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**Sent:** Thursday, April 02, 2020 1:41 PM  
**To:** Borum, Bradley <[BBorum@urc.IN.gov](mailto:BBorum@urc.IN.gov)>  
**Subject:** Follow Up Comments on Director's Report re 2018-19 DEI IRP

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Dear Brad -

Per your suggestion in our phone call on or about March 25, this is to reiterate and follow up in writing on my oral comments re your Director's Report for the 2018-19 DEI IRP which you filed on or about March 3, 2020:

1. As always, thank you for taking the time and expending the effort, especially at this most challenging time in the larger world, to review and comment so perceptively and expertly on the 2018-19 DEI IRP, as well as the Company's internal and stakeholder processes which preceded its filing. As you know, I have been an active participant in the DEI IRP Stakeholder Engagement Process since the Commission initiated it and very much appreciate the important opportunity for input and interaction it provides to interested and engaged Duke customers like me and others involved with citizens groups like the Energy Matters Community Coalition here in Columbus and the Citizens Action Coalition at the State level.

2. I am especially but not exclusively appreciative of your accurate and important comments regarding the Company's very limited review and complete lack of rigorous analysis of the potential retirements of its baseload coal plants, particularly Edwardsport. This deficiency in DEI's IRP process and filed report is especially glaring given the Company's plan for continued heavy reliance on those plants far into the future, with most of the Gibson units projected to operate well into the 2030s and Edwardsport until 2045.

Such extended operation of such relatively expensive and high GHG-emitting plants should be subject to the strictest scrutiny by the Company, its stakeholders, and the Commission. See especially the post-hearing filings on March 30, 2020, in DEI's pending rate case, Cause No. 45253, by the OUCC, the Industrial Group, Citizens Action Coalition, and the Sierra Club, as well as the underlying testimony and exhibits by those parties referenced in those filings. See also, for example, the media coverage as well as the underlying research reports by Morgan Stanley on this subject:

<https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/morgan-stanley-64b-capex-upside-for-utilities-replacing-coal-with-renewables-56987725> and [https://www.spglobal.com/marketintelligence/en/news-insights/trending/n2V18rq\\_af4OBqqaW6CmkQ2](https://www.spglobal.com/marketintelligence/en/news-insights/trending/n2V18rq_af4OBqqaW6CmkQ2) .

Particularly noteworthy here are the conclusions reached by Morgan Stanley regarding Duke (as well as AEP, which is similarly situated regarding both the timing of its most recent IRP and the salience of its Indiana generation retirement planning):

"Driven by the surprisingly low cost of renewables, we believe that carbon-heavy utilities that have not historically led the pack in clean energy deployment will accelerate their earnings growth by pursuing a 'virtuous cycle': shutting down expensive coal plants and investing in cheap renewables," Morgan Stanley analysts wrote in the Dec. 10 research report.

Morgan Stanley sees American Electric Power Co. Inc., Dominion Energy Inc., Southern Co., Pinnacle West Capital Corp., PPL Corp. and Duke Energy Corp. as the utilities with the "largest opportunity" to achieve a valuation re-rating under this approach.

"What we've found is, now there is a much greater opportunity to achieve kind of a triple-bottom-line benefit in the sense of customers [through lower bills], the environment and shareholders," Morgan Stanley analyst Stephen Byrd said in a Dec. 18 interview. "There is an opportunity now that we think some utilities will seize on. We don't know for sure, but we see that opportunity, and we see the benefit that other utilities have achieved with their share price performance that have embraced that opportunity."

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Morgan Stanley said it conducted an "in-depth, asset-by-asset assessment of the coal fleet" in the U.S. using a fixed or "all-in cost of coal" approach in three of five scenarios that it views as the more likely outcomes.

The base-case scenario in Morgan Stanley's research shows about 70,000 MW of coal capacity at risk by 2030, while a scenario that includes a \$40/ton price on carbon shows 192,000 MW of total coal capacity at risk.

Under the base-case scenario, coal-fired electricity declines from 27% of the total U.S. power mix in 2018 to just 8% by 2030. The firm predicted that wind and solar will grow from 9% to 30% of the generation mix over the same time frame.

