March 15, 2021

Dr. Bradley K. Borum
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Indiana Utility Regulatory Commission
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Electronically delivered:
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Dr. Borum,

AES Indiana appreciates the Commission's comments to IPL's 2019 IRP and recommendations for improving AES Indiana's future IRP processes. The attached response addresses some of the key topics included in the Director's Report.

We look forward to incorporating the Director's recommendations in future IRPs. Please let me know if you have any questions.

Sincerely,

Erik Miller
Manager, Resource Planning
AES Indiana

cc: Bob Pauley via email (mpauley@urc.IN.gov)

Indianapolis Power & Light Company's (d/b/a AES Indiana) Reply to Draft Director's Report for IPL's 2019 Integrated Resource Plan dated February 12, 2021

March 15, 2021

Introduction

AES Indiana appreciates the Director's comments to IPL's 2019 IRP. The Director's comments are generally positive and complimentary. In his comments the Director acknowledges the challenges associated with resource planning and recognizes that this modeling continues to evolve. The Director's draft report commends AES Indiana for the high quality of its IRP and AES Indiana's commitment to thorough well-written explanation of its planning actions. AES Indiana appreciates the Director's commendation regarding: the participation by AES Indiana's top management; AES Indiana's willingness to use state-of-the-art software; AES Indiana's facilitation of a robust stakeholder process; its efforts to broaden the diversity of the stakeholder community; AES Indiana's leadership in utilizing AMI and other load resource data to better understand customers' needs; and AES Indiana's commitment to continual improvement.

The Director noted areas in IPL's IRP where further explanation and/or improvement are appropriate. This document responds to these areas. AES Indiana values the feedback the Director has provided and plans to use this input as guidance for the next IRP.

I. Load Forecasting

Director Comment #1:

> *IPL significantly changed its load forecasting approach and narrative beginning with the 2016 IRP from the 2014 IRP. IPL retained Itron for the 2016 forecast and in the preparation of the report. The result was a significant improvement in the methodologies and clarity of the load forecasting section of the 2016 IRP and the 2019 IRP. We urge IPL to continue to build on this successful collaboration with outside experts.*
>
> *It was disappointing that, unlike the 2016 forecast prepared by Itron, that included a well-written Appendix, there was not a comparable Appendix in the 2019 forecast.*

(Director's Report pg. 8)

AES Indiana Response:

AES Indiana did not contract with Itron to perform the load forecast or write a report for the 2019 IRP. Instead, the forecast was performed internally using the Itron methodology with support and review from Itron. AES Indiana appreciates the Director's feedback and will consider contracting Itron for the load forecasting and appendix report in the next IRP.

Director Comment #2:

> *To make things more confusing, Volume 2 of IPL's 2019 IRP includes in the appendix portions of the 2013 Itron Long-Term Electric Energy and Demand Forecast Report prepared for IPL. While unclear, it seems that IPL staff is using Itron's Statistically Adjusted End-use (SAE) methodology that was developed in 2016. It is also unclear whether the SAE model used by IPL was updated.*

(Director's Report pg. 8)

AES Indiana Response:

The SAE model was updated. The intention of Attachment 4.3 (Residential SAE Modeling Framework and Commercial SAE Modeling Framework) including in the 2019 IRP Volume 2 is to provide a general summary of the SAE methodology used in the 2019 IRP load forecast. This is the same methodology used in 2016. AES Indiana updated all SAE data included in the 2019 IRP load forecast so that it is consistent with the 2019 EIA Annual Energy Outlook. AES Indiana will work to avoid this confusion in its next IRP.

Director Comment #3:

> *Actual weather data comes from NOAA for the Indianapolis Airport (IND). For the Residential forecast, the base temperature used for HDD is 60 degrees and for CDD 65 degrees. For the Commercial forecast, 55 degrees is used for HDD and 60 degrees for CDD. The base temperature[s] used in the 2019 IRP are different than what was used in its 2016 IRP where 60 degrees was used for HDD and 65 for CDD for both classes. Historically, over the past 10 years or so, it was common for utilities to use a base temperature of 65 degrees for both heating and cooling degree days. It is not clear what led IPL to change their temperature base for calculating degree days for the Commercial class after the 2016 IRP. It is becoming common for utilities to use something less than 65 degrees, especially for heating degree days. In future IRPs, it would be interesting to analyze the appropriateness of changes to the HDD and CDD.*

(Director's Report pg. 8-9)

AES Indiana Response:

