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POWER INDUSTRY OVERVIEW AND 2020 OUTLOOK: AN INDUSTRY IN TRANSITION

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Alvarez & Marsal[1]

The electric power industry in the United States represents a crucial underpinning of America's industrial infrastructure, providing power needed to drive the nation's economy. All other critical infrastructures — from transportation to manufacturing and beyond — depend upon the efficient operation by both electric utilities and independent power producers and transmission and distribution system operators across all regions.

Today, the U.S. power sector is an approximately $400 billion industry that has proven to be one of the most reliable and efficient electricity distribution systems in the world. Each year it benefits from advances in technology, less expensive and cleaner fuel supplies and more efficient distribution.

Yet, those same benefits have also become challenges. The shift to natural gas and renewable resources has ramped up the pressure on power producers to balance changing asset composition, costs and investment in new technology driven by the displacement of baseload coal and nuclear generation. In addition, the industry faces the unpredictable fuel prices and the inability to scale renewables in the absence of mass storage. Further, while the shift to renewables is most acutely felt today by companies weighted to coal, companies with other types of generation, transmission and distribution infrastructure, and related original equipment manufacturer (OEM) and service companies are increasingly under similar pressure.

1 This article was produced with research and support from the A&M Insight Center, which serves to provide relevant, industry-specific, actionable insights derived through proprietary studies and research. For a list of Sources, see p. 20

POWER MARKET OVERVIEW

Macrotrends Introduce Unpredictability

Each year, the industry's progress becomes slightly more uncertain as attitudes about energy consumption change. Historically, electricity consumption tracked with the U.S. gross domestic product, expanding and contracting along with the economy. The pattern made it easier to predict future energy needs from a regulatory point of view. However, over the past five to 10 years the correlation between economic growth, energy supply mix and energy consumption has been disrupted. Regulators are using Renewable Portfolio Standards (RPS) to support the expansion of renewable power generation, customers are increasingly building their own distributed energy resources (power generation) as well as adapting energy-saving electrical products. The net effect is that utilities need to balance supply- and demand-side generation, maximize operation of zero emissions generation — principally renewables — and increase operational flexibility and security of their grid management systems.

Faced with changing environmental concerns and public sentiment focused on the reduction of CO_2, climate change and RPS, leaders in the industry are seeking new sources of power generation. The primary fuel source for electric generation through the years has been coal, but recently the industry made a dramatic shift toward other fuels. Advances in hydraulic fracturing have unlocked abundant supplies of natural gas, supporting improved economics for natural gas-fired generation. Improving efficiency and economics of wind and solar have accelerated rapid buildout of renewable generation. As natural gas and renewables have become more important to generation capacity, the industry is relying less on coal and nuclear.

These macrotrends introduced unpredictability into the electric generation market. Abundant natural gas supplies are driving down customer prices, while developing renewable energy sources like wind and solar are becoming a larger portion of the industry's fuel source. Regulatory changes are requiring power generators to invest significant capital at a time when they face a depressed demand for electricity and falling prices. The erratic nature of the market will likely continue until the industry can find an effective solution to store electricity on a mass basis.

Fuel Overview: Costs of Generation and Coal's Decline

The power industry uses a range of fuel sources to generate electricity. Fossil fuels dominated electricity production in the U.S. over the last century and still represent more than 60% of the power generated today. However, coal used in power generation has fallen from 40% of total fuel consumption in the U.S. in 2013 to below 30% now. With advances in drilling technology significantly increasing the availability of natural gas in the early 2010s, natural gas rose from 26% to over 34% of the nation's total fuel source. That ample supply resulted in falling electricity prices, allowing natural gas plants to generate power at lower marginal costs than many coal plants. In addition, environmental regulations have placed further stress on coal, resulting in the retirement of significant coal capacity since 2012.

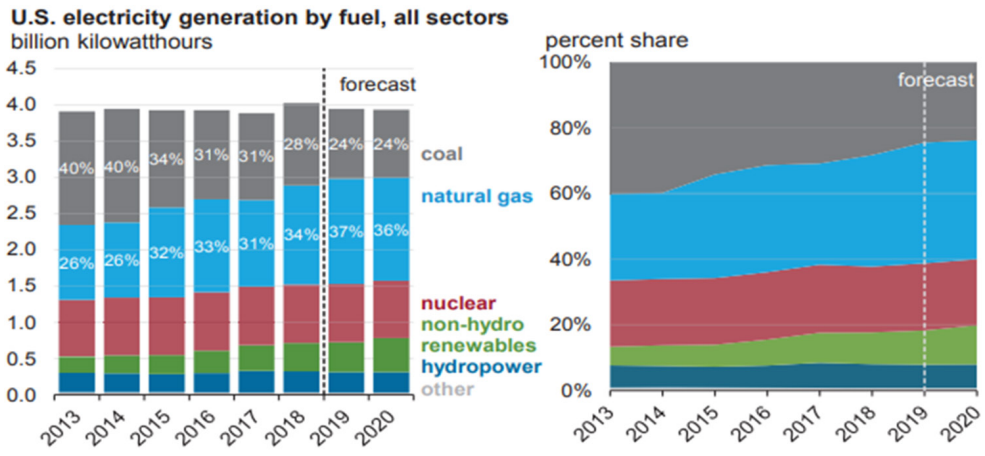
Improving technology, lower development costs and favorable regulations are helping renewable energy generation become a larger share of the industry's total fuel source. In particular, wind and solar generation is increasing and is expected to grow from approximately 5% of power generation in 2013 to an estimated 15% in 2020 (Exhibit 1).

