**Post Workshop Comments**
**Illinois Commerce Commission's White Paper Resource Adequacy in MISO Zone 4**
**December 21, 2017**

Murray Energy/Foresight appreciate the opportunity to submit post-workshop comments regarding resource adequacy in MISO Zone 4.

Murray Energy's Foresight mines are the largest coal producers in Illinois and Murray Energy is the largest underground coal company in the United States. Murray Energy is the largest privately-owned coal company in the United States, has 6,000 employees in the six states in which it operates, and owns two mines in Columbia, South America. Murray/Foresight submits these post-workshop comments on MISO Zone 4 Resource Adequacy issues and the Illinois Commerce Commission ("ICC") White Paper ("White Paper") dated November 1, 2017 on "Resource Adequacy in MISO Zone 4." The ICC White Paper discusses projections of resource adequacy, which is of critical importance to Illinois and to our Illinois coal operations.

Murray/Foresight truly appreciated the structure and information shared in the workshop on December 7, 2017. The meeting was professionally conducted by the ICC and allowed all interested parties to share their information with others participating in the workshop.

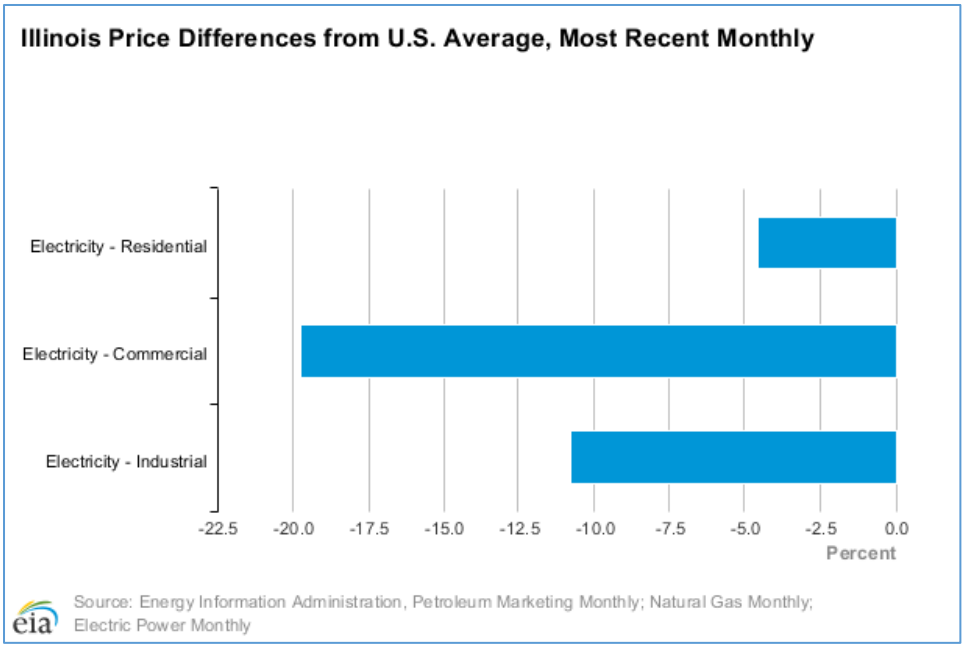
As Murray/Foresight stated in their pre-workshop comments, we again reiterate that before evaluating potential policy solutions regarding resource adequacy, policymakers must understand the competitive advantages Illinois has as it relates to the rest of the United States. Such evaluation needs to not only consider the short-term base load electricity needs for Illinois, but balance the long term needs and associated costs to consumers as it relates to Illinois' utilities in the MISO Zone 4 combined with Illinois utilities being the only de-regulated state in the MISO RTO. In Murray/Foresight's pre-workshop comments, the company shared its perspective on the potential policy solutions provided in the Illinois Commerce Commission's White Paper dated November 1, 2017. The Murray/Foresight position has not changed, yet hopes to add more supporting information in these post-workshop comments and further discuss the need for base-load generation in Illinois' diverse electricity generating portfolio.

