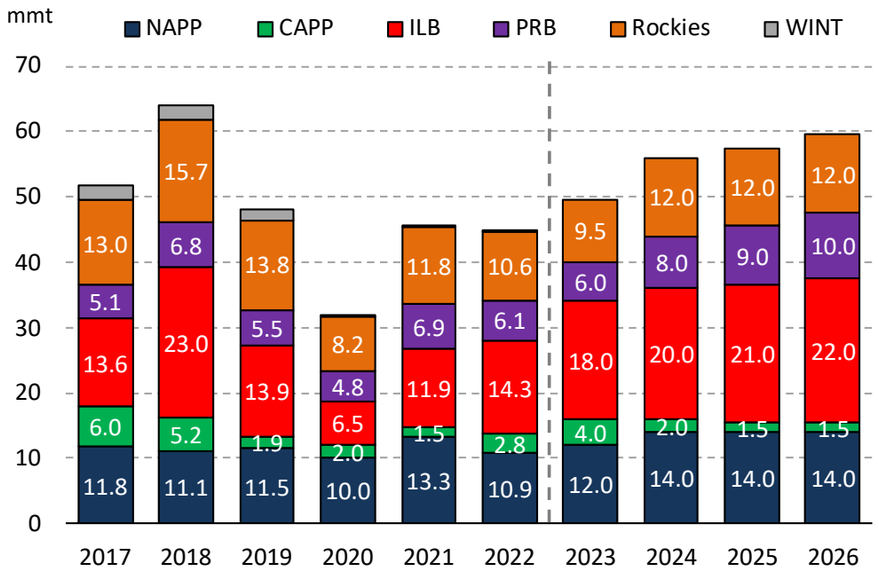
Domestic met coal consumption (incl. PCI)



2022 U.S. THERMAL EXPORTS FELL BELOW 2021 LEVELS, BUT FUTURE GROWTH LIKELY

- **Despite record or near-record high global coal prices in 2022, 2022 U.S. thermal coal exports finished down 1.6% compared to 2021 at 44.7 million tons**
- **Port strikes, railroad service issues, and a mine fire affected West Coast exports, while NAPP coal exports fell due to lower coal supply, displacement by Russian coal and cheaper pet coke in India**
- **ILB remains the primary basin for steam export growth in the near term (primary destinations: Europe & India)**
- **Ongoing permit issues for Bull Mountains mine puts Rockies export levels post-2024 at risk**

Steam coal export forecast - by basin



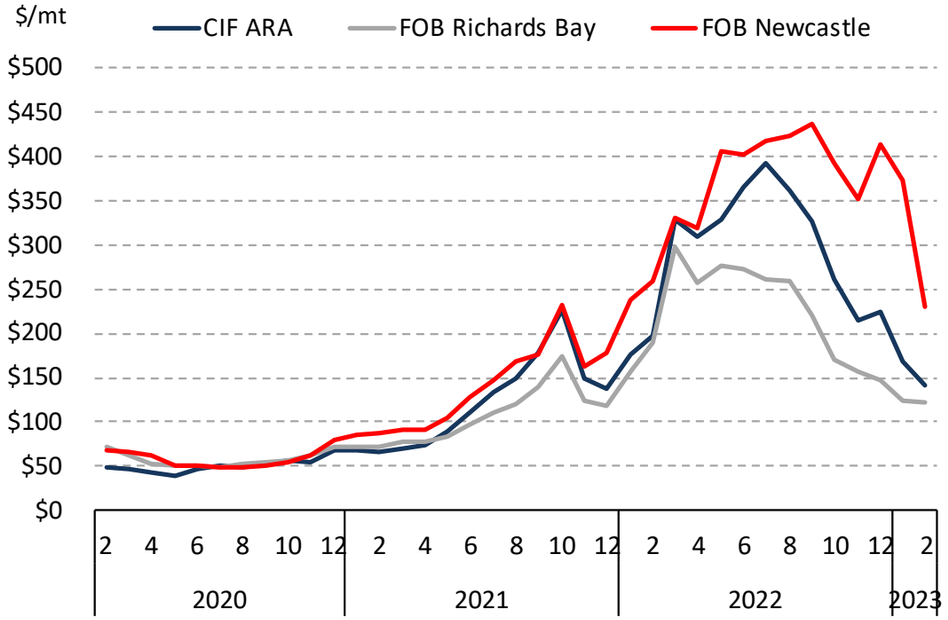
U.S. Total Steam Exports

		YTD Ending		Prior YTD Delta	
		Dec-22	Dec-21	k Tons	%
	Total U.S.	**44,733**	**45,446**	**(713)**	**-1.6%**
1	Japan	7,518	7,422	95	1.3%
2	India	7,018	11,791	(4,773)	-40.5%
3	Netherlands	6,416	3,679	2,737	74.4%
4	South Korea	5,348	6,739	(1,391)	-20.6%
5	Egypt	2,963	2,549	414	16.2%