Many states have shifted from coal-fired generation to natural gas and/or nuclear generation, and more recently, to renewables, as environmental regulations encouraged power providers to shut down older coal plants and invest in other fuel sources (Exhibit 2 on next pg.).

Declining power prices, high operating costs (relative to renewables and natural gas) and rising capital requirements from regulation have eroded the economics of coal facilities. Many states in the southeastern and northeastern U.S. increasingly use natural gas, nuclear and hydroelectric generation. In many cases, utilities that have shuttered coal plants face accelerated environmental costs, such as coal ash disposal, and dismantling costs, known as asset retirement obligations (ARO). Nuclear facilities in some markets increasingly face similar situations.

Given these regulatory issues, power generators now consider converting coal plants to natural gas because of its economic viability. Switching fuel sources is an attractive and economical option for utilities that must maintain a certain generating capacity in their fleet and can't justify the cost of other options.

Exhibit 1: Renewable energy has accelerated due to reduced costs and new regulations.



Source: Short -Term Energy Outlook, August 2019

Continued from p.13

Changing Landscape: A Future Focused on Renewables

As the power industry faces social, political and economic pressures to focus on more environmentally favorable policies, power generators increasingly look toward renewable fuel sources. Governments are also dictating the use of renewables. California and New York have independently announced plans to produce at least 50% of electricity from renewable sources by 2030. However, without economically achievable sources of energy storage, renewables cannot be the predominant source of electricity.

Renewables have become economically viable. On an unsubsidized basis, wind and solar generation offer substantially lower costs than coal. Driving down costs further are U.S. Government incentives. Tax credits, including the Production Tax Credit (PTC) for wind and the Investment Tax Credit (ITC) for solar, lower the levelized cost of energy for new generation. In addition, technology improvements and manufacturing cost reductions have and are expected to continue to drive down costs.

In the U.S., solar and wind generation is expected to grow at a compound annual growth rate (CAGR) of 34% and 11%, respectively, between 2016–2020. This growth of renewable sources will continue to pressure fossil fuel generation, with coal falling from 31% of the power produced to 24% over the same period. By 2020, electricity generation from coal, in absolute gigawatts, could fall back to pre-1980 levels.

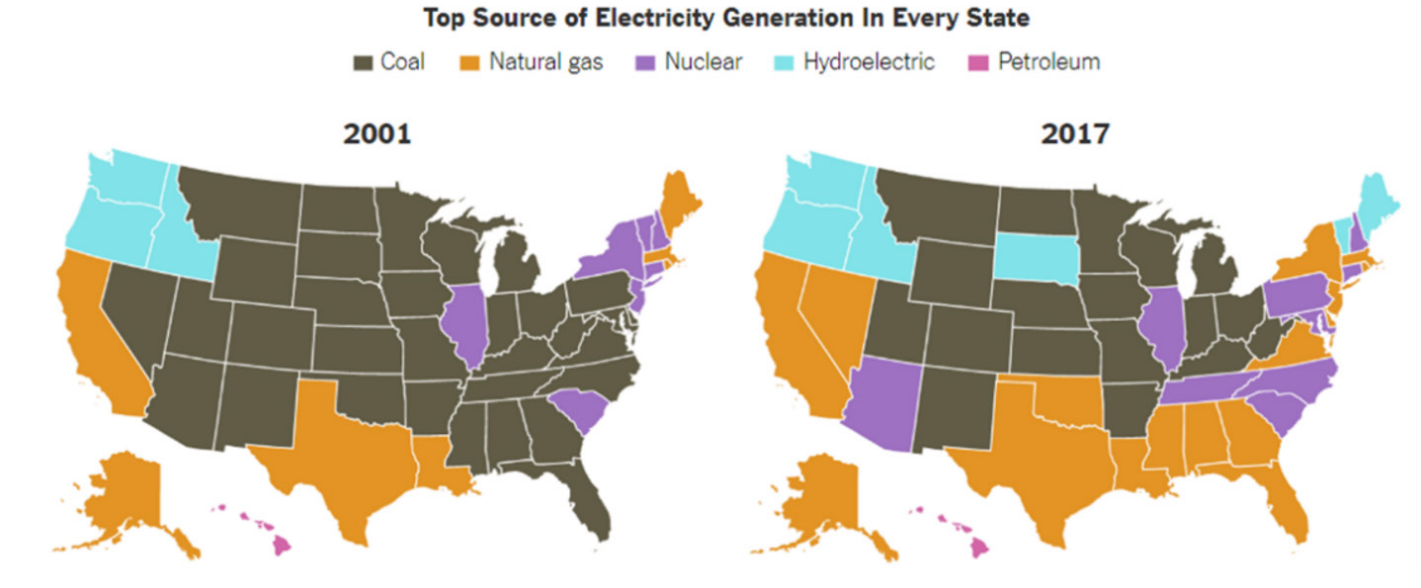
Looking ahead, the U.S. Energy Information Administration (EIA) projects electricity usage to rise slightly and for solar to become the dominant energy source in the nation by 2030. The continued shift to renewable fuel sources, led by solar, could make coal obsolete by 2040, according to the agency.

