

MIDWEST GENERATION'S ILLINOIS COAL PLANTS: TOO EXPENSIVE TO COMPETE?



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AN ECONOMIC ANALYSIS OF RETIRING EDISON INTERNATIONAL SUBSIDIARY MIDWEST GENERATION'S AGING COAL PLANTS IN ILLINOIS

OVERVIEW

The Sierra Club contracted with Synapse Energy Economics to provide an assessment of the market viability of Edison International's Illinois coal-fired power plants. This report provides an initial analysis of the forward-going economics facing Edison International's merchant coal units in Illinois (known as Midwest Generation, or MWG) and addresses the reliability implications of coal retirements in the western PJM area.

MWG's units primarily sell wholesale power and capacity into the PJM market, and are thus subject to the prices in that market. PJM power prices have been depressed in recent years, and demand has been low. Additionally, coal generators are now faced with complying with current and impending federal and state regulations that will require them to internalize the costs of pollution, forcing them to decide whether to retire or retrofit these units.

These pressures, along with pressure from Chicago communities, citizens, and politicians advocating for a safer place to live, breathe, and raise their families, led MWG to announce the retirement of its Fisk and Crawford plants in Chicago. MWG is still waiting to make a final decision on whether to retire or retrofit other units in its fleet. According to the company's Form 10-K filed with the Securities and Exchange Commission, it recognizes the "disadvantage compared with competing power plants operating in nearby states and subject to less stringent state emission limits or to federal emission limits alone."¹ Future emission control investments would greatly increase the plants' running costs, making them far less competitive. Since MWG participates in the market on a merchant basis, it is particularly sensitive to this issue because it cannot recover approved investments from ratepayers.

To explore this issue further, the Sierra Club asked Synapse to analyze the potential future costs of emission controls at MWG's plants and to estimate the average energy prices these units would need to receive to remain economically viable, compared with Synapse's forecasts of regional market prices.

Synapse found that for all MWG units, the increase in forward-going costs associated with even a single modest emission control (e.g., dry sorbent injection, or DSI) would exceed even Synapse's "high" projection of the market price for energy, rendering all MWG units uncompetitive. Given this conclusion, which strongly suggests that MWG should retire its remaining plants, the Sierra Club also asked Synapse to determine whether the retirements would impact reliability. Synapse concluded that PJM's reliability analysis has found no evidence that additional MWG retirements would have an impact on overall PJM reliability, or on electric reliability generally in Illinois.

FORECASTS OF WHOLESALE PRICES

Midwest Generation's Illinois plants are located in the Commonwealth Edison (ComEd) zone of PJM and thus sell into the wholesale market at this zone's locational marginal price (LMP). Forecasts of this zone's prices were unavailable; however, Synapse developed a range of forecasts based on the historical relationship of ComEd zone prices with PJM Western Hub and MISO Cinergy Hub prices — where futures were available from the Chicago Mercantile Exchange (CME). Figure 1 shows the past five years of average monthly prices in ComEd compared with those in PJM Western Hub. ComEd prices were consistently lower than PJM Western Hub prices — 25% lower on average. (The light blue line shows the historical ComEd price as a percentage of the PJM Western Hub price, indicated on the right axis.)

Figure 2 compares average monthly ComEd prices with MISO Cinergy Hub prices over the past five years. Unlike in the previous relationship (and as indicated by the light blue line relative to the right axis), ComEd's prices were consistently higher than Cinergy's – 8% higher on average.

To estimate ComEd future prices, Synapse assumed that these historical relationships would continue. Futures for PJM Western Hub were available through 2017, while futures for Cinergy Hub were available only through 2015. Therefore, Synapse assumed a future growth rate consistent with the previous year's growth to extrapolate to 2017 for this comparison. After converting the futures prices to constant 2011 dollars, Synapse then applied the historical percentage price differential between ComEd and each hub to arrive at a low and high forecast of ComEd prices in 2017. Figure 3 shows the futures prices and range of forecasts by year. In 2017, the low forecast price for ComEd is \$30 per MWh and the high forecast price is \$37 per MWh.