"Our base case is really just driven by economics," Byrd said.

## Regional breakdown

On a regional basis, Morgan Stanley said it sees the greatest amount of coal "at risk" and the greatest opportunity in the Midwest.

The firm sees the levelized cost of electricity for wind hitting as low as \$20/MWh by 2024, while the current average all-in cost of coal plants is \$30/MWh.

"Given this dynamic, we see 34 GWs of coal capacity likely at risk by 2030 under [the base-case scenario], growing to 74 GWs in a scenario with a \$40/ton carbon price," analysts wrote.

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"On the other hand, we may be underestimating the growth in renewables," analysts wrote.

They highlighted the potential for greater federal regulations on coal-fired plants and natural gas pipelines as well as stronger resistance at the state level to building natural gas plants. It is also possible that natural gas prices rise if the government enacts stronger restrictions on fracking and the permitting of natural gas extraction on federal lands.

A change at the U.S. Environmental Protection Agency could mean a "more rigorous approach to regulation of coal-fired power plants," Byrd said.

"The big dynamic, but this would likely require a Democrat Senate as well as a Democrat president, would be carbon pricing," Byrd added. "That was one thing, I guess it surprised me a little bit, but when we ran the numbers even at a price of say, \$20 a ton, that would cause [almost] every coal plant in our model to screen uneconomic."

Re Duke specifically:

Duke Energy has \$16.8 billion in capex opportunity tied to the transition from coal to renewables, with 8% earnings accretion potential in 2025. The Charlotte, N.C.-headquartered utility owns 15,400 MW of coal capacity at 41 units with 13,000 MW seen as "at risk by 2024" because of wind economics in Indiana, North Carolina and Ohio.

In general:

"We think that the economics make sense that the utilities in general should be pursuing this just because it seems to benefit everybody," Morgan Stanley analyst Stephen Byrd said in a Feb. 11 phone interview. "It benefits shareholders, customers and the planet."

3. I was especially struck by this statement by the Morgan Stanley analyst interviewed by S&P Market Intelligence: "Our base case is really just driven by economics," Byrd said. . . .

Then, speaking specifically of Duke:

Duke Energy Corp. [is one of] the utilities with the "largest opportunity" to achieve a valuation rerating under this approach.

"What we've found is, now there is a much greater opportunity to achieve kind of a triple-bottom-line benefit in the sense of customers [through lower bills], the environment and shareholders," Morgan Stanley analyst Stephen Byrd said in a Dec. 18 interview. "There is an opportunity now that we think some utilities will seize on. We don't know for sure, but we see that opportunity, and we see the benefit that other utilities have achieved with their share price performance that have embraced that opportunity."

**Notable here for IRP purposes is that "carbon risk" is NOT just the basis for a "sensitivity case" premised on the contingency of CO2 regulation, but an integral component of the "base case" "just driven by economics." In short, the capital markets are now "pricing" carbon risk into their "base case" valuations of major electric utilities' stocks even in the absence of an enacted carbon tax or cap-and-trade regulatory regime -- so those utilities (like Duke and AEP) should be doing the same in their IRPs !!!**

4. The other salient point in your comments for which I am especially appreciative is the emphasis on the necessity for integration of "Distributed Energy Resources" (DER) into not only future DEI IRPs but also its future utility operations. This is a "sea change" in utility planning and operations which the Commission has recognized by retaining Lawrence Berkeley National Laboratory (LBNL) to prepare a principal component of its upcoming report to the State's 21st Century Energy Planning Task Force. See

<https://www.in.gov/iurc/files/IURC%20progress%20update%20Jan%202020%20final%200def.pdf>

Notably, LBNL explains:

"There are several types of emerging technologies that are being deployed or could be deployed in the distribution system and behind the meter. Technologies can produce electricity (e.g. solar photovoltaic (PV) panels, natural gas micro-turbines), store electricity (e.g. batteries, flywheels), consume electricity in novel ways (e.g. electric

vehicles) and improve electricity management and consumption (e.g. smart thermostats, super-efficient appliances). These technologies are grouped and references throughout this document as Distributed Energy Resources (DER). Given the current landscape in Indiana and the focus of the Task Force, this study is limited to the following DER: solar PV, battery storage, electric vehicles, demand response, and energy efficiency. . . ."