Murray/Foresight is not only commenting on Illinois' need to maintain our existing coal fired units as a coal producer, but also as a large Illinois energy consumer. Murray Energy's five Foresight Mines in Central and Southern Illinois consume an average of over 51,000,000 kWh of power monthly at an average cost of nearly $4 million dollars per month. Murray/Foresight is extremely concerned with the direction of energy costs in Illinois as our mines struggle to keep their competitive advantage, as power costs are its largest expense.

## ***I. Importance in Understanding Illinois' Energy Profile, Usage, and Diverse Electrical Generating Assets***

As shared in the Murray/Foresight pre-workshop comments was the fact that Illinois is one of the five largest energy-consuming states[1], yet is ranked twenty-eight in the United States when evaluating the rates paid for electricity.[2]

[1] U.S. EIA, State Energy Data System, Table C10, Energy Consumption Estimates by End-Use Sector, Ranked by State, 2014.
[2] U.S. Energy Information Administration (EIA), Illinois, Rankings: Average Retail Price of Electricity to Residential Sector, August 2017 (cents/kWh)

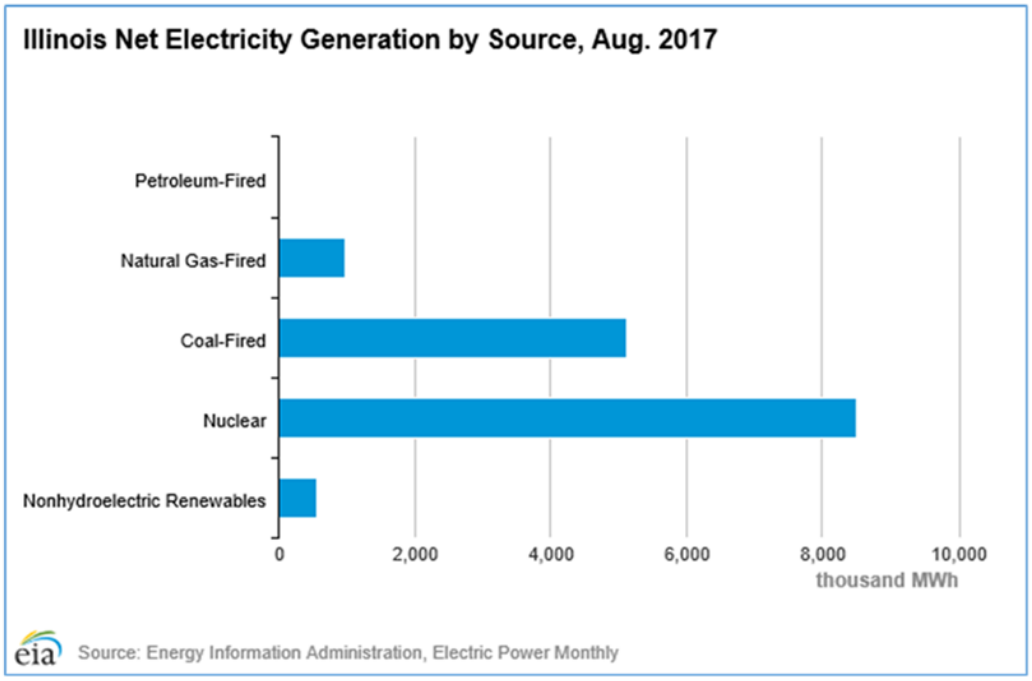



While Murray/Foresight does not want to be redundant in the post-hearing comments, we will restate a few critical items in order to allow us to expand to provide further points to coincide with our pre-workshop comments.

Items that must be considered when evaluating the impact of any energy decision is that Illinois is a very unique state and will respond differently than nearly any other state in the nation due to population and overall energy consumption combined with other factors which are unique to Illinois. Illinois generates considerably more electricity than it consumes, and is a net exporter of electricity.[3] Illinois leads the nation in electricity generation from nuclear power[4]. Coal has long been the second largest electricity provider in the state.[5] Illinois generation of electricity by coal is the largest coal-consuming sector in the United States, second only to Texas in its use of coal to produce electricity.[6] Natural gas supplies nearly one-tenth of all generation while renewable resources, primarily wind, account for approximately six percent of all generation in Illinois. Wind is the primary renewable resource used for electric power generation in the state.[7] In 2016, Illinois was sixth in the nation in terms of installed wind capacity.[8]

Illinois has the most diverse electrical generating portfolio of assets than any other state. This diversity not only allows Illinois independence from reliance on other states to provide electricity, but also allows for stable pricing, optionality, and intermarket competition. Illinois consumers and businesses benefit from this diverse portfolio of generating assets to which the backbone is baseload facilities.