COMPARISON WITH ENVIRONMENTAL COMPLIANCE COSTS

As previously mentioned, MWG's coal units are vulnerable to current and impending environmental regulations. To estimate the associated costs, Synapse analyzed the current running costs for each unit and estimated environmental compliance costs – assuming each control would be needed if it did not already exist at that unit – including the following:

- dry sorbent injection (DSI) or flue gas desulfurization (FGD) to reduce sulfur dioxide emissions (since these are substitutes, units would install one or the other)
- selective catalytic reduction (SCR) to reduce nitrous oxide emissions
- activated carbon injection (ACI) to reduce mercury emissions
- baghouse filtration to reduce particulate matter
- water cooling upgrades²

Figure 4 shows the forward-going costs by unit compared with the low and high ComEd price forecasts in 2017. The costs for each unit are broken into current operating costs (i.e., with no new investments) and leveled environmental upgrade costs. For each plant, forward-going costs

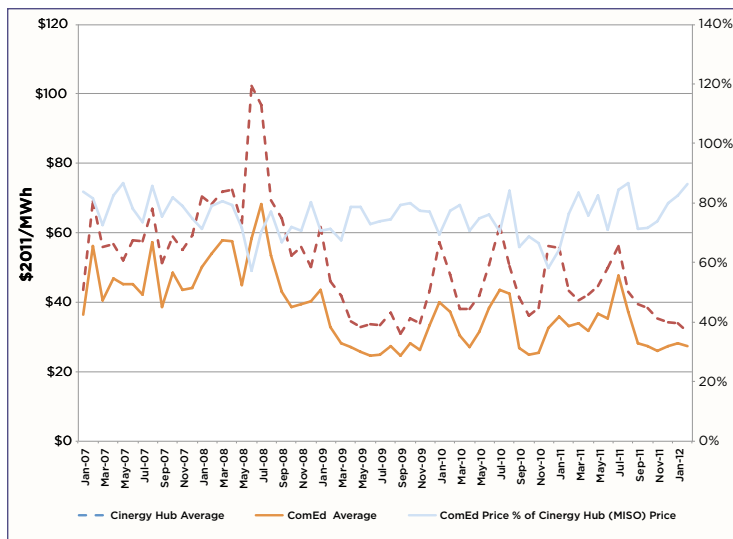


FIGURE 1: HISTORICAL PRICES FOR COMED AND PJM WESTERN HUB (2007-2012)

Source: PJM day-ahead prices; calculations by Synapse.

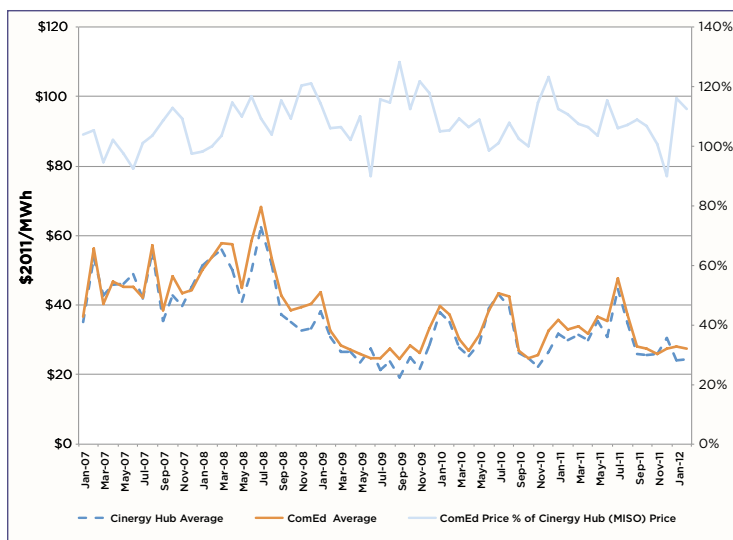


FIGURE 2: HISTORICAL PRICES FOR COMED AND MISO CINERGY HUB (2007-2012)

Sources: PJM and MISO Cinergy day-ahead prices; calculations by Synapse.

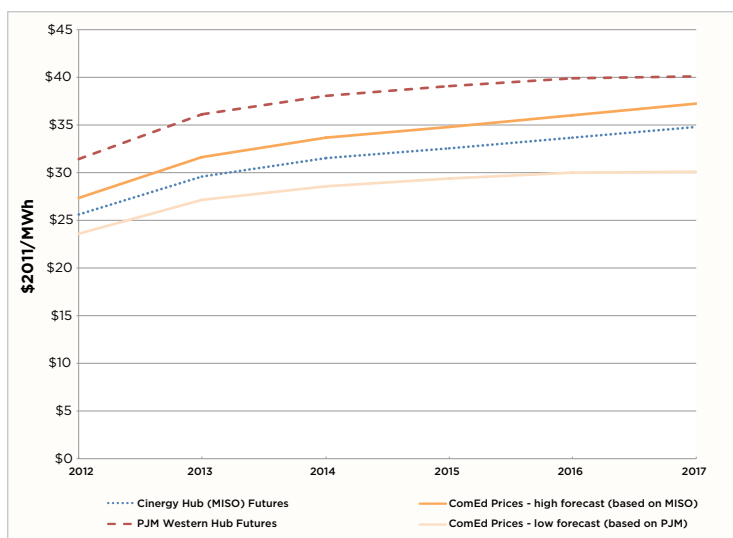


FIGURE 3: FORECASTS FOR COMED COMPARED WITH CME FUTURES FOR PJM WESTERN HUB AND MISO CINERGY HUB (2012-2017)

