UNITED STATES SENATE
COMMITTEE ON ENERGY AND NATURAL RESOURCES

TESTIMONY OF MICHAEL J. KORMOS

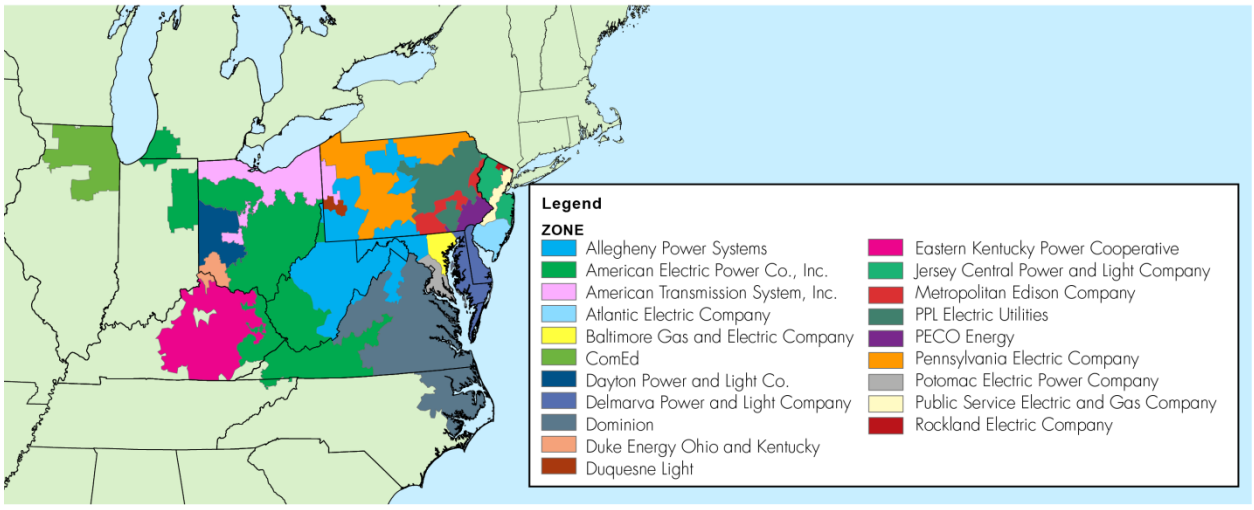
EXECUTIVE VICE PRESIDENT – OPERATIONS, PJM INTERCONNECTION L.L.C.