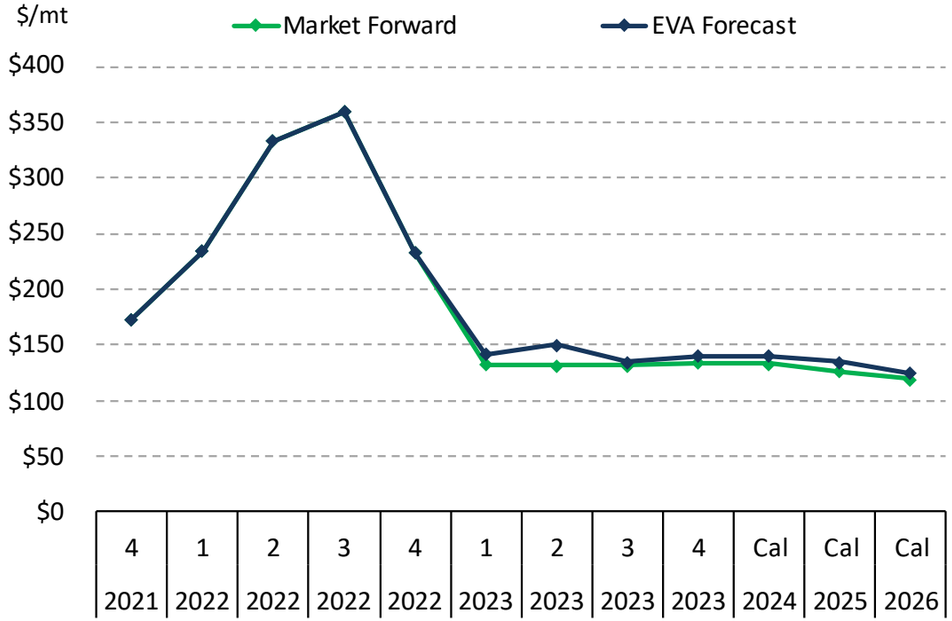
GLOBAL THERMAL COAL PRICES RETREATED AFTER MILD EUROPEAN WINTER

- **Global coal prices fell to pre-Ukraine War levels after Europe experienced a relatively mild winter, leading to sufficient coal and natural gas inventory levels amid steady import supply**
- **Increased coal demand in India due to growing economic activity and the beginning of peak demand season (April-June) will drive global coal prices in the near term**
- **After 2022 European energy crisis, global coal demand growth will refocus to Asia (China, India, Southeast Asia)**