[3] U.S. EIA, State Electricity Profiles, Illinois Electricity Profile 2015 (January 2017), Table 10, Supply and Disposition of Electricity, 1990 through 2015.
[4] U.S. EIA, Electric Power Monthly (February 2017), Table 1.3.B, 1.9.B
[5] U.S. EIA, Electric Power Monthly (August 2017)
[6] U.S. EIA, Annual Coal Report 2015 (November 2016), Table 26, U.S. Coal Consumption by End Use Sector, by Census Division, and State, 2015 and 2014.
[7] U.S. EIA, Electric Power Monthly (February 2017), Tables 1.3.B, 1.10.B, 1.11.B.
[8] U.S. EIA, Electric Power Monthly (February 2017), Tables 1.11.B, 1.14.B.




***II. Importance in Understanding and Defining Baseload Power***

The fundamental question regarding resource adequacy is which of these sources are truly baseload, available, and designed to operate economically in on or off-peak periods. Nuclear plants and coal-fired plants are baseload units and are designed and built to run continually and operate economically in on or off-peak periods on a 24/7 basis. The correct definition of baseload is required for Illinois to be competitive long term, retain business and jobs and to promote growth in all economic sectors.

Illinois' diverse electrical generating portfolio provides price stability, sustainability, and security for Illinois. Illinois' coal and nuclear fleet, which built Illinois, also allowed for the market mechanisms and funding for Illinois' renewable portfolio, which when operating, the renewable resources add to the balance during those periods of operation.

The intermittent and variable nature of wind and solar generators removes them from the traditional definition of "baseload" because of the volatility to meet peak demand due to the required wind and sun and no means to store electricity. The average capacity factor for all U.S. utility scale wind turbines for 2016 was 34.7%.[9] Wind power is variable and an efficient power grid needs a predictable supply of power to meet varying demand.

When determining if natural gas generating facilities are truly baseload, there are many factors to consider. Illinois is unique as it relates to natural gas production, consumption and uses. Illinois is second only to Michigan in total natural gas storage capacity.[10] Illinois is one of the top 10 natural gas-consuming states in the nation.[11] The residential sector uses about two-fifths of all natural gas delivered

[9] U.S. EIA, Electric Power Monthly (September 2017). Table 6.7.B. Capacity Factors for Utility Scale Generators Not Primarily Using Fossil Fuels, January 2013-August 2017
[10] U.S. EIA, Underground Natural Gas Storage Capacity, Total Number of Existing Fields and Total Storage Capacity, Annual 2009-14
[11] U.S. EIA, Natural Gas Consumption by End Use, Total Consumption, Annual, 2011-16.

to consumers in the state, the largest share of any sector.[12] In addition, four in five Illinois households use natural gas for heating.[13] The industrial sector is the second largest natural gas-consuming sector in Illinois and uses slightly more than one-fourth of the natural gas delivered in the state. [14] Natural gas use by the electric power sector varies substantially from year to year, depending on fuel economics.[15] In 2016, the Illinois electric power sector generated a record amount of electricity from natural gas.[16]

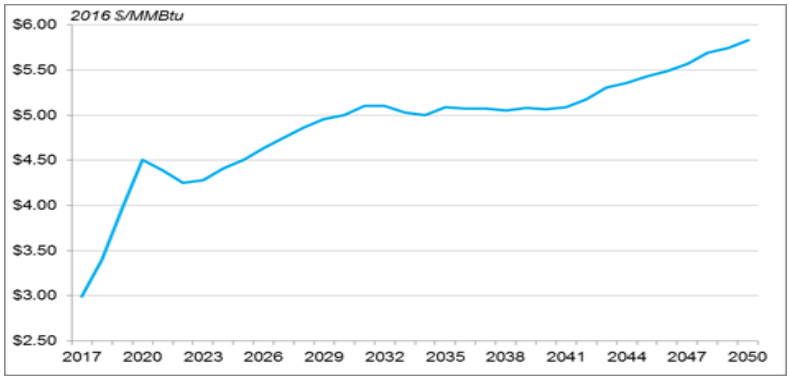
It is evident while gas prices are suppressed, the gas plants have operated as a much larger portion of total U.S. generation. The low price of natural gas over the past several years has forced U.S. baseload coal and nuclear units to close, putting the U.S. in a critical situation when looking at grid reliability, resiliency, and affordable power. However, with additional potential coal and nuclear baseload closures, natural gas prices could be vulnerable to severe price spikes which would affect residential and large energy consumers alike. Thus, why defining baseload power generation in the State of Illinois is of utmost importance.