Significant declines in pricing of key components of solar and wind energy, along with efficiency improvements, strong competition and the benefits of scale, have dramatically lowered their levelized cost of energy (LCOE). In fact, over the past decade, utility-scale photo voltaic (PV) and wind LCOE are now competitive or less expensive than fossil-fuel and nuclear generation, even without government subsidies (See Exhibit 3 on next pg.).

Natural gas is the quickest bridge fuel from coal to renewables until storage is perfected. Gas emits only 50% of the CO2 emissions of coal and can be installed at scale, driving significant CO2 reduction while maintaining stable capacity. That said, in states with high renewable requirements, e.g., California and New York, gas plants that would otherwise dispatch are not being operated optimally.

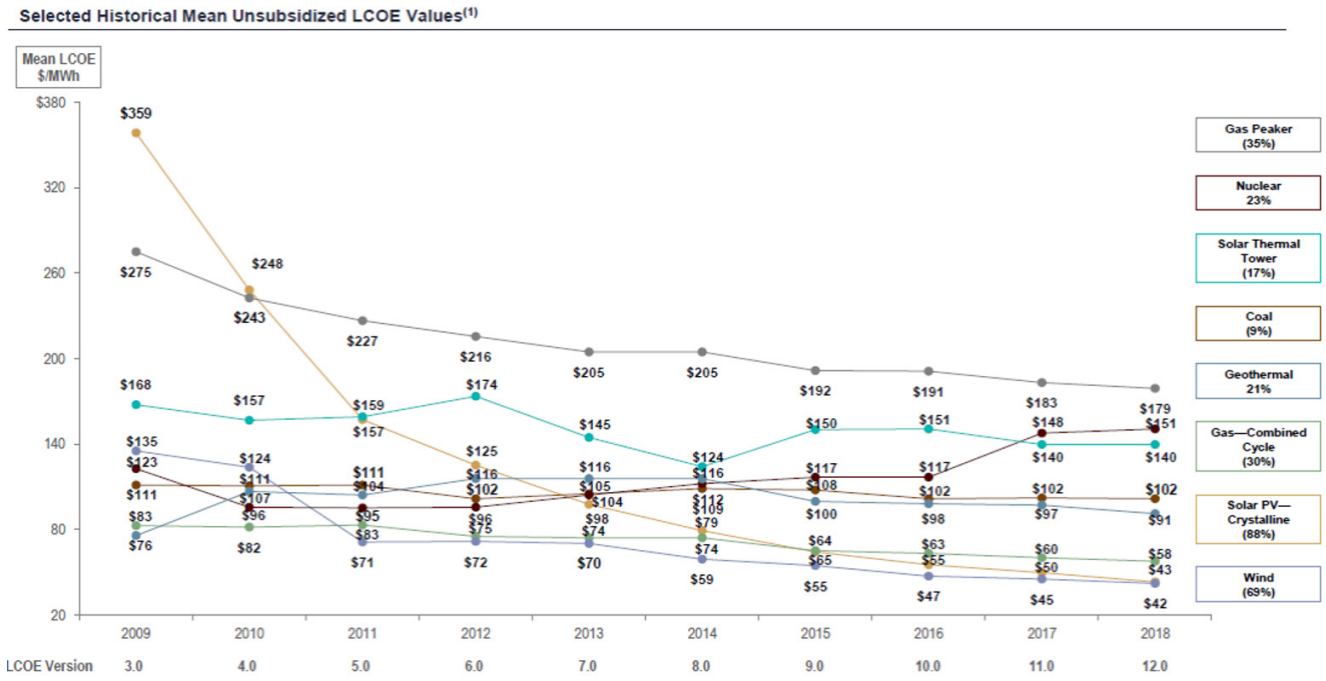
Nuclear, notwithstanding it is a zero-emissions technology, is also under pressure. Many nuclear plants are reaching the end of their useful lives and will require investment in order to continue to operate. Further, given high regulatory requirements, operating costs are higher than gas or renewable generation. The question for these utilities (and their regulators) is whether to extend the life of these plants or replace them with gas or renewables. The decision to retire these plants is

Exhibit 2: Coal sources are declining while natural gas and renewable sources grow.



Source: The New York Times – "How Does Your State Make Electricity?" by Nadja Popovich, dated Dec 24, 2018

Exhibit 3: The levelized cost of energy for renewable energy has fallen dramatically.



Source: Lazard estimates.

more complicated than simply assessing their marginal cost versus renewables or gas. When utilities retire large plants, regions may experience power shortages if not replaced with similar-sized alternate power sources and reliability concerns if more baseload power is needed than will be available post-retirement. Further, funding of costs for used nuclear fuel and plant decommissioning will likely need to be accelerated.