World thermal coal prices - 6,000 kcal



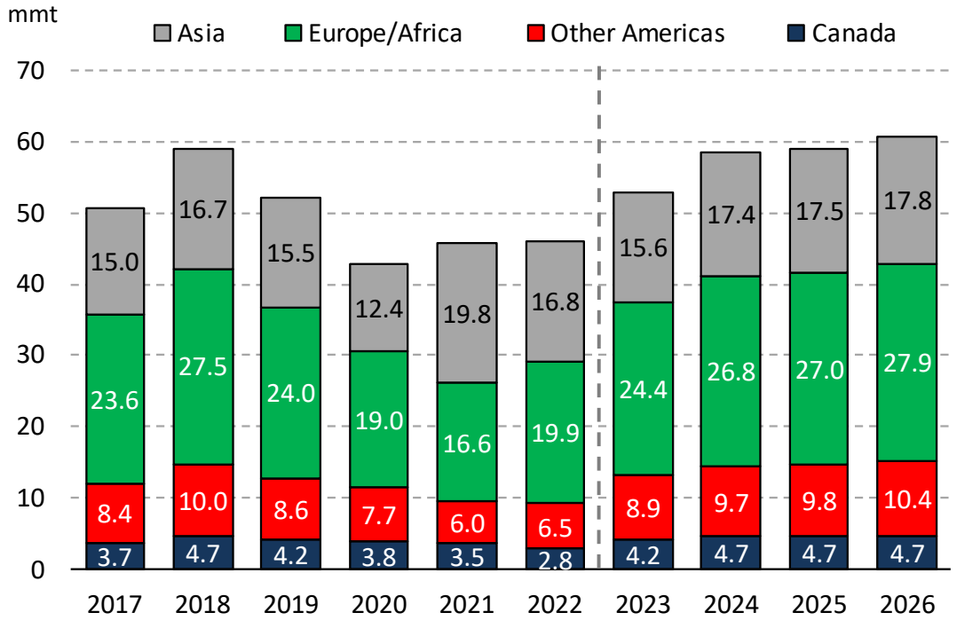
CIF ARA price forecast - 6,000 kcal



U.S. MET COAL EXPORTS PROJECTED TO GROW IN 2023-24 ON NEW SUPPLY

- **2022 U.S. met coal exports flat year-over-year as production and logistical issues limited export coal volumes**
- **Largest future growth in U.S. met coal supply will be NAPP longwalls, straining Baltimore export terminal capacity with some exports likely diverted down to Hampton Roads**
- **With the strike at Warrior SAPP met coal mines recently settled, exports will likely rebound to pre-strike levels as Mobile port issues are resolved – Shoal Creek output levels still below expectations**

Met coal export forecast - by destination



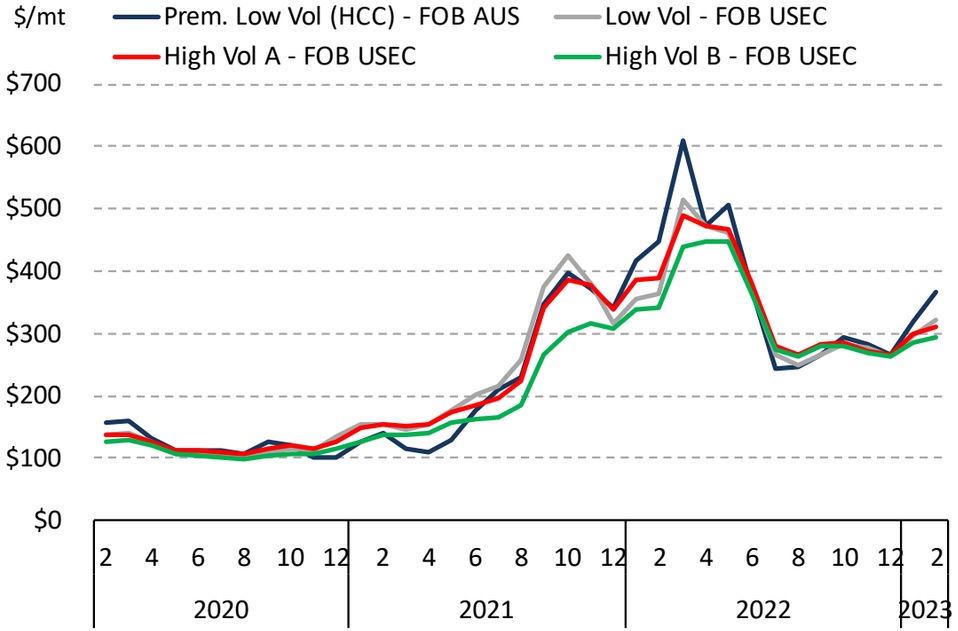
U.S. Total Met Exports

		YTD Ending		Prior YTD Delta	
		Dec-22	Dec-21	k Tons	%
	Total U.S.	**46,080**	**45,899**	**181**	**0.4%**
1	India	8,440	3,566	4,874	136.7%
2	Brazil	6,028	5,628	401	7.1%
3	Netherlands	5,502	3,461	2,041	59.0%
4	Japan	4,070	3,260	811	24.9%
5	Canada	2,844	3,522	(678)	-19.3%