## ***III. Impacts of Increasing Dependence on Natural Gas and LNG***

The impact of the retirements of baseload power as discussed below have reduced the amount of electric generation from non-gas fired generation by 18%. This has resulted in an ever-increasing dependence on natural gas for electric power generation. Currently, more than 27,000 MW of new combined cycle capacity is under construction, and another 21,000 MW has been permitted to come online by 2020. Even in terms of baseload retirements already made, the demand for natural gas for electrical generation is soaring. By 2040, power sector gas demand could increase by 1.2 Tcf (13%).

However, while natural gas prices have generally been low and stable over the past five years, this surface calm has obscured potential calamity underneath the surface. Historically, as previously discussed, the natural gas market is incredibly sensitive to weather, and cold winters can push the market to the breaking point. While it is true that natural gas reserves and production have significantly increased, as shown in the first figure below, EIA still projects that the price of natural gas by 2030 will increase from $3.00/MMBtu to $5.00/MMBtu in constant 2016 dollars, as shown in the figure below.

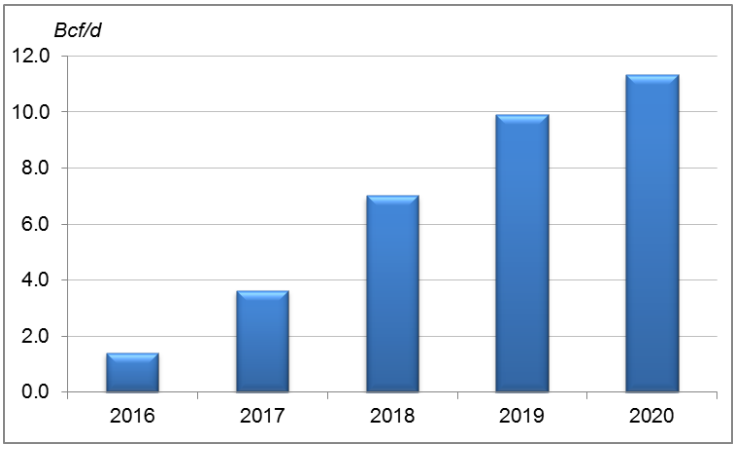
**AEO Henry Hub Price Outlook, 2017-2050 (2016 $/MMBtu)**[17]




[12] U.S. EIA, Natural Gas Consumption by End Use, Illinois, Annual, 2011-16.
[13] U.S. Census Bureau, American FactFinder, Illinois, Table B25040, House Heating Fuel, 2011-15 American Community Survey 5-year estimates.
[14] U.S. EIA, Electric Power Monthly (February 2017), Table 1.7.B
[15] U.S. EIA, Electricity, Detailed State Data, Net Generation by State by Type of Producer by Energy Source (EIA-906, EIA-920, and EIA-923), 1990-2015, updated November 30, 2016.
[16] U.S. EIA, Illinois Natural Gas Deliveries to Electric Power Customers, Annual, 1997-2016.
[17] EIA. Henry Hub Price Outlook, 2017-2050 (2016 $/MMBtu), Annual Energy Outlook 2017.

Additionally, EIA data shows significant increases in liquefied natural gas ("LNG") exports. The addition of LNG exports both increases demand in natural gas and connects the United States more significantly to the global gas market.

**Actual and Projected LNG Export Capacity, 2016-2020**[18]




This enormous surge of LNG demand is, by itself and before considering increases in other demand categories, larger than the increase in U.S. dry gas production that has occurred since the early days of the shale revolution in 2011.