Across the industry, transmission and distribution infrastructure also requires significant investment. This can present difficult capital allocation challenges and/or increase financial pressures for utilities. They must balance building new renewables, funding new renewable transmission lines, upgrading existing grid management systems (e.g., distributed energy resource management systems) and maintaining grid infrastructure, much of which is dated or at the end of its useful life.

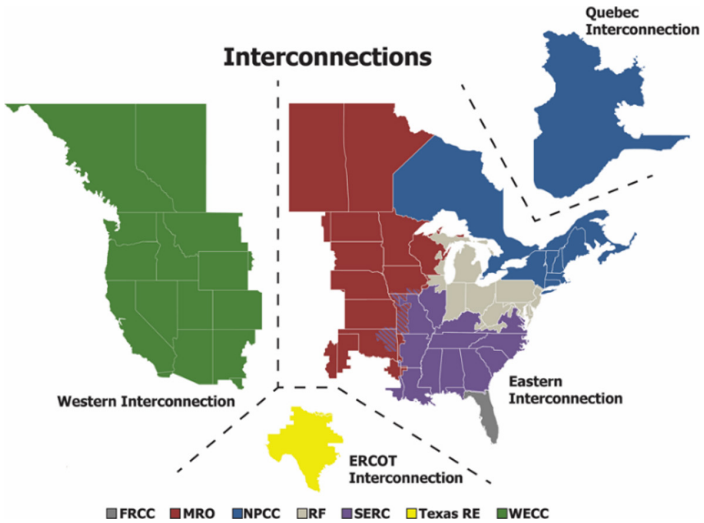
These challenges will likely persist for utilities, power companies, fossil and renewable OEMs and integrated service companies, given expected lower revenues industry wide. In the past, similar periods of disruption have resulted in bankruptcies and significant restructurings. Today, the industry faces tremendous pressure to cut costs, reduce leverage and further consolidate. If companies cannot navigate this transition, expect shrinking margins and corporate failures.

MARKET REGIONS AND STRUCTURES

Many Operators, Many Challenges, Different Structures

The U.S. power system consists of three electrically isolated, interconnected entities: Eastern, Western, and the Electric Reliability Council of Texas (ERCOT) (Exhibit 4). Within each interconnected market, regional transmission organizations (RTOs), independent system operators (ISOs) and balancing authorities oversee the reliable operations and delivery of electricity. Each

Exhibit 4: Market structure of U.S. power system consists of 3 interconnected entities.



Source: North American Electric Reliability Corporation (NERC)

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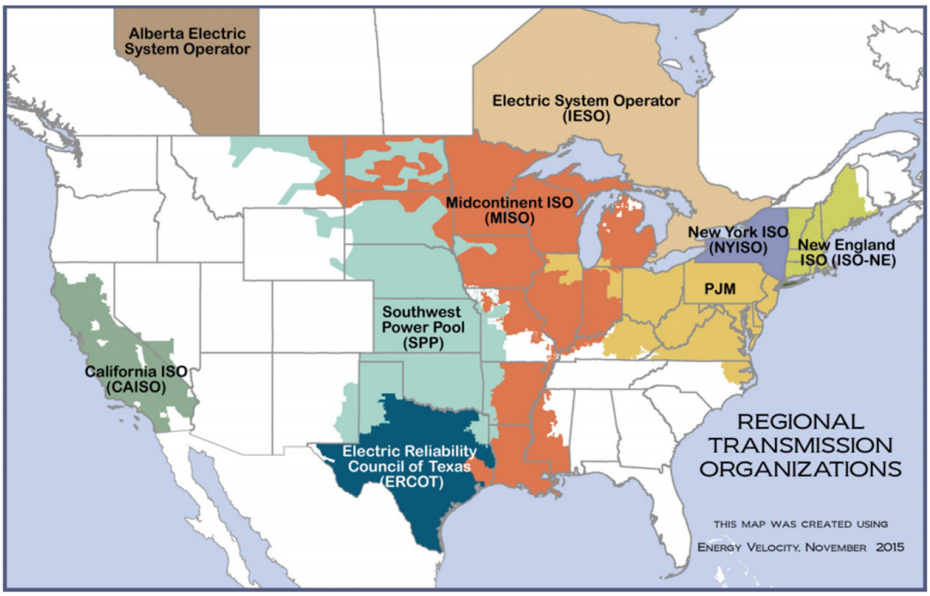
Exhibit 5: RTOs and independent operators set the power market in various regions.



Source:: Federal Energy Regulatory Commission, ABB Velocity Suite

region operates with different economic and regulatory conditions.

Regional transmission organizations and independent system operators set the market structures and operational policies within their respective regions, typically employing a combination of wholesale energy prices, capacity compensation, and bilateral agreements to meet financial targets and electricity needs. In this way, economics and market prices between different regions can vary significantly, necessitating electric power producers tailor their asset base to market structures in the regions they serve (Exhibit 5).

