IEEFA 2017 U.S. Coal Outlook

Short-Term Gains Will Be Muted by Prevailing Weaknesses in Fundamentals

Institute for Energy Economics and Financial Analysis
IEEFA.org

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EXECUTIVE SUMMARY

The U.S. coal industry, after suffering one of its worst years ever in 2016, will continue its decline in 2017, though at a slower pace.

Consumption, production and prices will slump, but by a small amount compared to that seen in recent years.[1] The overall effect will be one of flat performance at best.

While the industry will likely gain limited market share in day-to-day competition in regional electricity markets due to a relative increase in the price of natural gas, any such gains will be marginal.

IEEFA sees the following occurring across the U.S. coal industry in 2017:

- *Coal production declining by as much as 40 million tons.*
- *Coal prices failing to increase enough to benefit shareholder or stimulate new investment.*
- *Coal exports remaining weak.*
- *Little or no gain from regulatory relief as capital continues its flight from coal.*
- *Increasingly dim employment prospects.*

The U.S. coal industry enters 2017 with improved optics: a new administration comes to power promising regulatory relief and a coal resurgence, major industry players are emerging from bankruptcy, and a recent spike has occurred in global prices. While these optics are positive on their face, IEEFA sees the U.S. coal industry as a sector saddled with a fundamental problem: Too many companies are mining too much coal for too few customers.

Modest improvements in 2017 will be driven almost exclusively by the relative rise in the price of natural gas, which is coal's main competition. This dynamic will create some regional advantages and some marginal profitability gains for coal producers. Contura (formerly Alpha Natural Resources) and Arch Coal are emerging from bankruptcy and may see some initial improvements due in large measure to the debt relief supplied by the bankruptcy process. It remains to be seen how Peabody Energy, which has recently filed its reorganization plan, will emerge from bankruptcy. Other coal producers with manageable debt levels should also see some improvement.

Coal's value as an investment will remain clouded, however, by market competition from natural gas, wind, and solar, and gains in energy efficiency. Potential benefits from regulatory relief that has been promised by the new administration will provide little or no gain. And the long-term prognosis for the coal industry in every region from now through 2050 is poor, as more coal-fired power plants will close and as utilities will continue to allocate capital away from coal.

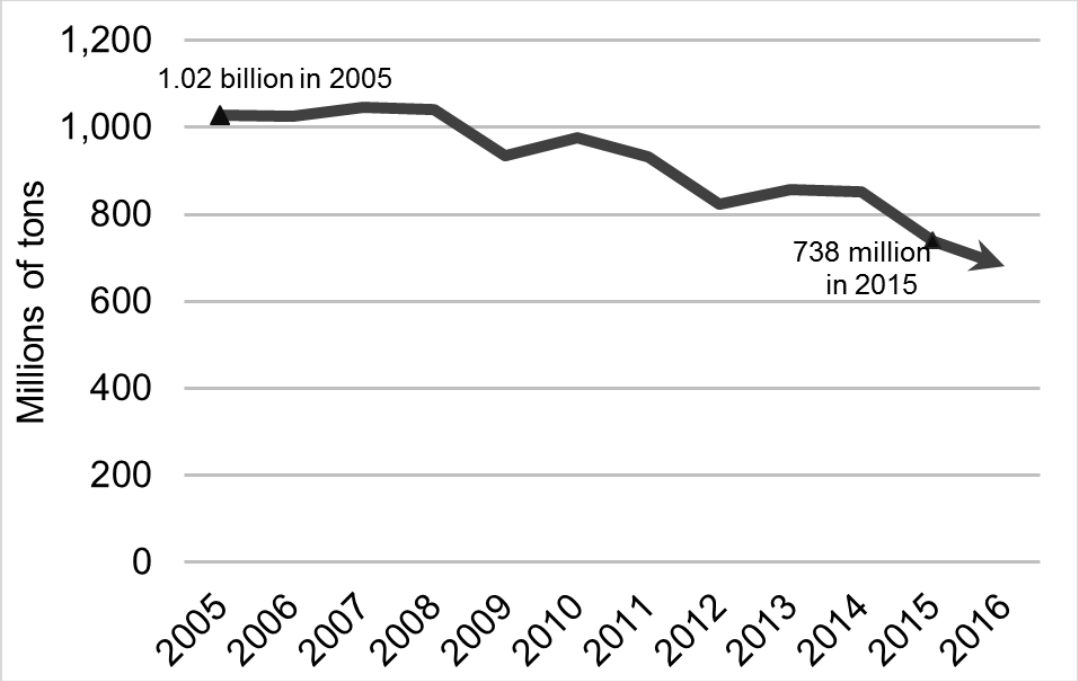
Promises to create more coal jobs will not be kept—indeed the industry will continue to cut payrolls. These losses will be related in part to the coal industry's long-term business model of producing more coal with fewer workers. Job losses will be exacerbated further by the current low-coal-price environment and by the inability of the industry and its component companies to adapt to a smaller customer base.