Adjusting the base temperature for calculating the HDDs and CDDs for the Commercial sector in the 2019 IRP generally improved key forecast model statistics – R-square and Mean Absolute Percent Error. The improvement in statistics indicates that this base temperature adjustment better captures the heating and cooling breakpoints for the Commercial sector. AES Indiana will provide additional analysis and explanation for any similar adjustments in future IRPs.

a. Residential

Director Comment #4:

> *The narrative for the residential forecast is confusing. The number of residential customers grows at 0.8% (Figure 4.9) and average use grows at 0.4% (Figure 4.10). Thus, it seems*

like sales should grow at 1.2% (0.8+0.4). But the text on page 38 states that there is a "forecasted flat-to-declining sales per customer." Note this seems to contradict Figure 4.10. Also, Figure 4.12 indicates sales grow at 1.7%, not 1.2%. (IPL's IRP pages 36-39) The March 26, 2019 Stakeholder meeting presentation by IPL discussed the load forecast. The base case results discussed there had residential average use increasing 0.4% on an average annual growth rate over the period 2020-2039, the number of customers growing at a rate of 0.8%, and total residential sales growing at a rate of 1.2%.

(Director's Report pg. 9)

AES Indiana Response:

The total residential sales growth rate should have been listed at 1.2% in Figure 4.12 Residential Sales on pg. 39 on of the 2019 IRP Volume 1. This would be consistent with the growth rate presented for total Residential sales at the March 26, 2019 Stakeholder meeting. Additionally, the Director is correct in noting the contradiction that the sales per customer (average use) is not forecasted to decline. The appropriate characterization is that AES Indiana's historical residential sales per customer has been flat-to-declining due to the shift to multifamily housing as well as increases in organic and AES Indiana-sponsored efficiency. However, average use is forecasted to be flat-to-slightly increasing at a rate of 0.8% due to saturation of efficient residential lighting potential and an increasing volume of miscellaneous electronic devices in homes.

Director Comment #5:

To avoid double counting the impact of EE, IPL sponsored DSM was included as an "endogenous variable" in the sales models. This allowed IPL to adjust out of the load forecast any effects from planned DSM. Unfortunately, there is little detail to better understand what was done. (IPL's IRP page 35)

(Director's Report pg. 9)

AES Indiana Response:

In the 2019 IRP load forecast, AES Indiana included a DSM variable in the sales models for rate codes that participate in DSM. The endogenous variable is a data stream that included all historic/realized DSM and all planned DSM for 2018-2020 based on the Commission order in Cause No. 44945 and selected DSM from the 2016 IRP for 2021-2039. This was done to capture the planning horizon in the 2019 IRP.

AES Indiana only included this variable in the sales models if it was considered significant (using p-value) and did not impair other model statistics (R-square). By correlating the DSM variable's history with AES Indiana load history, the model provides a coefficient for the variable that indicates the volume of the variable's planned DSM that is included as a reduction in the load forecast going forward. For example, a coefficient of -0.8 would mean that 80% of the DSM variable's planned DSM is being reduced from the load forecast. This method captures the trend embedded in AES Indiana's load history and results in a forecast that is reduced for DSM.

Because DSM is treated as a resource in the IRP model, AES Indiana needed to include a load forecast that is free of all planned DSM. Modeling a future that assumes no future planned DSM provides a blank slate for the model to add DSM. To achieve this, AES Indiana grossed up the load forecast that had been reduced for planned DSM as described above. AES Indiana made this adjustment in spreadsheets outside of the model.

b. Commercial

Director Comment #6:

> *The 2019 IRP contained less information about Commercial sales than the 2016 IRP. The 2016 IRP says Commercial customers, like Residential, are modeled and forecast using the Statistically Adjusted End-Use model; except using a total sales model as opposed to an average use model. If IPL's 2019 IRP continued to use the Itron methodology that was used in 2016, it should be more clearly stated. In other words, the 2016 IRP stated the Commercial model was similar to the Residential except total sales were used instead of average use. There is no mention of this in the 2019 IRP. Has this changed or is it the same as in the 2016 IRP? In the 2019 IRP, there is a picture of Commercial average use on page 40 which makes the use of the SAE model unclear.*

(Director's Report pg. 10)

AES Indiana Response:

There was no change. The methodology that AES Indiana used for the 2019 IRP load forecast was identical to the methodology used for the 2016 IRP load forecast – both used Itron's Statistically Adjusted End Use methodology. All data sets, including economics, EIA saturations, sales, customers, weather, and utility price forecasts, were updated to contemporary 2019 data. As noted by the Director, the Commercial models forecast total sales by month by rate code, whereas the Residential models forecast average use by month by rate code in both 2016 and 2019. AES Indiana will include additional information in the next IRP to make sure that the methodology is clear.