In *wholesale energy markets*, merchant power plants produce and sell power. Under these arrangements, generation units that are available to produce power are dispatched to serve load in the order of each unit's marginal cost of operations until enough generating capacity has been dispatched to meet existing load requirements. The cost to produce electricity from the final generator sets the wholesale price of electricity that all dispatched units receive.

In *capacity compensation markets* the pricing framework is designed to maintain the reliable operations of the grid. They accomplish this by incentivizing generators to maintain their facilities in optimum operational condition, even during periods where wholesale prices do not provide adequate compensation.

In addition, each market faces different operating requirements and changing grid requirements, often facing one or all of the following risks:

- *Short, steep ramps in peak periods* – occur when the ISO must bring on or shut down generation to meet an increasing or decreasing electricity demand quickly, over a short period.
- *Oversupply risk* – happens when more electricity is supplied than needed to satisfy real-time electricity requirements.
- *Decreased frequency response* – occurs when fewer resources are operating and available to automatically adjust electricity production to maintain grid reliability.

ISO-specific challenges are also varied:

- *California ISO* – California utilities operate in one of the most regulated markets, with the nation's first cap-and-trade program to limit carbon production and a mandate for energy retailers to source 50% of their electricity from renewables by 2030. In addition to the PG&E bankruptcy, several California facilities have filed for bankruptcy or shut down, citing uneconomic power prices.
- *Pennsylvania, Jersey, Maryland Power Pool (PJM)* – maintains both wholesale energy and capacity markets, compensating utilities for actual power production in a wholesale energy market and incentivizing them to keep plants in operating condition even when the wholesale market prices do not provide adequate return. However, demand for electricity in the market outpaces the supply of natural gas, primarily due to a lack of adequate pipeline capacity, so establishing reliable gas delivery is a significant challenge.
- *New York ISO* – runs both wholesale energy and capacity markets and faces significant challenges, such as a highly regulated market that requires it to

produce 50% of electricity from renewable resources by 2030.

- *New England ISO* – has experienced downward pressure on prices from state-subsidized generator projects that reduced market competition. Extreme weather events in recent years also stressed the region's fuel supply infrastructure, causing market prices to reach record highs and increasing the risk of inadequate electrical supply.
- *Electric Reliability Council of Texas (ERCOT)* – unlike other markets, provides no capacity compensation and relies on scarcity pricing (increased energy prices as supply and demand become imbalanced) to provide the additional compensation needed for generators to cover their fixed operating expenses. With significant wind resources, ERCOT's energy prices fluctuate significantly, placing significant pressure on its coal and nuclear assets.
- *Missouri ISO (MISO)* – like other regional ISOs, operates both wholesale energy and capacity markets; however, its capacity market is not as robust as those and other regions.
- *Southwest Power Pool (SPP)* – relies heavily on power purchase agreements with utilities and service providers throughout the region, and the abundance of utilities and bilateral agreements makes the market less transparent than other U.S. power markets.
- *Southeast Electric Region* – is dominated by vertically integrated, regulated electric utilities, as well as bilateral agreements. Its biggest challenge is in its nuclear generating sector, where cost overruns, project delays and project abandonments mean ratepayers bear the burden of paying for industry miscues.

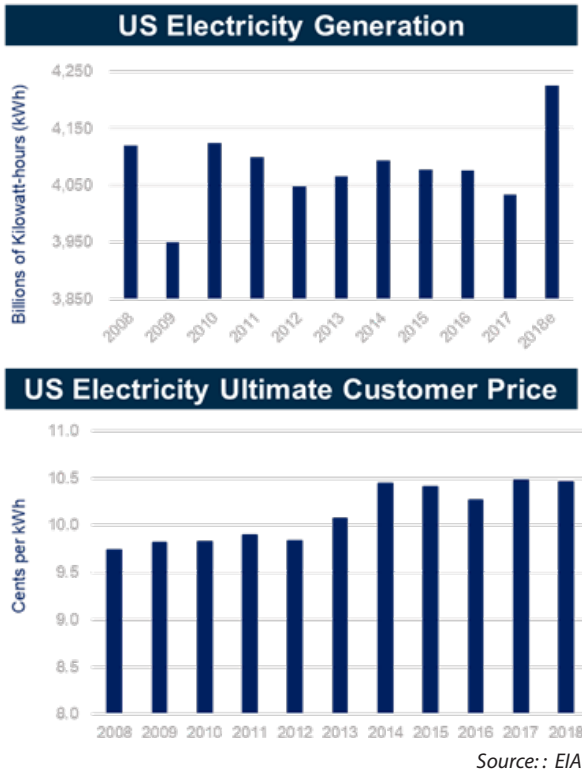
PRICING AND FORECASTS

Pricing Electricity: A Complex Task

The pricing of electricity depends on several factors and the type of customer served (Exhibit 6). For example, prices reflect the costs to build and maintain plants, to generate power, and to maintain the power grid over certain regions. In addition, electricity costs vary by region, reflecting local regulations and unique geographic features that generators must overcome to distribute power (Exhibit 7 on next pg.)

Another factor in pricing electricity is the cost of fuel. Fuel costs vary, often peaking in times of high demand, such as summer, and decreasing in times of lower demand. Likewise, the type of fuel affects the cost to generators.