[1] https://www.scientificamerican.com/article/coal-will-walk-a-ledge-in-2017/

COAL CONSUMPTION WILL DECLINE BY AS MUCH AS 6 PERCENT IN 2017, AND THE LONGER-TERM OUTLOOK IS ONE OF FURTHER DECLINE

Consumption of thermal coal, which is burned for electricity generation,[2] is down 28% in the U.S. over the past decade, declining to 738 million tons in 2015 from 1.02 billion tons in 2005—an average annual drop of 29 million tons. Estimates of coal-consumption decline for 2016 range from 26 million tons (a 3.5 percent decline from 2015)[3] and 57 million tons (a 7.7 percent decline from 2015)—a decline that was actually an improvement over more precipitous year-to-year losses in 2011 and 2014.

Figure 1: U.S. Coal Consumption for Electricity from 2005 to 2016 (Millions of Tons)



The decline in thermal coal consumption is due largely to the retirement of coal-fired power plants, with 46,000 megawatts having been retired in the U.S. since 2006.[4] SNL Energy (using U.S. Energy Information Administration (EIA) data) foresees more coal plants retiring in the coming years but the rate of retirements slowing. IEEFA sees the rate of decline in coal plant closures and coal consumption declining more rapidly than the EIA predicts, mainly because coal plants are aging: the average retired coal plant is 50 year old and the average age of currently operating plants is 39. No new coal plants are slated for construction in the U.S.,

[2] http://www.eia.gov/totalenergy/data/monthly/pdf/sec6_4.pdf

[3] For the purposes of this paper we use Table 6.2 Coal Consumption by Sector, https://www.eia.gov/totalenergy/data/monthly/pdf/sec6_4.pdf. For the 2016 figure, we use EIA's estimate of 681 million tons http://www.eia.gov/todayinenergy/detail.php?id=29472 in the above chart. Platts, Coal Trader/Coal Analytics, *Weekly Coal Consumption, Total United States,* December 30, 2016 places the end of year consumption number at 712 million tons. The variation in the EIA and Platts numbers account for our use of a range. There will be a final coal consumption count issued sometime in February 2017 by the EIA.

[4] SNL Energy,*10 year coal unit retirement by NERC Region*, January 7, 2017 (proprietary database)

where the age of the fleet—along with other factors—strongly suggests a slow, steady decline in coal's market share of electricity generation.

Another factor in declining consumption is the reduction in daily operations of many coal-fired plants. When plants run less frequently, they burn less coal. Coal plant capacity factors, which measure the amount of time a plant is online, averaged in the 70% range[5] from 2000-2008. From 2008 through 2012, coal plant capacity factors[6] were in the 60% range[7] and today tare in the middle 50% range.[8]

IEEFA sees coal consumption declining to 675 million tons in 2017, a drop of as much as 40 million tons (or approximately 6 percent) from 2016.[9] IEEFA considers this estimate, which is consistent with that of the EIA,[10] to be conservative.

Over the long term, the EIA has coal consumption rising until 2020 (to 736 million tons per year) and then going into a steady, long-term decline through 2050 (to 464 million tons per year). IEEFA concurs with the notion that U.S. coal consumption faces a long-term decline but is skeptical of the EIA's projected increases through 2020, as competing natural gas prices are expected to recede after modest gains in 2017.