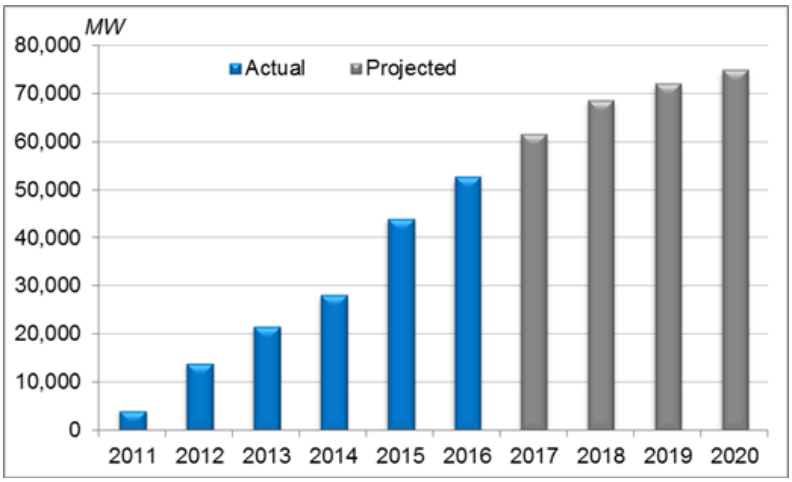
Critically, however, in addition to the aggregate increase in natural gas demand due to LNG, exposure of the domestic natural gas market to the variability of worldwide demand for natural gas may present new issues for the industry to address. The variability of LNG demand could reach 6 Bcf/d by 2020 – an enormous impact layered on top of the already precarious nature of the natural gas market as illustrated by the 2014 Polar Vortex.[19]

***IV. Continued Coal and Nuclear Plant Retirements and the Resulting Vulnerability of U.S. Energy Markets to Severe Price Spikes.***

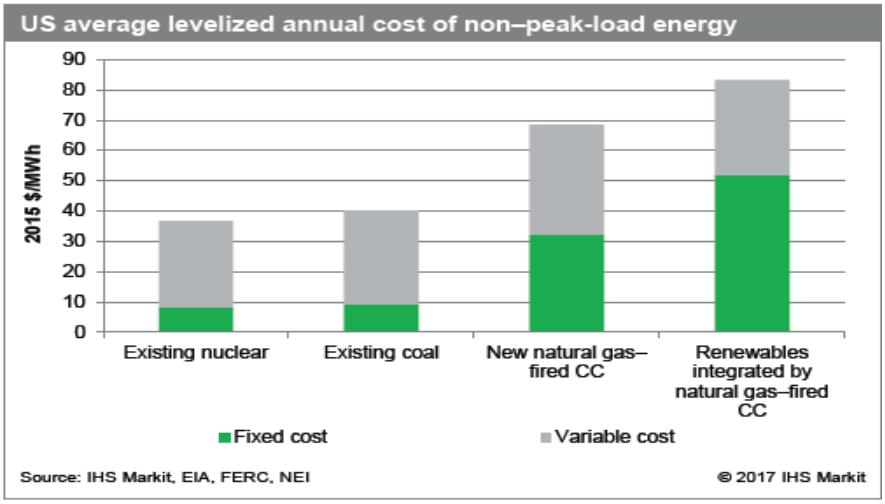
During the past six years, close to 58,000 MW of highly dependable baseload generating capacity with stable cost structures and on-site fuel supply have been retired in the U.S. Most of these generating units burned coal, but almost 5,000 MW of nuclear capacity also have been shut down. Prior to retirement, these generating units accounted for 18% of total baseload generating capacity in the United States, routinely generating 2,555,000 GWh of electricity per year. The replacement cost for this generation is more than $100 billion. Over the next 5 to 10 years, a significant portion of the remaining baseload generating capacity in the United States could be retired, permanently altering the generating resource mix available to grid operators in the United States. Approximately another 30,000 MW are currently scheduled to be retired. Again, Illinois has the baseload generating assets to not only sustain Illinois from adverse power costs, but to expand exports, and ultimately attract new business due to having predictable energy costs and reliability of baseload power. Every business has power costs as either its number one cost or the power costs may be second to labor costs, based on the type of business, but in any case, predictable power costs are key to any business.