Exhibit 6: Power generation trends over past decade



Source:: EIA

The need to invest heavily in infrastructure has also affected pricing, since power plants and transmission infrastructure require constant maintenance and new construction and plant conversions require significant capital.

In addition, power plants face the constant cost of meeting regulatory standards, including environmental requirements. Those costs show up in the final pricing of electricity.

Finally, the more difficult it is to distribute electricity to the end user, the higher the pricing, so residential and commercial customers typically pay more. Industrial customers, who usually require more volume of electricity at higher voltages, generally pay a lower rate.

While wholesale prices are set by the day-to-day cost of supplying electricity as demand fluctuates, most retail customers pay a seasonal average, so they don't experience real-time variation of electricity costs.

Power Generation and Pricing Trends

Long-term power generation trends have been flat; however, prices have recently declined due to reductions in natural gas and coal costs. Also keeping prices down: a surplus of supply coupled with slowing demand from warmer-than-normal winters.

In 2018, weather-driven demand increased, helping the market experience some price improvement, but pricing pressure remains nationwide and is likely to continue for the foreseeable future.

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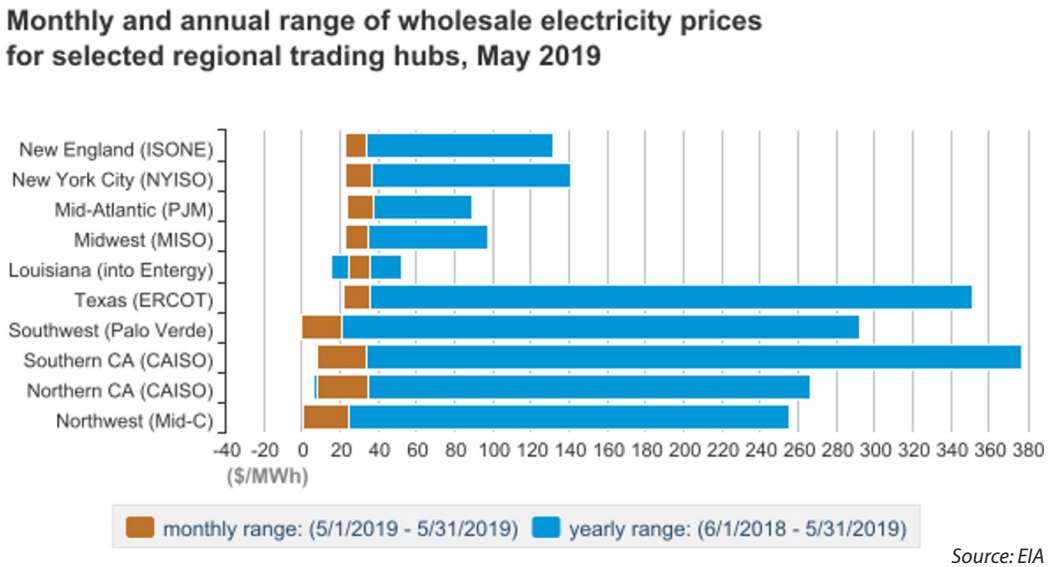
Exhibit 7: Power generation prices by market, 2017-2018.



Source: EIA

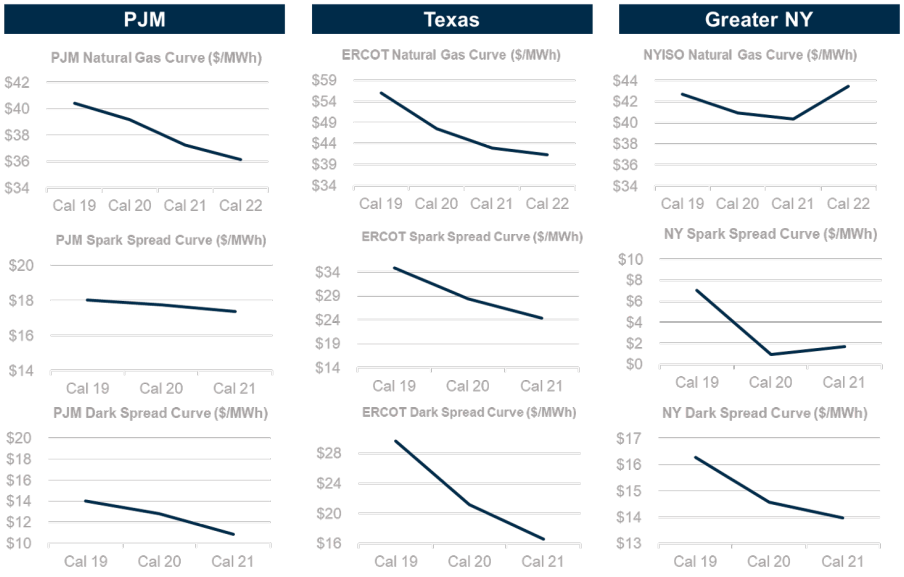
Exhibit 8: Forecasts point to higher natural gas and coal prices in the future.