While IEEFA agrees with parts of the EIA 2017 Annual Energy Outlook (AEO), an outlook relied on by many experts, we see the electricity sector in the U.S. undergoing a more rapid transformation than the EIA predicts, on several points:

- As described in more detail in the section on coal prices, below, we see natural gas prices being lower than what the EIA projects.[11] Persistently low natural gas prices will cut into coal's long-term market share.
- We see energy demand slowing in several regions, and we note that net generation nationwide is expected to be flat in 2017.[12]
- IEEFA's research on wind and solar energy in Texas[13] and our broader reports on renewable energy around the world, show rapid deployment replacing coal-fired power in many locations. With no new coal plants slated for construction in the U.S., the existing fleet getting older, and as dispatch of coal-fired power for electricity continues to weaken, utilities will continue to make decisions sooner rather than later to move away from coal.[14]

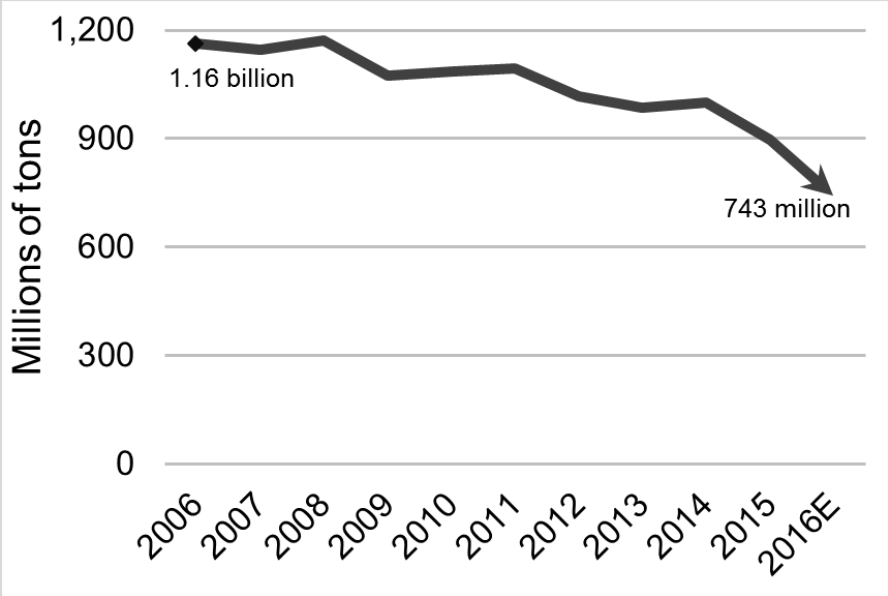
[5] http://www.eia.gov/electricity/annual/archive/03482008.pdf, p. 52.
[6] The capacity factor of a power plant is the ratio of its actual output over a period of time, to its potential output if it were possible for it to operate at full nameplate capacity continuously over the same period of time.
[7] https://www.eia.gov/todayinenergy/detail.php?id=22832
[8] http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_6_07_a
[9] EIA 2017 Annual Energy Survey shows coal consumption rising from 2016 to 2017. EIA projected coal consumption at 660 mtpa for 2016. As noted above Platts put the year end consumption total at 712 mtpa. IEEFA sees decline from this level.
[10] http://www.eia.gov/outlooks/aeo/data/browser/#/?id=8-AEO2017&cases=ref2017&sourcekey=0
[11] We take note of the presentations by EIA in its 2017 Annual Energy Review that show rising natural gas prices and declining coal consumption. We concur that this will be trend will be more pronounced overtime as wind, solar energy and energy efficiency investments mature.
[12] http://www.eia.gov/outlooks/aeo/data/browser/#/?id=8-AEO2017&cases=ref2017&sourcekey=0
[13] http://ieefa.org/ieefa-texas-beginning-end-coal-fired-electricity-%E2%80%A8/
[14] Darren Sweeney and Garett Devine, *Trump Election hasn't changed utilities retirement plans,* SNL, November 21, 2016

COAL PRODUCTION WILL DECLINE BY AS MUCH AS 40 MILLION TONS IN 2017

On average, U.S. coal production declined by 42 million tons per year from 2006 through 2015.

In 2016, production plummeted by an estimated 150 million tons, the highest single-year drop in 10 years.[15] Production has declined by 37 percent over the past 10 years as coal companies have reduced production and as demand has declined.