Oversight Hearing on Electric Grid Reliability and Security

April 10, 2014

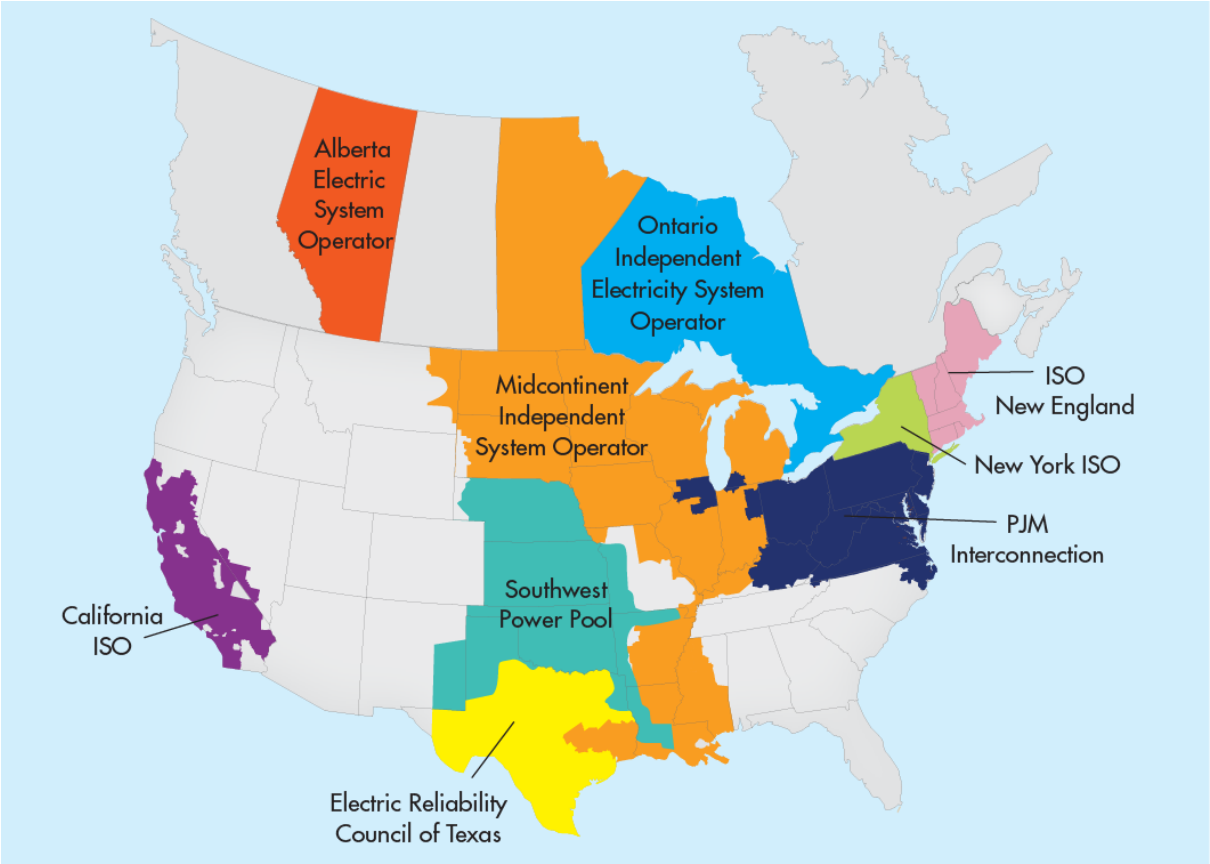
On behalf of PJM Interconnection, L.L.C. (PJM), I want to thank Chairman Landrieu, Ranking Member Murkowski and members of the committee and its staff for calling this important oversight hearing today. My name is Michael Kormos, and I serve as the executive vice president of operations for PJM Interconnection. As depicted below, PJM is the Regional Transmission Organization (RTO) serving all or parts of the states of Illinois, Indiana, Michigan, Ohio, Kentucky, Tennessee, West Virginia, North Carolina, Virginia, Maryland, Delaware, Pennsylvania, New Jersey and the District of Columbia. You can think of PJM as the "air traffic controller" of the electric grid ensuring the delivery of electricity across the high-voltage electric transmission grid to customers in the 13-state region we serve. We are not the local utility, nor do we control the distribution lines that deliver electricity to individual homes and businesses. Rather, like an air traffic controller, we operate the high-voltage electric grid for our member companies, which include companies such as American Electric Power, Dominion and Exelon to name a few.

Figure 1: PJM Service Territory



We are not alone in this endeavor. There are other RTOs serving other parts of the nation including the Midcontinent ISO, which serves the upper Midwest as well as the region served by Entergy; ISO New England, serving the New England states; and the California ISO, serving that state among others.

Figure 2: ISOs and RTOs



Reliability is job one at PJM, and, as executive vice president, I oversee PJM operations associated with ensuring the reliability of the electric grid in our region. In addition, PJM operates the world's largest competitive wholesale electricity market where we serve as a platform for procuring electricity both day ahead and in real time for the 61 million people in our footprint as well as procuring sufficient resources three years ahead to meet our future reliability requirements. Finally, we are responsible for planning the build-out of the electric grid, another PJM function that I oversee.