LIMITED SUPPLY SUPPORTS STRONG WORLD MET COAL PRICES

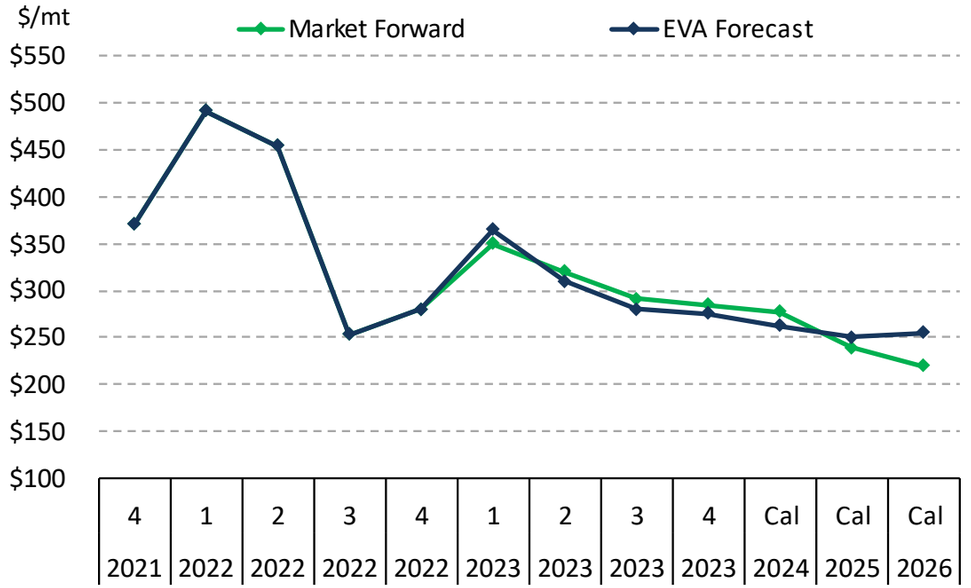
- **World pig iron production fell in 2022 by 3.8% from high output in 2021**
- **Steel prices have rallied strongly in early 2023 (>50%) as economic growth spurs steel demand, likely causing pig iron production to rebound in response**
- **Supply growth in Australia and Canada unlikely, leaving U.S. and Russia to provide incremental supply, supporting higher prices (~upper-$200/mt FOB Australia) in the near term**