Commodity Future Price Changes and Forecast

	Price Indexes (2010=100)[1]					Change (%) q/q		Change (%) y/y		Index revision[3]	
	2016	2017	2018	2019f[2]	2020f[2]	2018Q4	2019Q1	2019	2020	2019f[2]	2020f[2]
Energy	55	68	87	82	81	-9.5	-8.0	-5.4	-1.4	-9.6	-4.6
Non-Energy[3]	79	84	85	83	85	-1.5	0.9	-2.1	1.4	-2.4	-2.2
Agriculture	87	87	87	84	86	-2.2	0.9	-2.6	1.7	-3.2	-3.2
Fertilizers	78	74	82	86	88	6.6	-5.4	4.8	1.7	3.6	3.4
Metals and minerals	63	78	83	81	82	-1.0	1.7	-1.9	0.8	-1.2	-0.8
Precious metals[4]	97	98	97	100	103	0.7	6.1	2.6	3.1	4.0	7.8
Memorandum items											
Crude oil ($/bbl)	43	53	68	66	65	-11.9	-6.0	-3.4	-1.5	-8.0	-4.0
Gold ($/toz)	1,249	1,258	1,269	1,310	1,360	1.3	6.1	3.2	3.8	65.1	129.0

Source: World Bank

Exhibit 9: Continued pricing pressure is expected to continue in the foreseeable future.



Source: Bloomberg set defaults on Sub-market and fuel type. Spreads for lowest heat rate. Eastern Rail CSX used for dark spreads.

Commodity Pricing and Supply

Commodities such as energy, metals and agriculture all experienced a significant price change since 2016 (Exhibit 8). Warm winter weather and high levels of natural gas depressed pricing. In addition, record power generation in summers and colder than expected winters drove commodity prices higher.

Unregulated power generation (as is expected under this Administration) is positively levered to higher gas, coal, and to a lesser extent, oil prices.

Future Energy Pricing

Given the outlook for commodity prices, the industry is expected to continue to see pricing pressure into the future, compressing overall operating margins for electric power producers at a time when these same companies need to be investing to modernize their asset base and streamline operations (Exhibit 9).

CHALLENGES FACING THE INDUSTRY

Headwinds for Coal-Fired Plants Continue

Coal dominated the power generation industry and made up 50% of power plant fuel supply until mid-2015. Then in April of that year, natural-gas fired generation surpassed coal for the first time (Exhibit 10).

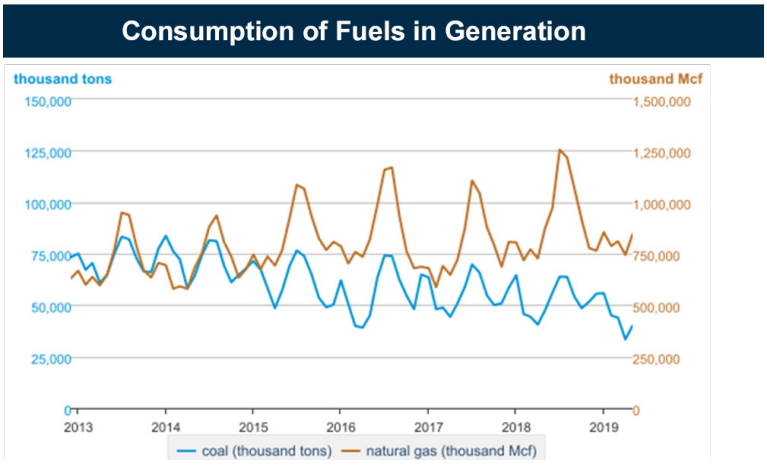
Coal's market share in the power industry will likely continue to decline because of the abundance of low-priced natural gas and the increase in renewable energy.

More than 10% of coal generation capacity, approximately 35 gigawatts, has been retired since 2011, and another 8%, or 24 gigawatts, are forecast to retire between 2016 and 2020, according to Morgan Stanley (Exhibit 11).

Even assuming relaxed environmental policies and regulations applicable to coal under the current administration, the economics of coal will continue to hold back its long-term outlook. Fundamentally, coal cannot compete with natural gas and renewables; companies with gas-heavy fleets and renewables are better positioned for the future.

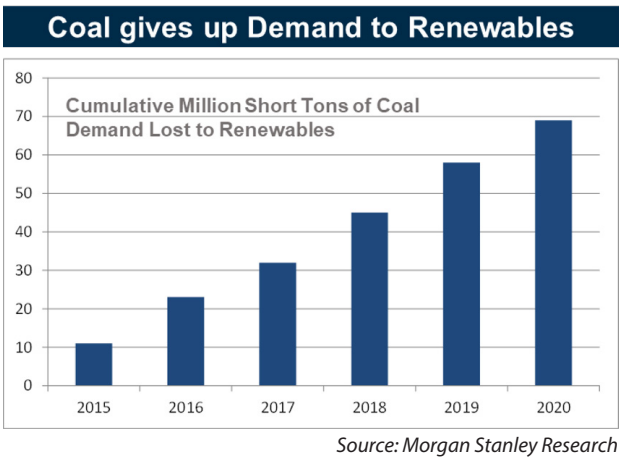
Coal has primarily competed with natural gas to meet "static" electric demand and continues to lose ground. Further, more coal plants now face the end of their useful lives. The average age of coal generators is between 30 and 40 years out of a useful lifespan of 50 to 60 years For that reason, operators face a decision on whether to reinvest or rebuild plants or shift away from coal to meet new generation needs.