[18] EIA et al, Actual and Projected LNG Export Capacity, 2016-2020, August 15, 2017.
[19] See WoodMac: up to half of US LNG exports at risk of shut-in, LNG World News, available at http://www.lngworldnews.com/woodmac-up-to-half-of-us-lng-exports-at-risk-of-shut-in/.

**Actual and Scheduled Coal Retirements, 2011-2020**[20]




Unfortunately, FERC has not yet systematically examined in depth the impact of the U.S. Baseload coal and nuclear plant retirements on grid resilience, the vulnerability to severe price spikes, or the ability to keep electricity costs at reasonable levels on a long-term basis. FERC's core responsibility under the Federal Power Act is to address these issues and ensure the adequacy of the bulk power system in the United States. There is overwhelming evidence that the FERC's current market rules are failing and no longer may be sustainable. This failure is demonstrated in part by a recent study performed by the leading global economic consulting firm, IHS-Markit, which concludes that on a going forward basis (excluding sunk costs) the costs of continuing to operate many recently retired plants is significantly lower than the long-term marginal cost of building new generation.[21] As shown in the figure below from the IHS Study, in some instances, on a properly calculated comparison, the cost of electricity generated by a newly constructed power plant may be approximately twice that of a baseload coal or nuclear plant that has recently retired.[22]



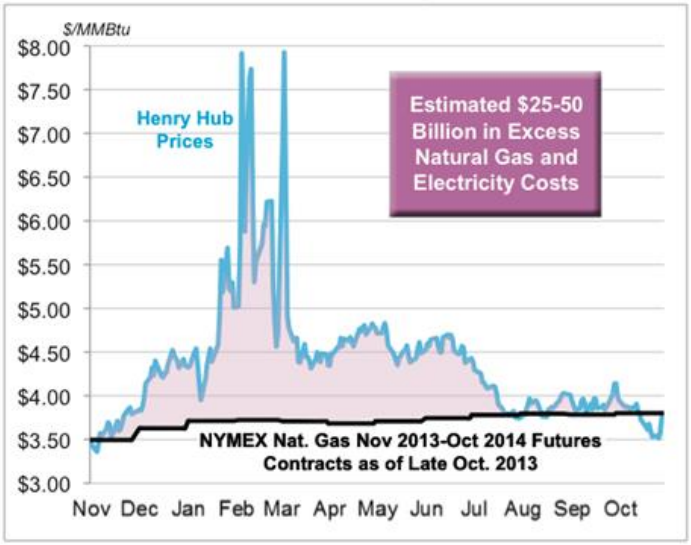

[20] ABB, Actual and Projected Nuclear Capacity Retirements in the United States, 2013-2025, Ventyx Database, October 18, 2017.
[21] IHS Markit, *Ensuring Resilient and Efficient Electricity Generation: The Value of the current diverse US power supply portfolio*, at p. 8 (Sept. 2017) (hereinafter, "IHS Study").
[22] IHS Study at 36.

The fact that utilities would be incentivized to close power plants that generate energy much more cost effectively than building alternative new generation is a clear red flag that the issue needs addressed. Furthermore, baseload coal and nuclear plants typically operate at high capacity factors, have stable operating costs and are generally not exposed to spikes in the cost of fuel. As such, they are valuable resources to limit exposure to price spikes and keep electricity costs at reasonable levels and historically have been the backbone of the operation of the grid. From an economic standpoint, it seldom should make sense to shut down these generating units, especially since, once shut down, these generating units often will be permanently lost. Yet that is precisely what is occurring today.[23]

A related problem that will continually get worse with further retirements of baseload coal and nuclear plants will be the increased frequency, severity, and duration of price spikes that will arise with increased dependence upon natural gas. In particular, during the past several years the ability of grid operators to shift back and forth between natural gas-fired generation and coal-fired generation has played an increasingly critical role in managing price volatility in the natural gas market. As coal plants continue to retire, however, the ability to reduce gas use by increasing use of coal-fired capacity has started to rapidly decline, reducing the amount of available fuel switching by a startling 11 BCF/day in the past six years.[24] As a result, natural gas prices need to rise far more sharply than they did just six years ago to induce comparable reductions in gas use.