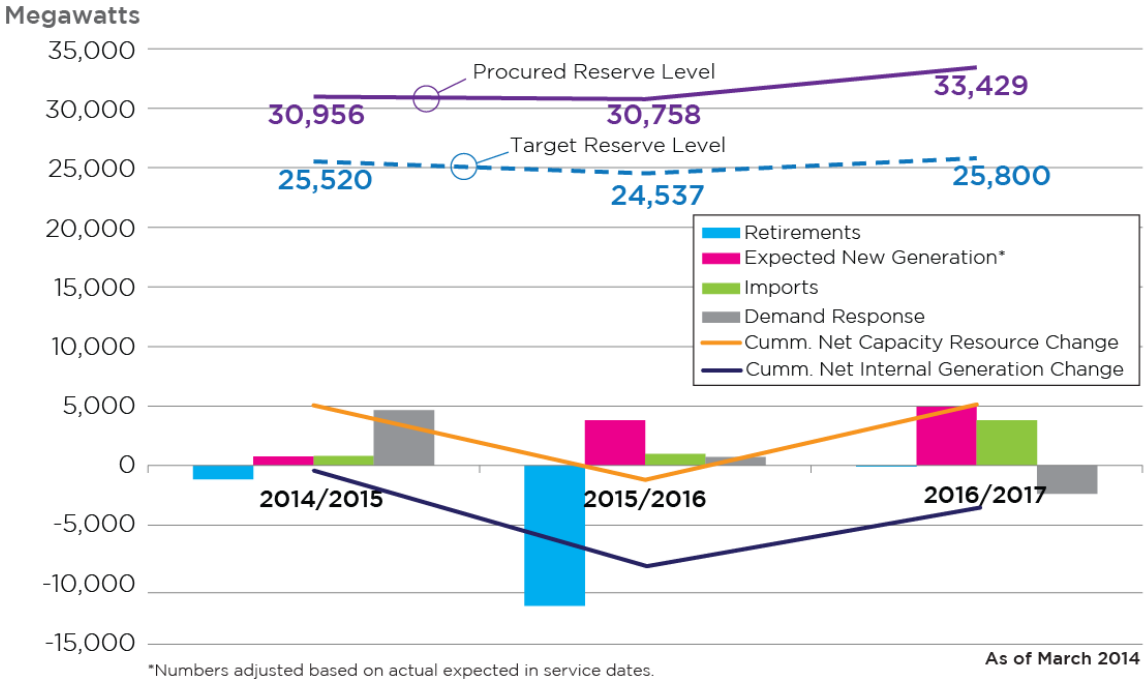
Figure 3: PJM's Role as a Regional Transmission Organization

The committee has asked me to provide testimony on the impacts of future environmental regulations on the future reliability of the power grid. Although we are at the beginning of implementation of a host of new environmental regulations including the Environmental Protection Agency's Mercury and Air Toxics (MATS) rule, its Section 316 Cooling Water Rule and its Greenhouse Gas Rulemaking, we at PJM are required, as part of our reliability function, to look forward and try to incorporate the impact of these rules into our future plans for ensuring reliability of the grid. That task is not easy. For example, amid a changing fleet of resources, in order to ensure that we can keep the lights on during stressed conditions, we are called upon to procure more resources than we might need based strictly on the actual demand on the system in a given day in order to take into account the many short and longer-term contingencies that can occur – ranging from extreme weather conditions to generation plant outages to economic rebounds. Today, we procure at least 116 percent of our forecasted needs three years ahead (known as our "reserve margin") to take into account these contingencies and often procure additional resources above 116 percent of forecasted demand when it is economic to do so. This cushion has served us well. Over just the past six months, we saw record-breaking heat waves in September of 2013 and record cold in January of 2014, both events which broke previous records for demand on the system.

Where does this leave us in managing the impact of environmental regulations? My bottom line message today is several-fold:

- As illustrated in the top two lines of the chart below, we have procured adequate reserves for the next three years (and will continue to procure such supplies on a rolling year-by-year basis three years forward) and, in fact, have procured into 2017 approximately 5,000-8,000 megawatts more than our target reserve margin to address contingencies. As a result, the PJM region has adequate reserves to meet our forecasted needs through the next three years including 2016 when the EPA MATS rule is scheduled to take effect.