World met coal prices



World met price forecast

Premium Low-Vol Benchmark FOBT



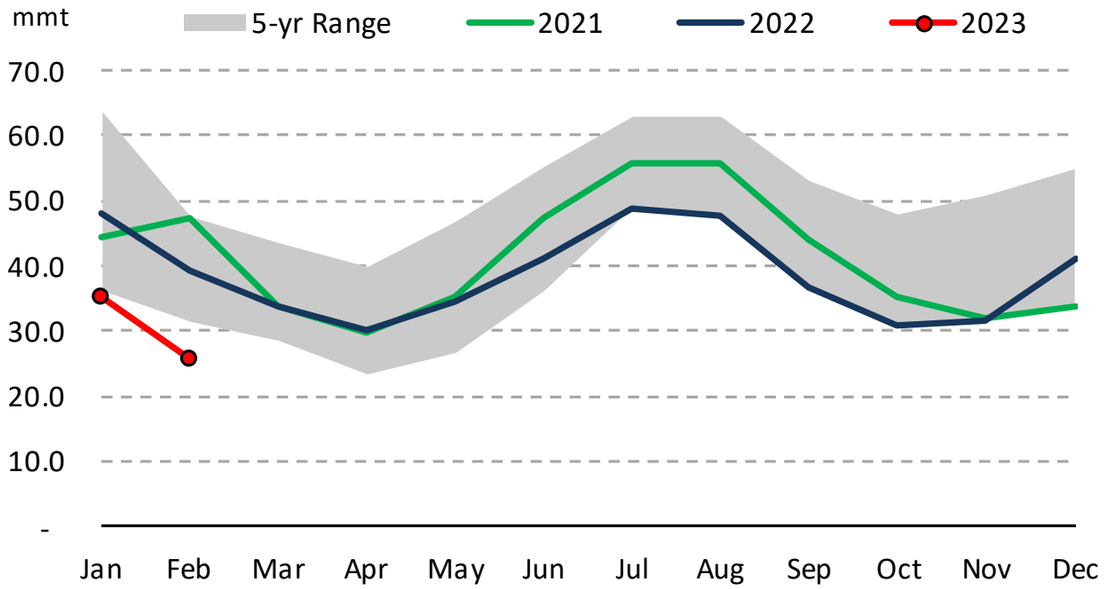
FACTORS THAT WILL AFFECT SHORT-TERM FORECAST

- **Weather**
- **New regulations**
- **Retirements**

RECORD MILD WINTER CAUSING BURN TO FALL & INVENTORIES TO BUILD

- **U.S. and global natural gas prices took a nosedive in 1Q23 as mild winter weather across the Northern Hemisphere loosened the natural gas Supply-Demand (S-D) balance**
- **With coal prices slow(er) to respond, L48 coal burn dropped to record-low levels for February in 2023 and inventories to build to 40 days of FLB**
- **As fossil fuel prices rebalance in Q2, stronger coal burn is forecasted for 2H23**

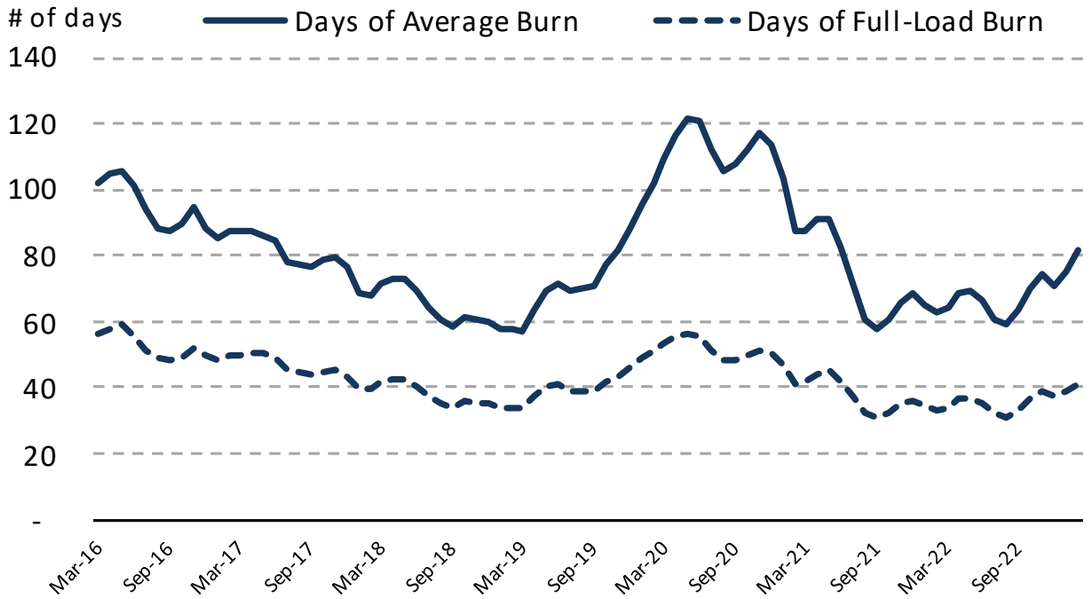
Coal consumption - U.S. electric power sector



* Excludes waste coal

Source: EVA 2023 Q1 Coal Forecast

Coal stockpiles - U.S. electric power sector



Source: EVA 2023 Q1 Coal Forecast

EPA FINALIZED GOOD NEIGHBOR PROVISION WITH TIGHTER LIMITS IN CSAPR OZONE PROGRAM

- **On March 15, EPA finalized the Good Neighbor Rule (GNR), which modifies the existing CSAPR Ozone program to comply with the 2015 8-hour ozone National Ambient Air Quality Standard (NAAQS) reduced from 75 to 70 ppb**
- **Highlights of the Transport Rule include:**
  - Wyoming, Tennessee, and Delaware are out of the final rule, Utah and Texas still in
  - EPA preset emission budgets for years 2023-2029, with possible higher budgets from 2026-29
  - EPA phased-in the emission budget cuts for assumed new SCR retrofits over 2 years (2026-27)
  - Daily backstop emission rate of 0.14 #Nox/MMBtu applicable for all coal plants starting with 2030 ozone season
    - Only applicable for plants with SCRs before 2030
  - EPA increased carry-over allowance bank to 21% for years 2023-2029, remains 10.5% for 2030
- **Rule will be challenged once published in the Federal Register**