Sources: PJM day-ahead prices and Chicago Mercantile Exchange settlements; calculations by Synapse.

are shown with either DSI or FGD. FGD is more expensive than DSI, but it's also more effective at mitigating sulfur dioxide. The message of this chart is that if any unit shown installs DSI or FGD, it will become uncompetitive in the future market – even before considering other environmental upgrades. When all environmental compliance costs are combined, the units' forward-going costs run between \$52 per MWh (Powerton Unit 5) and \$66 per MWh (Joliet 9 Unit 6), assuming DSI is installed, and between \$56 and \$79 at the same units, respectively, assuming FGD is installed.

This chart also demonstrates that all MWG units are uneconomic in the face of compliance with environmental and public-health regulations. Edison has undoubtedly reached a similar conclusion, and revealed in its recent 10-K filing that the company “may ultimately decide to shut down the Waukegan Station and Joliet Unit 6, and possibly other units, rather than make improvements.” In fact, the “current running costs” shown here may be conservative since, again quoting the 10-K, the company expects average costs of coal to increase by “approximately one-third in 2012” because of recent transportation issues.

RELIABILITY

Retiring MWG's remaining units over the next several years should have no impact on reliability. The Western PJM region has nearly 84 GW of existing capacity (as of December 2011).³ Of these existing resources, units providing 8 GW are slated for retirement (including Crawford and Fisk), and those providing another 3 GW are deemed “at risk” (including Waukegan, Will County Unit 3, and Joliet 9).⁴ Assuming no new capacity additions, this means 73 GW would remain. If no new units were built or additional units retired, then the region would still have adequate resources to meet 2017 load – even assuming there were no changes in energy efficiency (EE) and demand response (DR). However, this is a conservative estimate given that new demand-side resources are likely, and there are approximately 39 GW of new generation capacity (excluding steam capacity) in the planning queue or under construction for this region in the coming years.⁵

MWG's units represent approximately 6 GW of coal capacity; the retirements of the Fisk and

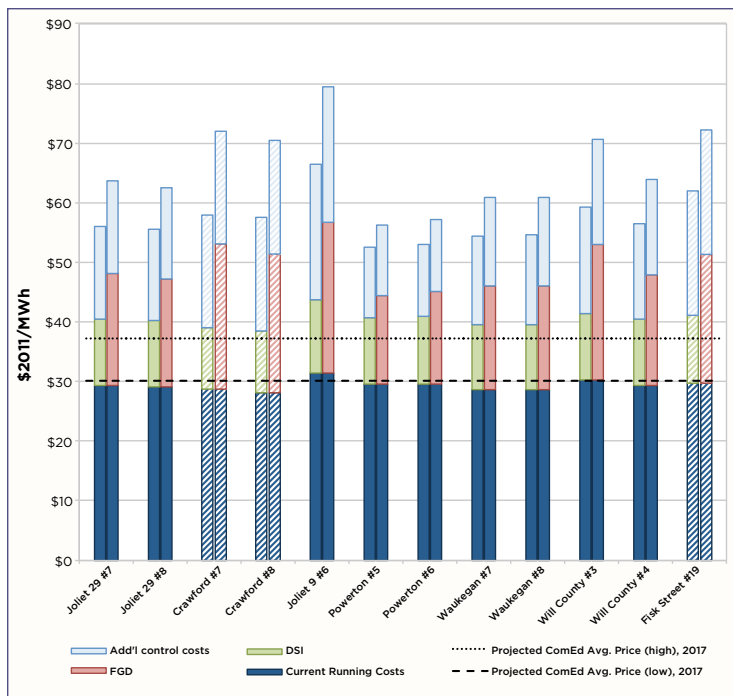


FIGURE 4: COMPARISON OF FORWARD-GOING COSTS FOR MWG COAL UNITS WITH FORECAST COMED PRICES IN 2017

Notes: (1) Current costs include fixed and variable operation and maintenance costs and fuel costs. DSI, FGD, and other control costs include fixed and variable operation and maintenance costs and capital costs amortized over a 15-year period. (2) Stripes indicate units announced for retirement by Midwest Generation.