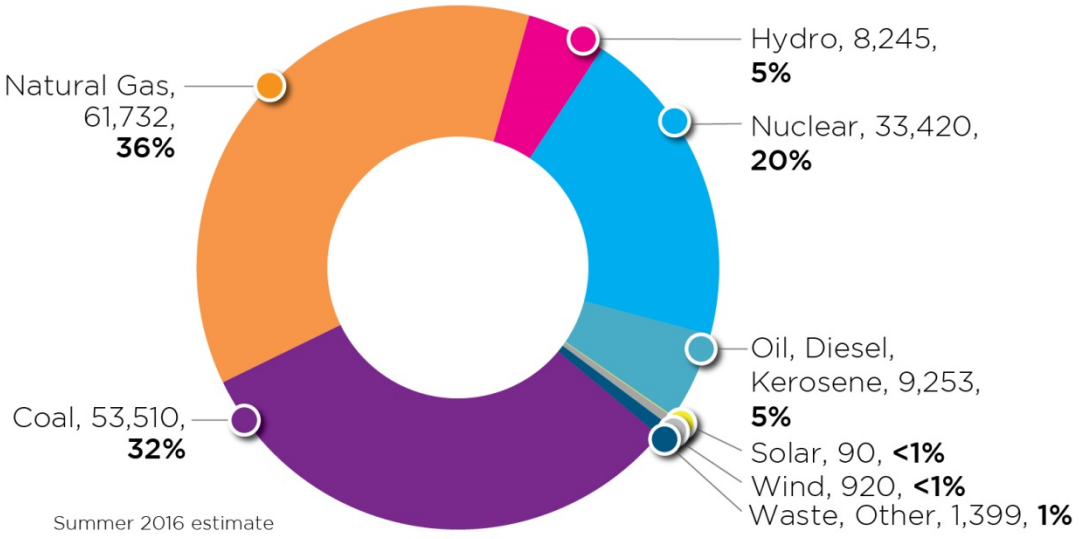
Figure 4: Future Capacity



- Although overall, we have procured adequate reserves to meet the projected demand, the mix of resources will change dramatically during this period. We are seeing a rapid "change out" of the generation fleet with a record number of coal plant retirements: approximately 12,000 megawatts in 2015/2016 alone and a total of more than 19,000 megawatts of coal retirements from 2011 to 2019. This kind of turnover of the generation fleet usually takes over a decade – yet we are seeing this turnover occurring over the next two to three years.

- The PJM generation fleet profile will markedly change in this short time period. Coal will still play a large role in our overall resource fleet representing over 32 percent of the total generation mix in PJM. But our future reserves will be made up of a great deal more demand response resources, natural gas generation, renewables and imports from other regions.

Figure 5: Future Generation Mix



"Demand response" occurs when customers respond to a directive when PJM calls an emergency to curtail their use of electricity. For factories, this could mean temporarily halting a production line. For residential customers, this could mean having their air conditioners automatically cycle during emergency periods. Retail customers decide whether or not they wish to commit to make these curtailments, but, once they so commit, they are bound for one year or one summer (as PJM is counting on these curtailments in order to ensure region-wide reliability) and face penalties for failing to curtail their electricity use in response to PJM-designated emergencies. In return, the customers who participate in the program at the wholesale level are paid the same clearing price that we would otherwise pay a generator to produce electrons during this period.

As another game changing event, natural gas has proven to be the "fuel of choice" for new generation developing in our region. Over 64 percent of new resources in our queue are proposed gas-fired generation. Improvements in the efficiency of combined-cycle generating plants, the availability of Marcellus and Utica shale right in our region as well as the impact of the EPA rules on coal generators clearly have driven the industry to invest in new gas-fired rather than coal-fired generation.