Figure 2: U.S. Coal Production from 2005- 2016 (Millions of Tons)



IEEFA sees one of two scenarios occurring in 2017.

One will result in flat production. The other sees a decline in production. These two scenarios are shaped by three factors: natural gas prices, coal exports to Europe, and electricity demand in the U.S.

Our flat scenario assumes that natural gas prices will not rise above $3.5 mmbtu, exports to Europe will remain at 2016 levels, and energy demand will increase slightly.

Our production-decline scenario includes a bearish outlook for natural gas prices, deterioration of European demand, and lower-than-expected energy demand. Under this scenario, production could drop by 40 million tons this year.

[15] The EIA offered a similar analysis earlier in 2016 based on a very weak first two quarters. http://www.eia.gov/todayinenergy/detail.php?id=26612

While natural gas prices may increase in 2017, any such increase will not be enough to improve the position of coal sellers in Central Appalachia, Illinois Basin and Northern Appalachia. Powder River Basin producers, who can mine coal at less expense, may see some competitive benefit from rising natural gas prices, but this gain would be tempered by low power prices, slower electricity demand in some regions and wind and solar expansions.

One additional factor bears careful watching. Companies could decide to increase coal production without a commensurate increase in coal consumption. Arch Coal, Alpha Natural Resources (now called Contura) and Peabody Energy are all emerging from bankruptcy. Arch and Peabody have expressed optimism over price spikes in 2016 (see discussion of prices below), and these price signals could encourage increased production without a commensurate increase in demand.

IEEFA's long-term outlook, through 2050, is for a steady, downward decline in coal production as demand from utilities decreases. The EIA is in general agreement. Its long-term outlook has overall U.S. coal production declining to 583 million tons by 2050, a 20% drop from 2016, a projection that would mean a 50 percent decline from a 2006 peak of 1.2 billion tons.

Over the long term, IEEFA also sees the U.S. coal industry becoming even smaller than these projections suggest, because coal-fired power plants could be retired at a more rapid pace than the EIA assumes.

COAL PRICES WILL NOT RISE ENOUGH TO REWARD INVESTORS

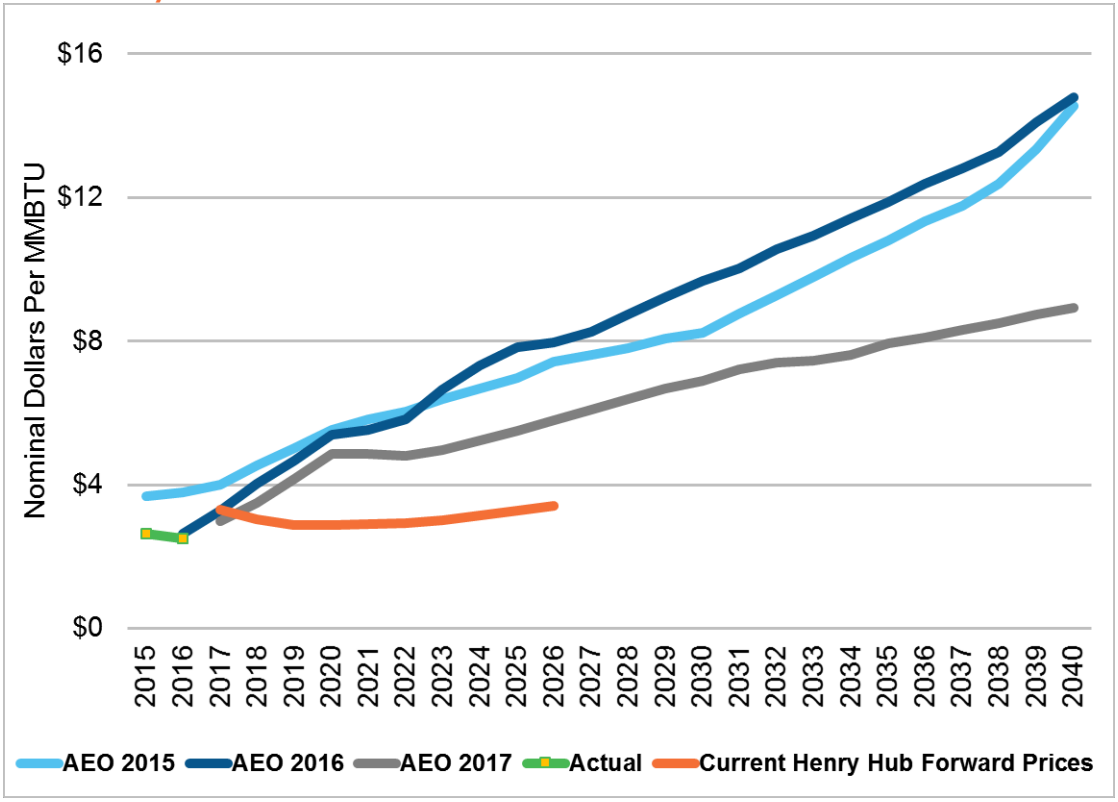
Prices were very low at the beginning of 2016 in most of the nation's coal-producing regions and remained so through the third quarter before rising in the fourth quarter. These increases, though, were modest. Powder River Basin 8800 coal, for instance, was priced at $9.60 per ton for most of the year and then rose to $11 per ton.