Sources: (a) Current running costs: Form EIA-923 2010, NERC EPA Analysis 2010 Assumptions. (b) DSI, FGD, and additional control costs: Form EIA-860 2010, EPA IPM v4.1 Appendix 5-1a, 5-2a, 5-3, 5-4, 5-5 (Sargent & Lundy), EPA Technical Development Document for 316(b).

Crawford units will reduce this total to nearly 5 GW. When retirements are announced, PJM conducts reliability studies for individual units to determine whether any regional or local reliability issues will result. PJM's analysis of the MWG retirements concluded that there would be “no impacts” on reliability. In addition to the Fisk and Crawford retirements, PJM has deemed 9 GW of other coal capacity as “at risk” for retirement in the coming years, including Waukegan Units 7 and 8, Joliet Unit 9, and Will County Unit 3, which in total represent 1.3 GW. PJM's reliability analysis concluded that retiring the Waukegan, Joliet, and Will County units will have few implications on reliability for the entire region, though individual reliability studies will need to be performed for each unit to determine any local impact. However, there is plenty of reason to conclude that PJM will continue to have enough generation and capacity, even if the actual retirements are higher than currently projected. PJM's analysis of coal plant

retirements' effects on reliability concluded the following:

As long as resource adequacy and local reliability are assured, the cycle of generation retirement and new resource entry are market-driven outcomes that can be reliability and efficiency enhancing. Newer, more efficient generation resources that replace retiring generation may have lower forced outage rates and thus, are more dependable than older generation resources that may be nearing the end of their useful lives.⁸

While certain eastern zones in PJM have had reliability issues, the western zones are typically unconstrained for several reasons, including less energy demand compared with the east, more access to transmission, and closer access to the MISO grid.⁹ In addition, PJM has historically been very conservative in forecasting energy efficiency and demand response, while being aggressive when forecasting load growth. These trends have contributed to an oversupply system-wide. Figure 5 shows the most recent forecasts of demand-side resources (EE and DR) in Western PJM,¹⁰ which continually shift upward with each passing year. These conservative forecasts stem from PJM's conservative assumption that only EE and DR resources that have cleared the most recent forward capacity auction (three years in advance) will be available thereafter – despite the fact that a significant quantity of new resources have cleared the market each year.

Figure 6 shows the declining trend in Western PJM load forecasts from the past several years, illustrating PJM's persistent overestimation of future load. The forecasts have been continually revised downward each year, in part because of decreased load expectation but also because of new demand-side resources clearing the market each year (as seen above). For example, the most current (2012) forecast for 2017 load is 6 GW lower than the 2009 forecast. If PJM were to forecast new EE and DR, the load forecasts would drop even further. Also shown is an "aggressive" forecast, assuming that new EE and DR will be added at a similar rate as in the past auctions. This assumption results in a projection of an 8 GW lower load for 2017 than is forecast by PJM's current analysis.

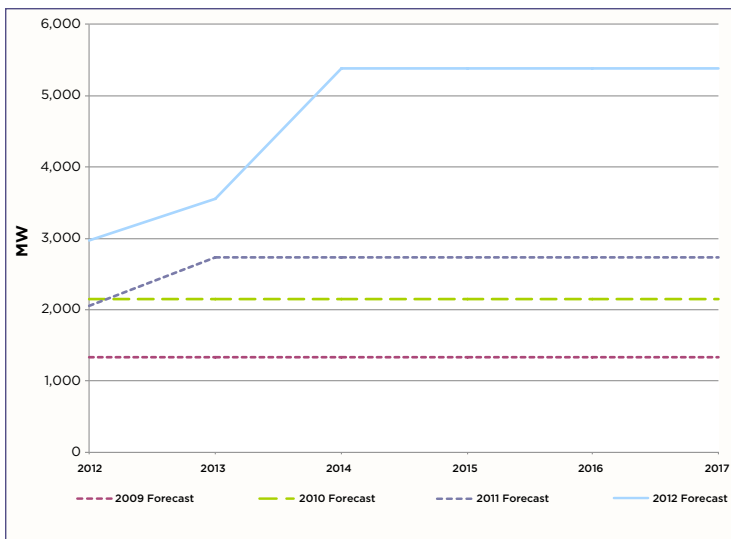


FIGURE 5: WESTERN PJM FORECASTS OF ENERGY EFFICIENCY (EE) AND DEMAND RESPONSE (DR)

Source: PJM Load Forecast Reports; calculations by Synapse.