All of these rapid changes leave us with a mixed picture of the future:

- As indicated previously, PJM has procured adequate reserves three years forward and will continue to do so on a rolling basis three years forward into the future.

- Although we have procured adequate reserves, the reliability "cushion" we previously enjoyed with the large fleet of coal-fired generation has substantially diminished. As a result, and due to the fact that demand response resources are only available to us when we are approaching emergency conditions (what is defined as a "pre-emergency" condition), we potentially will have to run the system closer to its limit than we have previously in order to be able to call on demand response resources. As a system operator, I am not comfortable with having to plan my system to go into emergency (or pre-emergency conditions) before I can call upon resources to restore the system to more normal

operating conditions. But, the limitations that have been placed on the availability of demand response resources along with the loss of the cushion of coal units have made this the "new normal" operating condition for PJM into the future.

- Finally, many of your constituents, especially those on variable rate plans, will likely see more volatile wholesale prices than they have in years past. Although the exact amount of exposure to the wholesale markets that retail customers see in their monthly bills varies by state, there is no question that at the wholesale level, as we depend more on natural gas, volatility in the cost of electricity will significantly increase from what we have seen in past years when we could rely more on predictably-priced coal and nuclear facilities to meet our baseload requirements. Natural gas prices have proven quite volatile. Although they generally have cleared at levels of $4 to $5 per million BTU, during the height of the polar vortex in January of this year, prices reached over $100 per million BTU. In addition, because the short-term natural gas market is not as transparent as the electric markets, we saw generators subjected to extremely onerous terms and conditions, which required us to pay for gas at times when it was not economic to run the particular generator, and we witnessed generators procuring gas for an entire weekend merely to ensure its availability to meet the increased Tuesday morning demand after the three-day Martin Luther King Day holiday. These all are issues we are working with the Federal Energy Regulatory Commission to prepare for a more gas-centric world in the future.

- While I am on the subject of the Polar Vortex, I will just note that this was the most difficult winter challenge the grid has faced since the winter of 1994. Summer heat stresses transmission lines while winter cold is particularly hard on generators. It was not simply cold in the PJM region – it was deeply cold over a very long period across our entire footprint. On many days, demand was 20,000 to 40,000 megawatts above normal January peaks. When you consider that only 18 U.S. states use more electricity in an entire year than the PJM region consumed during the single month of January, you get an idea of the extreme stress January placed on the system. An unprecedented 22 percent of our generators – coal, nuclear and gas – were forced out of service by problems such as equipment breakdowns, prolonged operations in extremely cold temperatures and fuel supply limitations. Advanced planning and close coordination between PJM and our members paid off as we were able to meet record demands without interrupting power supplies to anyone. While the system was indeed very tight, we were never – as some accounts have portrayed – 700 megawatts away from rolling blackouts. On the worst day, January 7, our next step if we had lost a very large generator would have been to implement a small voltage reduction. This action, which is unnoticeable to consumers, can produce up to an additional 2,000 megawatts. Even this step, however, proved to be unnecessary, and we were able to meet the record peak with our remaining reserves.

Going forward, we, along with the other RTOs and independent system operators, have requested that EPA build into its Greenhouse Gas Rulemaking a "reliability safety valve," which would ensure that regional reliability considerations are taken into account before a particular state or federal implementation plan is approved. We negotiated a similar Reliability Safety Valve with EPA in the MATS rule, one which generation owners have employed to seek a fourth year extension on complying with the MATS rule. We believe reliability reviews need to be hard-wired into any final EPA rule at key points in the process

including at the beginning when the parameters of the rule are being developed and at key points in the rule's implementation. We look forward to working with the administration and the Congress on these issues going forward.

Let me end where I began. I cannot say that we will never have an interruption in service in the PJM footprint. No one can realistically make that assertion. We are figuring out how to meet reliability objectives by deploying the resource portfolio mix that results from governmental policy preferences and the economics of competing resource options. We are working hard to manage these changes to ensure reliable, cost-effective service to the 61 million Americans that depend on us every day.