The increase followed the relative rise in the price of natural gas. Natural gas started the year in the $2 mmbtu range and gradually rose to $3.5 mmbtu. The fourth-quarter coal price increase occurred as natural gas prices rose past the $3 mmbtu mark.

While natural gas prices are the primary factor affecting coal prices, history has shown that other variables can come into play. In 2011, for example, although the price of natural gas was in the middle $3 mmbtu range, coal prices in the Powder River Basin were in the $14-per-ton range due to more robust annual export sales and a supportive export outlook.

IEEFA sees a high likelihood for flat coal prices in 2017, and through 2025, because natural gas prices will remain low and—as a result—utilities will have little incentive to accept higher coal spot prices or to sign long-term contracts with marginally higher coal prices to hedge against future increases.

Future Henry Hub Natural Gas Prices



The chart above tracks the futures contract market for Henry Hub natural gas prices through 2025 and compares them to the EIA's Annual Energy Outlook (AEO) over the past several years. The prices in the futures market never rise above $4 mmbtu in this chart, and generally track around $3.5 mmbtu. Although the AEO projections came down in the 2017 estimate, they remain well above the outlook derived from futures contracts. It is worth noting here that the EIA's own retrospective analysis shows that the agency has consistently overestimated natural gas prices ever since natural gas prices collapsed in 2008.[16]

Assuming that U.S. coal prices in 2017 remain in their current range,[17] coal producers will be under pressure to maintain cost discipline. Their improved margins will remain largely insufficient, however, to support new investment or substantial investor payouts. The attention to cost discipline will temper any inclination on the part of coal producers to rehire miners laid off over the past few years. (See discussion below on employment levels in the mining industry).

[16] http://www.eia.gov/outlooks/aeo/retrospective/pdf/table_7b.pdf and http://www.eia.gov/outlooks/aeo/retrospective/pdf/table_7a.pdf

[17] For the week ending 12/29/16 the spot market for Central Appalachian coal is $48.00 per ton, Northern Appalachian coal $45.75 per ton and Illinois Basin (11,800) $34.50 per ton. http://www.eia.gov/coal/markets/

2017 COAL EXPORTS WILL REMAIN WEAK, IN THE 55- to 60-MILLION-TONS-PER-YEAR RANGE

U.S. coal exports declined to 79 million tons in 2015 from a peak of 125 million tons in 2012. Through the third quarter of 2016, coal exports were down 37 percent from 2015.[18] During the third quarter of 2016, the coal industry benefitted from higher coal prices, more demand and an improving outlook.[19] Despite gains across global markets in the third quarter of 2016, U.S. exports actually declined as suppliers from other nations benefited from improved market conditions.[20]

Recent estimates[21] of global thermal coal market activity suggest a drop from current prices in the $80-per-ton range to the mid-$70-range by the second quarter of 2017 and then an additional drop into the low-$70 range through 2022. Although these prices suggest some export opportunities for U.S. coal producers, IEEFA see exports staying generally below 60 million tons for 2017 and in the 55- to 60-million-ton-per-year range for the foreseeable future.