EPA PROPOSES CHANGES TO EFFLUENT LIMITATION GUIDELINES

- **On March 8, 2023 EPA proposed updates to the Effluent Limitation Guidelines (ELG) for coal plants**
- **The proposed rule includes changes from 2020 ELG rule for FGD wastewater, bottom ash (BA) transport water, and coal combustion leachate from landfills and other CCR storage facilities**
  - For FGD wastewater, EPA proposes to require chemical precipitation +membrane filtration
  - For BA transport water, EPA proposes to require zero liquid discharge (aka dry handling or 100% wastewater recycling)
  - For combustion residuals leachate, EPA proposes to require chemical precipitation before discharge
- **The compliance date for the new ELGs is "no later than Dec. 31, 2029"**
- **EPA proposes to keep the 2028 retirement option for plants that decided not to comply with the previous ELG rule(s)**
- **EPA allows plants to forgo additional investments if already in compliance with 2020 ELGs and agreeing to retire no later than December 31, 2032**

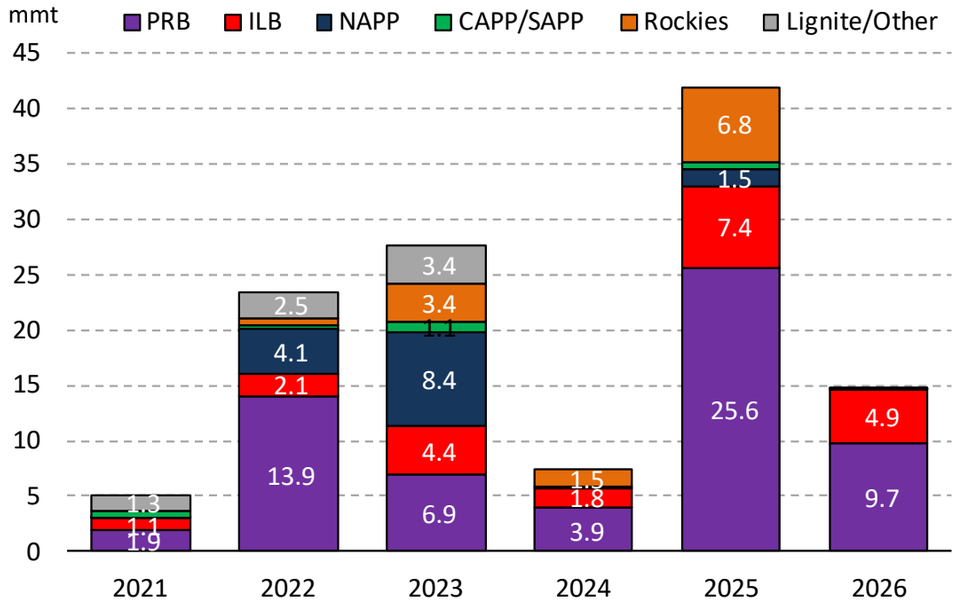
SECTION 111(B) AND SECTION 111(D)

- **EPA has announced plans to issue a New Source Performance Standard (NSPS) for greenhouse gas (GHG) emissions from Natural-Gas Combined Cycle Plants under Section 111(b) of the Clean Air Act (CAA).**
- **EPA has announced plants to issue GHG limits from existing coal- and natural-gas fired plants under Section 111 (d) under the Clean Air Act.**
- **Early indications are that the NSPS will require new combined cycle plants to be either carbon capture capable or able to convert to hydrogen.**
- **Early indications are that the Section 111(d) regulations will require conversion of coal plants to co-firing with natural gas.**
- **Questions about these requirements if proposed as expected are as follows:**
  - Will the 111(d) regulations face the same future as the Clean Power Plan proposals because it is not clear that conversion to co-firing natural gas is what was meant by “inside the fence”. Further, there is no indication that co-firing is possible everywhere, i.e., no access to natural gas.
  - With respect to 111(b), carbon capture while technology feasible will have variable economics based upon availability of storage and 100% hydrogen conversion is a concept but not commercial.