## **Value of DER**

"A growing body of literature analyzes the benefits and costs of DER. NREL (2014) reviews methods for analyzing the benefits and costs of distributed PV generation to the U.S. electric utility system. This NREL review is one of the main sources for the DER valuation framework used in this study. Utilities will occasionally commission 'value of solar' studies in their service territories to understand the benefits and costs specific to their geographic location, generation portfolio and customer base. RMI (2013) reviews sixteen distributed PV (DPV) benefit/cost studies by utilities, national labs, and other organizations. Completed between 2005 and 2013, these studies reflect a significant range of estimated DPV value. Some studies examine costs and benefits at a broader level. Cohen et al. (2015) estimated the economic impact of DPV in California, and, closer to Indiana, PNNL (Orrell et al., 2018) estimated the value of DG in Illinois."

## **Utility of the Future**

Some states have conducted "Utility of the Future" studies. These studies generally examine the role and business model of today's utilities and explore ways they could change in the face of an evolving business environment measured by customer expectations, DER adoption, and technological advances. In the Midwest, several states have conducted such studies: Ohio, Michigan, Illinois, and Kentucky. Ohio's PowerForward Roadmap examined potential future regulatory paradigms, distribution grid architecture, and grid modernization (Ohio PUC, 2018). Michigan's study specifically focused on the near-term challenge of ensuring an adequate electricity supply (Public Sector Consultants, 2014). Illinois' NextGrid study assessed options for further grid modernization and candidate updates of state regulatory policies (NextGrid Illinois, 2018). Kentucky developed a Smart Grid Roadmap in 2012, where it examined the modernization of the electric power grid (KSGRI, 2012).

## **DER Forecasting and Planning Integration**

A critical input to the body of work on DER impacts is the adoption forecast for DERs. The methods for developing these forecasts can be divided into two categories: (1) top-down and (2) bottom-up (NREL, 2019). Top-down methods tend to be simpler and require less data and computing power. They include time series models, econometric models, and Bass diffusion models. Time series models are the most straightforward to implement, as they take historical data and extrapolate to future outcomes. Econometric models use statistical methods to explain historical observations by finding relationships between penetration levels and other variables. Researchers can then use these

relationships to predict future adoption levels. Bass diffusion models represent adoption patterns of new products or technologies and are the most frequent top-down model used (NREL, 2019). Bottom-up methods require more data and are more methodologically sophisticated, as they evaluate DER adoption based on characteristics of individual customers. For example, agent based models simulate the actions of individuals to model the impacts to the larger system. These types of models allow for more complex decision-making processes and can simulate a more heterogeneous customer base (Mills, 2018).

A number of researchers have examined how to incorporate DERs into the distribution planning process. For example, LBNL conducted a comparative analysis and evaluation of roughly 30 recent planning studies, identifying innovative practices, lessons learned, and state-of-the-art tools (Mills et al., 2016). PNNL describes activities in states that have adopted some advanced elements of integrated distribution system planning and analysis and also covers a broader array of state approaches (PNNL, 2017b)."

Plainly, it is time for DEI, as Indiana's largest electric utility and a subsidiary of one of the nation's and the world's largest electric utility holding companies, to integrate DER into its distribution system planning and operation and, in turn, into its overall integrated resource planning, modeling and reporting. Now is a particularly critical time in this context for DEI because, as your comments note, Duke Energy is currently in the process of investigating and evaluating alternatives for a new IRP system which would be integrated into its overall Management Information System framework at the corporate level.

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Thank you very much for this additional opportunity of provide my follow up comments to your own regarding the 2018-19 DEI IRP. Thanks also for all of the work which you and other members and employees of the Commission have done over the years to bring the Integrated Resource Planning process in the State of Indiana to its current high level of performance while continuing to identify and implement new considerations, concepts and methods to further improve it in the future.

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