In the second half of 2016, prices for both thermal and metallurgical coal spiked on the global market.[22] These spikes were the result of actions taken by Chinese officials to affect their internal energy economics, increasing their import needs (China consumes half of the world's coal). This increase suggested to U.S. coal producers that new opportunities might be forming. However, the trend proved temporary, and prices for both types[23] of coal have recently declined and stabilized after Chinese officials reinstated policies designed to reduce coal imports.[24]

The International Energy Agency (IEA) reported recently that coal demand worldwide declined in 2016 and that it expects coal to continue to lose market share.[25] This outlook is driven by lower natural gas prices, decarbonization policies and the rise of wind, solar and energy-efficiency initiatives.

Over 80 percent of U.S. coal exports are shipped out of eastern and southern ports, and half of the coal shipped out of the U.S. goes to Europe.[26] Some East Coast mining interests still see value in metallurgical sales to Europe in 2017,[27] despite the recent price retreat. IEEFA sees several factors standing in the way of an overall increase in exports to Europe.

Thermal coal exports will be affected by changing European energy markets, where coal, natural gas and renewables compete for market and policy decisions. Russia has made its

[18] https://www.eia.gov/coal/production/quarterly/pdf/qcr.pdf
[19] http://www.cnbc.com/2016/10/04/reuters-america-update-2-coal-prices-hit-30-month-high-as-newcastle-cargoes-surge-over-80.html
[20] Joshua Learner, *U.S. coal exports drop in third quarter despite international rally,* SNL, December 28, 2016.
[21] https://www.barchart.com/futures/quotes/LQ*0/all-futures
[22] http://www.wsj.com/articles/chinas-coal-market-reforms-fuel-rebound-in-prices-1470654404
[23] The price of Newcastle coal is currently at $83.50 it is expected to decline to the $70 range and stay there for through 2022. Australian coking coal is expected to drop from current levels of $195 per ton to the $140 range by year end 2017 and then not rise above $150.00 per ton through 2020. http://www.cmegroup.com/trading/energy/coal/australian-coking-coal-platts-low-vol-swap.html
[24] http://ieefa.org/rally-coal-prices-unsustainable/
[25] http://www.powermag.com/iea-coal-boom/
[26] http://www.eia.gov/coal/production/quarterly/pdf/0121154q.pdf, 9-21.
[27] http://www.platts.com/latest-news/coal/houston/capp-coal-players-optimistic-of-a-stronger-spot-21476290

intentions known to press forward with strategies to provide more low-cost natural gas to Europe.[28] Although it is too soon to know what impact potential changes in U.S. trade policy under the new administration will play in strengthening the Russian economy, it is clear that an increase in cheap Russian natural gas sold to Europe would occur at the expense of U.S. thermal coal producers. In addition, where natural gas is abundant and cheap, steelmakers are looking at natural gas as an alternative to metallurgical coal.[29]

Thus, 2017 is likely to be a weak year for coal exports from the U.S., with a potential for significant deterioration in U.S. coal exports to Europe. Some shipments of coal to Asia will occur in the first quarter of 2017, a reflection of some U.S. producers' ability to move coal deals during the third and fourth quarter. After these transactions are complete, we expect exports to Asian ports to decline, as the market that remains will be largely supplied by companies outside the U.S. with longstanding coal-trading relationships with Asian countries.

REGULATORY RELIEF WON'T BRING BACK COAL-FIRED POWER PLANTS

Federal regulatory changes in the mining and utility sector may occur in 2017. The changes anticipated by the industry would be designed to prevent the implementation of environmental restrictions on coal burning and to stop reforms of various mining programs. However, these regulatory actions would not likely increase coal consumption.[30] The market forces described above—not regulatory activity—drive coal's market share.

As natural gas prices remain relatively high, there may be some regional market share gains for coal related to dispatch dynamics and natural gas prices, but the broader outlook does not support new investments in coal-fired power plants. The Edison Electric Institute, a utility industry trade association, estimates that of the approximately 190,000 MW of new power generation slated for the U.S. beyond 2017, only 2 percent will be coal-fired.[31]

Efforts to reduce environmental regulation of coal plants and stop mining reforms may have a shelf life of only four years. The new administration's attempts to weaken pollution and climate rules are likely to meet public opposition. Concerns about air pollution and climate change will not dissipate. Indeed, as other countries are showing, the issues will probably only grow in importance. Public utilities and state public service commissions will continue with new generation planning and the least-cost options will continue to be natural gas, wind, solar and energy efficiency.