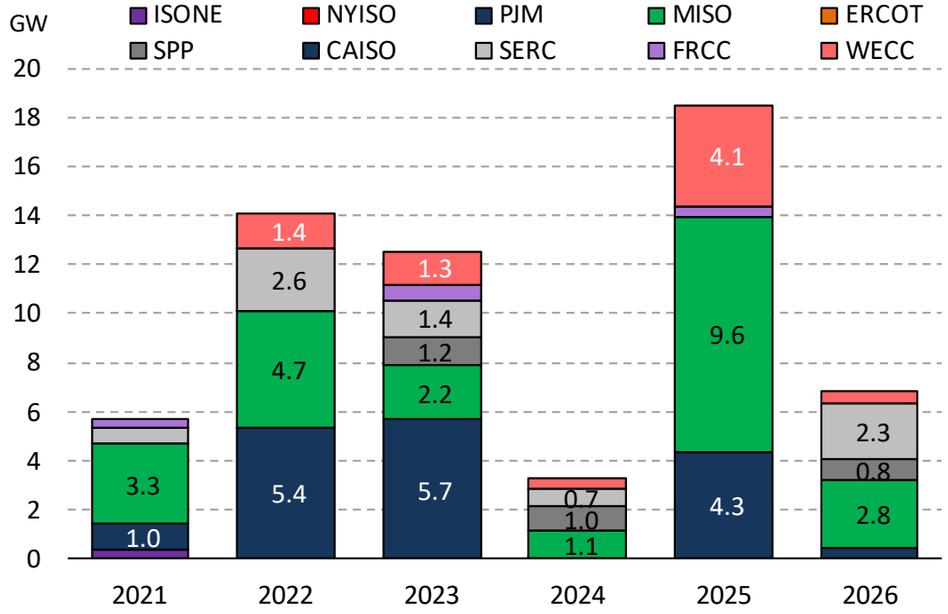
EPA-DRIVEN COAL RETIREMENTS CONTINUE IN 2023, WITH MORE ON THE HORIZON

- About 14 GW of coal-fired generating capacity retired during 2022 plus over 12 GW in 2023
- Recently announced EPA rules (ELG & GNR) will likely drive additional retirements before the end of the decade, especially in 2028
- Despite reliability issues during recent winter storms (e.g., Elliott), utilities continue to replace dispatchable capacity with renewables to take advantage of IRA tax credits and boost earnings

Latest 12-M coal burn by announced retirement year



Coal retirements by power market



CLOSING THOUGHTS

RETIREMENTS DECISIONS FOR REGULATED COAL PLANT RETIREMENTS ARE SUSPECT

- Increasingly retirement/refueling decisions are announced before Integrated Resource Plans have even been completed.
- Utility earnings are tied to invested capital.
- Prudent retirements allow utilities to recover return on and of undepreciated capital of retired plant.
- Earnings can be substantially increased with early retirements as ratepayers are paying for both the retired plant and new capacity.
- Investment decisions are being justified by looking at Net Present Value (NPV) of Revenue Requirements with virtually no consideration of ratepayer impacts.
- Further, many utilities exclude undepreciated capital from new plants in their financial analyses.
- The decisions to retire coal plants appear to be increasingly made in the Board Room in part driven by ESG targets.
- A number of utilities are compensating management for success in accelerated coal plant retirements

THE RUSH TO RETIRE COAL PLANTS MAY BE SHORT-SIGHTED

- **Supply chain issues, inflation, etc., have delayed resource replacements and increased the associated costs.**
- **Region after region is sounding the alarm that on the current trajectory there will be serious reliability issues in the second half of this decade.**

  - PJM noted the projections in (its recent) study indicate that the current pace of new entry would be insufficient to keep up with expected retirements and demand growth by 2030.

  - MISO notes its Regional Resource Assessment (RRA) modeling indicates a continued near-term capacity risk, highlighting the urgent need for coordinated resource planning and additional investment.

  - The 2022 Western Assessment of Resource Adequacy states “without previous actions by states and companies to delay plant retirements, the DRI would most likely have been much higher. While these actions did reduce short-term resource adequancy risks, they are temporary. Once the retirement delays expire, a lack of additional action to strengthen resource adequacy will result in returning risks.

CHANGES MAY BE COMING

- **Several states (KY, IN, and WV) are requiring that the decision to retire any coal plant must be independently addressed.**
- **RTO's are indicating flexibility regarding changes to retirement status.**
- **The big question is whether EPA will be pressured to adjust at least the timing of some new rules to address the reliability issues posed by the coal plant retirements.**
  - The final GNR showed some of this
  - The new ELG rule did as well

Q & A

Emily Medine

emedine@evainc.com

412-916-2930