The impact of coal plant retirements and increased gas use on price volatility was illustrated dramatically three winters ago, in the winter of 2013-2014 (the so-called "Polar Vortex" winter), when U.S. prices for natural gas alone increased by $18 billion due to a slightly colder than normal winter, with billions of dollars in additional electricity costs as well.

**Winter 2013-2014 Energy Prices Far Higher than Futures Contracts Before Began**[25]




[23] Individual commissioners and nearly every presenter at FERC's May 2017 Technical Conference acknowledged that the current rules are not providing adequate compensation to avoid baseload generating units with stable cost structures from retiring. The companies which historically have been leaders in U.S. electric generation have announced that, except for intermittent generating units supported by long-term Purchase Power Agreements, they will no longer build new merchant generation and, in several instances, are liquidating their entire deregulated generation portfolio.

[24] ABB. Actual and Projected Coal Capacity Retirements in the United States, 2011-2020, Ventyx Database, October 18, 2017.

[25] Bloomberg L.P. Henry Hub Spot Price and NYMEX Forward Curve, November 2013-October 2014, Bloomberg Terminal, October 18, 2017.

Prices at Henry Hub averaged more than $4.50 for an eight-month period and peaked at nearly $8.00. Further, *even with* the reduction in natural gas use that resulted from price-induced fuel switching, end-of-winter storage was driven down to just 824 BCF – perilously close to the minimum level required for operators of the interstate pipeline system to maintain operating pressure in the system. If weather conditions had been just slightly colder, the increase in natural gas prices (and concomitant increase in electricity prices) might have been far greater. The interstate pipeline system would have been stressed even further, with potentially catastrophic consequences.

The experience during the Polar Vortex was extremely perilous. If winter demand was only 1.0 Bcf/d higher, natural gas prices could have wildly escalated out of control – with impacts magnified for electricity markets – potentially totaling more than $100 billion dollars in unexpected costs. The crisis was averted, however, as rising natural gas prices led to gas-to-coal switching. As gas prices were driven higher, power generators switched from gas-fired generation to coal-fired generation. This reduced demand for natural gas and reduced upward pressure on both natural gas and electricity prices. As coal fired generating capacity is retired at alarming rates, however, this crucial market balancing mechanism will cease to be effective.

Every time additional coal-fired generation is retired, the vulnerability to frequent and severe natural gas and electricity price spikes rises, since the natural gas price increase required to induce sufficient fuel shifting to balance the market continues to increase. As a result, in any winter as cold or colder as the winter of 2013-14, the potential natural gas price increase required to balance the market could be as much as two to three times as great as in the Polar Vortex winter.

Currently, FERC nor MISO have market rules which properly credit the many benefits provided by baseload coal and nuclear generation and are instead irrationally driving coal and nuclear into premature retirement, the market rules themselves have a problem that needs addressing. Illinois has the opportunity to address this issue for Illinois at the request of MISO.[26]

NERC has been equally vocal in emphasizing the importance of maintaining resource diversity played by coal and nuclear. As stated by NERC's Chief Executive Officer: "Higher reliance on natural gas exposes electric generation to fuel supply and delivery vulnerabilities, particularly during extreme weather conditions. Maintaining fuel diversity and security provides best assurance for resilience. Premature retirements of fuel secure baseload generating stations reduces resilience to fuel supply disruptions."[27] Analyses by PJM and other RTOs freely acknowledged, however, that FERC's current market rules failed to account for the benefits of resource diversity.

***V. Understanding the Impacts of Focusing Only on Short Term Margins Versus Maximizing Efficiency***

Across the nation, the rigid focus on short-term marginal costs gives generation owners an incentive to focus only on maximizing short-term operating margins, not on maximizing operating efficiency over the seven to twelve-year planning horizon required for investments in new baseload generation. Baseload coal and nuclear plants retired in regulated states, thus Illinois has a much larger issue to face in a deregulated state.