There is little reason to believe that actions designed to remove direct regulations of coal mining will result in meaningful benefits to individual coal companies. While the coal industry expects the new administration to end the federal moratorium on coal leasing,[32] it is unlikely that the end of the moratorium would result in any surge of applications[33] for new leases.

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[28] https://www.bloomberg.com/news/articles/2016-02-01/gazprom-meets-investors-as-it-prepares-record-exports-to-europe
[29] http://www.ulcos.org/en/docs/Ref17%20-%20ULCOS_%20Korea.pdf
[30] http://ieefa.org/the-supreme-court-case-against-the-clean-power-plan-is-a-red-herring/
[31] http://www.eei.org/resourcesandmedia/industrydataanalysis/industryfinancialanalysis/finreview/Documents/FinancialReview_2015.pdf. P. 49.
[32] Joshua Learn, *Coal Sector anticipates end of federal coal lease moratorium with Trump,* SNL, November 10, 2016.
[33] By contrast, the GAO notes that when a moratorium was lifted in the late 1980's pent-up demand resulted in the immediate filing of new coal applications. https://www.gpo.gov/fdsys/pkg/GAOREPORTS-RCED-94-10/html/GAOREPORTS-RCED-94-10.htm

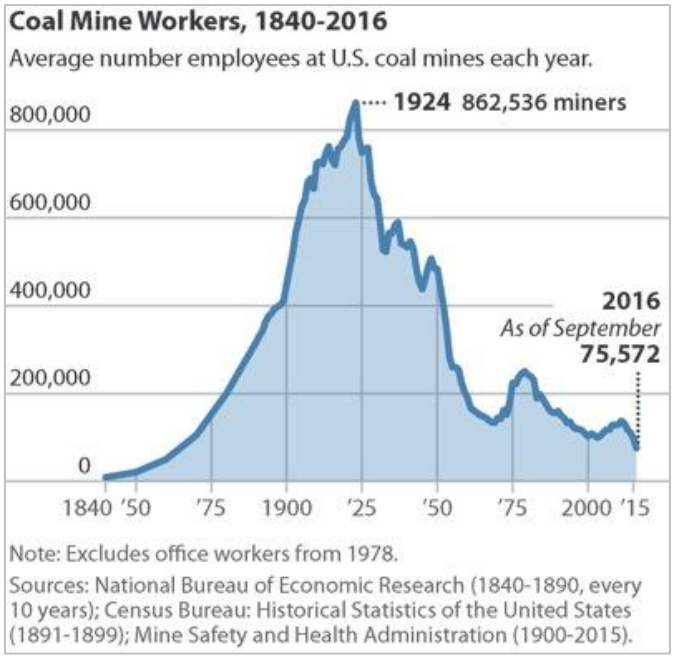
Arch Coal, for one, a company that favors an end to the lease moratorium, is apparently in no hurry to apply for more coal leases. According to a report in SNL Energy,[34] Arch has 1.2 billion tons of coal at its Black Thunder mine—more than enough than it needs, as cited by a company representative—and mines about 80 to 90 million tons of coal. "Given these facts, we can continue to mine at current production levels for a number of years to come" the Arch representative said.

COAL'S EMPLOYMENT OUTLOOK WILL CONTINUE TO DIM

Assurances by the president-elect that the coal industry will rebound and employ more people will prove empty.[35] Even if coal demand were to rebound, the industry will probably not rehire workers, and in fact quite the opposite is likely to occur. One prominent coal executive has warned the incoming administration to temper its coal-job promises.[36]

As the coal industry is now coming through a wrenching period of further decline, industry leaders say it must become more efficient—a term that usually entails a host of labor-saving measures to improve productivity and cut costs. Some management consultants are predicting greater robotization and further cost cutting to decrease personnel and capital outlays[37] while others see new ways of measuring worker productivity, some of which result in fewer workers.[38]

Over the long course of U.S. coal industry history, employment has fallen even during periods of rising profitability and production. From 1975 to 2000, coal production grew from 654 million tons per year to over 1 billion tons per year.[39] The chart on the right shows how employment in the coal industry dropped during that same period. It also shows the longer-term trend in which the coal industry has evolved to use fewer workers to mine more coal. Current employment is now at a record low 75,572 nationwide.