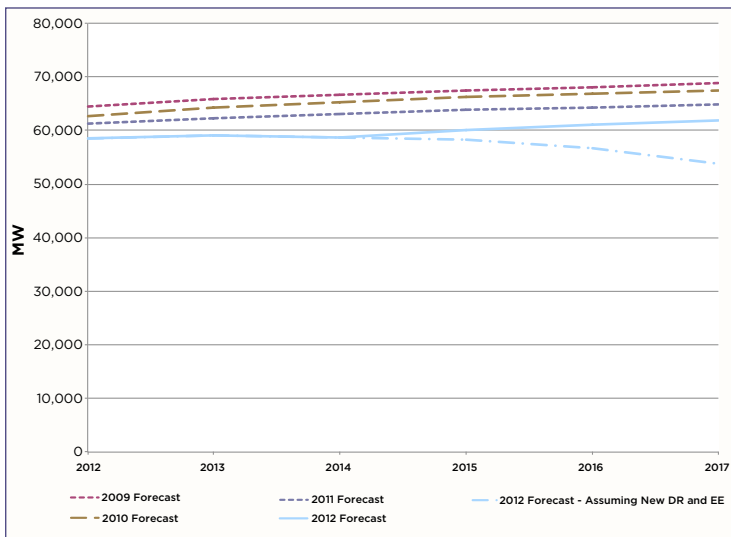


FIGURE 6: WESTERN PJM LOAD FORECASTS – NET OF FORECASTS OF EE AND DR

Source: PJM Load Forecast Reports; "New EE and DR" forecast calculated by Synapse.

The questions that remain are the local implications within the ComEd zone, including the implications if more units were to retire than currently expected. However, improvements in local reliability in the ComEd territory should result from the state's aggressive renewable energy and energy efficiency goals. The Illinois Renewable Portfolio Standard requires 25% of energy to come from renewable sources by 2025, with interim goals for development of solar PV and distributed generation.¹¹ Illinois's Energy Efficiency Standard calls for reductions in peak demand of 0.1% per year (relative to the previous year) for 10 years (2009–2019), with reduction in 2009 energy

delivered (relative to the previous year) increasing by up to 2% by 2016.¹² ComEd also recently filed a plan to invest \$2.3 billion over the next decade in improvements to its grid, which is slated to “improve reliability and reduce frequency and duration of power outages.”¹³

CONCLUSION

As Midwest Generation is forced to pay the true price of operating its coal-fired power plants through the installation of various pollution controls, Synapse’s analysis strongly suggests, retrofits will only make MWG’s plants less competitive and more uneconomic. Without the ability to competitively sell power, the company could face stranded investment in aging coal plants. The better outcome for public health and the environment, and arguably for the company, is to put the remaining MWG plants on a reasonable schedule for retirement.

ENDNOTES

- 1 Edison International. Form 10-K, Securities and Exchange Commission, 2012.
- 2 The Sierra Club does not include the full cost of cleaning up the wastewater and coal ash from Edison’s fleet in the analysis above, which focuses primarily on air. These costs would only increase the overall forward-going cost.
- 3 Monitoring Analytics. *State of the Market Report for PJM*. March 15, 2012.
- 4 PJM At-Risk Machine List. Regional Transmission Expansion Plan Scenario. April 2012.
- 5 Monitoring Analytics. *State of the Market Report for PJM*. March 15, 2012.
- 6 PJM Transmission Expansion Advisory Committee, presentation on April 12, 2012: <http://pjm.com/-/media/committees-groups/committees/teac/20120412/20120412-reliability-analysis-update.ashx>
- 7 PJM At-Risk Machine List. Regional Transmission Expansion Plan Scenario. April 2012.
- 8 *Coal Capacity at Risk for Retirement in PJM: Potential Impacts of the Finalized EPA Cross State Air Pollution Rule and Proposed National Emissions Standards for Hazardous Air Pollutants*. PJM Interconnection. August 26, 2011.
- 9 As noted in the text, this is an overview of regional reliability or resource adequacy; we have not performed any analysis of the potential for local reliability issues associated with any particular retirement scenario.
- 10 This region’s definition has changed over the years. For consistency and comparison, it includes AEP, Allegheny, ComEd, Dayton, and Duquesne.
- 11 See http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IL04R&re=1&ee=1.
- 12 See http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IL19R&re=1&ee=1.
- 13 ComEd Press Release. “ComEd Files 10-Year Plan with ICC for Implementing New Grid Modernization Program.” January 6, 2012. https://www.comed.com/newsroom/news-releases/Pages/newsroomreleases_01062012.pdf.