The aforementioned IHS Study highlights the critical importance of this issue. IHS estimates that over the past three years, maintaining a diverse generating portfolio has saved electricity users an average of $98 billion/year – i.e., extrapolated out over 20 year period, potentially as much as $2

[26] MISO letter to Governor Bruce Rauner, May 1, 2017, Ensuring that sufficient electric resources continue to be available in downstate Illinois"
[27] DOE Staff Report at 62-63.

trillion.[28] Illinois has a diverse energy mix, yet needs to understand what role each generating asset plays in Illinois' energy security, capacity needs on a 24/7 basis, and which mix of assets leads to stable operating costs. It would be reckless for Illinois to allow baseload coal and nuclear plants to retire until it better understands this risk.

The wrong decisions towards baseload power assets are irreversible in a deregulated state or at an enormous cost financed over decades on the back of Illinois energy consumers, which Illinois will lose more businesses, jobs, ratepayers, and taxpayers, which affect all economic sectors of Illinois. Without baseload coal fired and nuclear plants in Illinois' energy mix, the state will rapidly climb the ladder to the one of the highest rates paid for electricity.

Future retirements of coal and nuclear generation will only continue to increase demand for natural gas generation and reduce the ability to switch from gas-to-coal in periods of system stress. The number of such retirements is likely heavily dependent on actions that FERC will or will not take to modify its market rules. Illinois has an opportunity to not suffer from the adverse effects of losing baseload coal fired and nuclear plants. Absent such modifications from FERC and or Illinois, it is entirely plausible that within the next decade an additional 20-25% of coal and nuclear capacity may be retired. This will lead to additional employment loss and will further increase vulnerability of the grid to natural gas price shocks, while at the same time making these shocks significantly more likely by reducing the ability to switch from gas-to-coal during periods of high system stress. Even if these obstacles could be overcome, there will likely be a significantly increased fuel cost for natural gas generators and, by extension, higher prices for electricity.

In summary, there is a strong likelihood that currently cheap natural gas prices are an illusion as to future, long-term natural gas prices, both in terms of increases and price volatility. Currently cheap natural gas prices are enabled by market mechanisms, such as gas-to-coal switching ability, that are currently in place but in the process of being decimated. These and other changes, such as the dramatically increased LNG exports and their inherent volatility, could have large effects throughout the wholesale electricity market and on the broader U.S. economy. Any rationale planning for future electric generation must take these potential challenges into account.

***VI. Illinois Must Develop a Policy Based Solution to Resource Adequacy***

Murray/Foresight appreciated the efforts that the ICC is investing to review the importance of this critical issue for Illinois. If Illinois had addressed this issue a decade ago, Illinois may not have lost the baseload generating units that closed during this period. We have an opportunity today to change this trend.

Illinois must develop a structure, which ensures adequacy of service, protects electricity users against long-term wholesale electricity prices that are higher than necessary, and properly defines and accounts for the value of baseload coal and nuclear generation in Illinois' diverse energy portfolio. Illinois must ensure that we maintain wholesale power rates which are just, and reasonable which are mitigated from price spikes, overall economic downturn, and job loss due to not taking into account all previously mentioned concerns.

Illinois' downstate coal fired generating facilities deserve the same opportunities to be competitive as provided to other energy sectors in the Future Energy Jobs Act. Senate Bill 2250 and House Bill 4141 which very closely mirror the White Paper methodology outlined under the FRAP

[28] IHS Markit, *Ensuring Resilient and Efficient Electricity Generation: The Value of the current diverse US power supply portfolio*, at p. 8 (Sept. 2017) (hereinafter, "IHS Study").

Procedure. Illinois needs to immediately attempt to prevent the retirement of any downstate coal fired units until a long-term plan and direction for Illinois is addressed. Illinois faces serious near-term and long-term risks of a capacity deficit of base-load generating capacity coupled with all of the points addressed in these post workshop comments as it relates to the closing of U.S. baseload facilities. Illinois should continue being a net exporter of electricity with an opportunity to capitalize on those states and regions that have ignored the impact of U.S. baseload generation units no longer providing the stable baseload power. Jobs and businesses will be lost if Illinois does not have stable, fair energy prices. As Murray/Foresight stated in their Pre-Workshop comments, “doing nothing” is not an option, but a disservice to Illinois citizens and businesses.

For the reasons mentioned above and in reviewing the options proposed in the White Paper, we currently support the IPA FRAP Procurement concept outlined.