IEEFA notes that if the U.S. coal industry is to stabilize it will need to close more mines.[40] This important step could have and should have been achieved through recent

[34] Joshua Learn, *Coal companies will benefit if federal coal lease moratorium is lifted,* SNL, December 29, 2016.
[35] http://money.cnn.com/2016/12/16/investing/trump-coal-jobs-murray-energy/
[36] http://money.cnn.com/2016/12/16/investing/trump-coal-jobs-murray-energy/
[37] https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Energy-and-Resources/gx-er-tracking-the-trends-2016.pdf
[38] http://www.mckinsey.com/industries/metals-and-mining/our-insights/productivity-in-mining-operations-reversing-the-downward-trend
[39] https://www.eia.gov/totalenergy/data/annual/showtext.php?t=ptb0702
[40] http://ieefa.org/wp-content/uploads/2016/02/Peabodys-Strategies-for-Survival-Ignore-Market-Realities-and-Risk-Backfiring-FEB-2016.pdf

bankruptcy and related workouts. Major producers, particularly Arch and Peabody, have resisted making the requisite closures, however. Such closures are nonetheless inevitable—along with concomitant layoff notices—as U.S. coal companies will find it increasingly difficult to regain their financial footing.

Some mine openings and some attendant hirings will be announced in 2017, and these announcements will likely be presented as evidence of a new stability in the U.S. coal industry. They will serve largely to mask the industry's weak fundamentals, however, as it continues to grapple with the problem of industry shrinkage, a trend that will continue and that IEEFA expects will put this new "stability" at risk.

In view of past and future job losses across the coal industry, IEEFA has advanced a series of economic transition policy recommendations for state and local governments[41],[42] and for the federal government.[43] Such strategies will be sorely needed as the coal sector continues to shrink.

CONCLUSION

The U.S. coal industry is not on a path to recovery in the short or the long term, due to market dynamics unrelated to regulation. The industry will continue to suffer from declining demand, low prices, and its inability to compete with natural gas and renewable energy.

Expectations will go unmet for more export sales, new coal-plant construction, and expensive coal-plant retrofits.

While times may have changed politically, the U.S. coal industry remains in financial and fundamental decline.

[41] http://ieefa.org/in-western-new-york-an-instructive-tale-of-two-coal-fired-plants/
[42] http://ieefa.org/post-coal-transition-model-upstate-new-york-might-work-montana/
[43] http://ieefa.org/invest-struggling-coal-industry-communities-let-us-count-ways/

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About the Authors

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Tom Sanzillo, director of finance for IEEFA, is the author of several studies on coal plants, rate impacts, credit analyses, and public and private financial structures for the coal industry. He has testified as an expert witness, taught energy-industry finance training sessions, and is quoted frequently by the media. Sanzillo has 17 years of experience with the City and the State of New York in various senior financial and policy management positions. He is a former first deputy comptroller for the State of New York, where he oversaw the finances of 1,300 units of local government, the annual management of 44,000 government contracts, and where he had oversight of over $200 billion in state and local municipal bond programs and a $156 billion pension fund.

Sanzillo recently contributed a chapter to the Oxford Handbook of New York State Government and Politics on the New York State Comptroller's Office.

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David Schlissel, director of resource planning analysis for IEEFA, has been a regulatory attorney and a consultant on electric utility rate and resource planning issues since 1974. He has testified as an expert witness before regulatory commissions in more than 35 states and before the U.S. Federal Energy Regulatory Commission and Nuclear Regulatory Commission. He also has testified as an expert witness in state and federal court proceedings concerning electric utilities. His clients have included state regulatory commissions in Arkansas, Kansas, Arizona, New Mexico and California. He has also consulted for publicly owned utilities, state governments and attorneys general, state consumer advocates, city governments, and national and local environmental organizations.

Schlissel has undergraduate and graduate engineering degrees from the Massachusetts Institute of Technology and Stanford University. He has a Juris Doctor degree from Stanford University School of Law.