Exhibit 10: Natural gas will continue to surpass coal as a fuel supply.



Source: EIA

Exhibit 11: Coal production will continue to decline.



Source: Morgan Stanley Research

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SUMMARY AND CONCLUSIONS

The U.S. power industry faces unique challenges at the beginning of the 21st century that it didn't have to wrestle with previously. Increasing regulatory requirements, the push for more renewable energy, regional market inefficiencies and unpredictable pricing at various times and places, put pressure on utilities and power companies to invest heavily in new technologies, existing infrastructure and meeting regulatory goals.

The industry's long-term future will unfold with fewer fossil fuel sources, more solar and wind and other renewable energy technologies coming online. In some areas of the country, the power industry must operate under significantly stricter environmental policies. And in many regions, new efficiencies and economic models can help generators and power operators minimize fluctuations in supply and demand.

As utilities, IPPs and transmission and distribution operators invest in new infrastructure or upgrade existing infrastructure, many will face limitations on their ability to raise debt and/or earn an appropriate return on their investment. Primary reasons include an expected lower future revenue profile and a sensitivity by regulators, public utility commissions and customers to rising electricity prices, which in turn, pressures operating margins. These companies may well need to consider ways to rethink or restructure their balance sheet, even as they continue to adapt their business model and align their cost structure. Similarly, as competition and innovation put pressure on electricity prices, OEMs and service companies will face pressure to invest, even as they work to streamline their cost structure in order to be competitive. Getting ahead of this financial pressure through proactive measures, and engaging experts equipped to address these problems, will be necessary to navigate this period of transformation in the energy industry.

SOURCES

"Electric Power Annual," U.S. Energy Information Administration, October 2018.

"2017 State of the Grid," ERCOT, April 2018.

S&P Global Market Intelligence.

Morgan Stanley Research

"Short-term Energy Outlook," U.S. Energy Information Administration, August 2019.

"Annual Energy Outlook 2018," U.S. Energy Information Administration, February 2018.

"Annual Energy Outlook 2019," U.S. Energy Information Administration, January 2019.

"How Does Your State Make Electricity?" by Nadja Popovich, The New York Times, December 2018.

"Regional Transmission Organizations (RTO)/Independent System Operators (ISO)," Federal Energy Regulatory Commission, May 2019.

Federal Energy Regulatory Commission, ABB Velocity Suite.

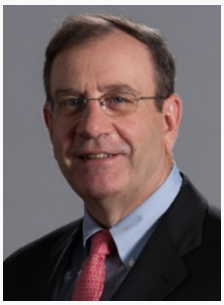
California Energy Commission, staff analysis, November 2018.

ERCOT 2017 State of the Grid, April 2018.

"The Commodity Markets Outlook in Six Charts," World Bank, April 2019.

"Quarterly Mine Employment and Coal Production Report," U.S. Department of Labor, Mine Safety and Health Administration.

ABOUT THE AUTHORS



Ray Dombrowski

Ray Dombrowski is a Managing Director in A&M's New York Office. He has extensive experience in the power industry starting from his undergraduate days at the U.S. Merchant Marine Academy; financing over $5 billion of alternative energy projects and serving as CRO and/or CFO of Ogden (Covanta), Allegheny Energy; MEPCO; leading assignments on behalf of the Unsecured Creditors Committees of Westinghouse and SunEdison; serving as Chair of a hedge fund that traded on the PJM and CAISO markets; as well as serving in advisory capacity for private equity and a number of IPP and IOU concerns.

Charles Moore

Charles Moore is a Managing Director in A&M's Detroit office. He has 25 years of experience in operational and financial restructuring, turnaround consulting, performance improvement and interim management. He has significant experience with power generating assets located in PJM Interconnection, and currently serves as the Chief Restructuring Officer of FirstEnergy Solutions Corp. and FirstEnergy Nuclear Operating Company.

Paul H. Barry

Paul H. Barry is a Managing Director and Co-Head of A&M's North America Corporate Mergers & Acquisitions. Mr. Barry brings over 30 years of experience specializing in origination, development, and execution of global growth initiatives. Prior to joining A&M, Mr. Barry was CEO and co-founder of Public Infrastructure Partners LLC and led the company's operating platform with expertise in acquiring, operating, and maximizing investor returns in regulated and unregulated power markets, midstream gas, and renewables.

Lisa Price

Lisa Price recently joined A&M as a Managing Director in Atlanta. She has extensive experience in the power industry from power plant and maintenance operations at Freeport McMoran, followed by an energy and power sector focus in Investment Banking. At GE, Ms. Price held business development roles at Corporate, China and Energy focused primarily on power equipment She also served as GM and CEO of Global Nuclear Fuels, the nuclear fuels joint venture between GE, Hitachi and Toshiba.