Director Comment #7:

> *The 2019 IRP narrative also doesn't mention other model drivers (in addition to the economic ones) that were mentioned in the 2016 IRP. The reduced information did not include billing days, price, end-use intensity trends (measured on kWh per square footage basis), and heating and cooling degree days. Based on the presentation by IPL to the March 26, 2019, IRP stakeholder meeting, IPL used an equation with total sales as the dependent variable.*

(Director's Report pg. 10)

AES Indiana Response:

The Director is correct; AES Indiana used an equation with total sales as the dependent variable. As indicated in the previous response, AES Indiana used the same Itron methodology for the 2019 IRP load forecast as the 2016 IRP load forecast. This included the same driving variables but updated to the most contemporary 2019 data. AES Indiana will improve the description around the methodology and variables in the narrative of next IRP report. In addition, AES Indiana agrees that having Itron provide a detailed report (as noted by the Director on pg. 8 of the Draft Director's Report) could better facilitate the understanding of the methodology and general load forecasting process. AES Indiana will consider including Itron for this work in the next IRP.

c. Industrial

Director Comment #8:

> *The narrative for the economic input does not seem right. GDP grows at 1.57% and employment at -0.53%. If you combine those two with equal weights, it would be close to the average of those (actually 0.62% for 20 years). If employment were weighted more heavily, as the text states, it would be lower than the amount with equal weights (since employment has the lower growth). Instead it is higher (0.93%). Also, manufacturing employment can be a poor indicator of industrial energy use, particularly if the level of process automation changes. (IPL's IRP page 41)*

(Director's Report pg. 10)

AES Indiana Response:

The Director is correct in noting that the weighted economic percentage appears high at 0.93% given the GDP and Employment growth indicated. The chart presented on IPL IRP Volume 1 – pg. 43 that notes the percentage of 0.93% is for rate code SL (which is categorized as a large commercial and industrial class of customers). This rate code is forecasted using nonmanufacturing GDP and employment (with growth rates of 1.8% and 0.73%, respectively) rather than manufacturing GDP and employment. AES Indiana should have included the chart for rate code HL1 that appropriately ties to manufacturing GDP and employment and presents a growth rate of -0.16%.

AES Indiana agrees with the Director that manufacturing employment can be a poor indicator of industrial energy use due to process automation changes. That is why AES Indiana also includes GDP as part of the weighted economic variable in the load forecast models.

Director Comment #9:

> *IPL exogenously adjusts its Industrial forecast for anticipated customer loads larger than 5 MW. (see page 43 of IRP). These customers are tracked by IPL's Strategic Accounts Group because it is assumed that changes for customers this large are not being picked up in Moody's economic forecast given it is difficult to predict this type of change. The discussion is confused but IPL appears to exogenously adjust the load forecast for near term expected increases measured in megawatts for individual customers. The question arises whether these adjustments should be changed over a five to 10-year period. The large megawatt load changes for individual large customers may not be reflected in the near-term forecast so an exogenous adjustment might be reasonable, but it seems likely these types of changes are reflected in the broader historical load history and thus accounted for in the long-term forecast beyond an assumed early period in the forecast horizon. If these large customer changes are captured in the historical load data, perhaps it makes sense to slowly taper off the adjustment. Because of the higher certainty in the*

near-term, it seems likely there may be a higher probability that these exogenous adjustments in large customer load growth may not persist in the longer-term planning horizon which is another concern for a broader forecast band.

(Director's Report pg. 10-11 (footnote omitted))

AES Indiana Response:

There may be a misunderstanding as to how the anticipated large customer load is being captured in the forecast. Here's an example of the process to help with understanding –

> Each quarter the load forecasting team meets with the Strategic Accounts team to assess new customer loads at AES Indiana. A hypothetical example of new customer load may be that an existing customer is adding a new 10 MW facility on January 1, 2023. Using customer input on the type of facility, the AES Indiana team estimates a load factor for this addition (for example – 80%) to calculate annual MWh consumption (in this case 10 * 0.8 * 8760 = 70,080 MWh annually). The forecasting team then divides this estimate by 12 months and adds it to the load forecast starting January 1, 2023. This load remains on the system unless the customer indicates that it is only temporary or shutting down.

AES Indiana agrees that a portion of customer load growth is reflected in the broader load history and thus is accounted for in the long-term forecast. However, this growth is primarily in smaller customers that are less than ~5MW. Any expected customer loads greater than ~5MW are generally larger than the typical customer load increases reflected in the broader load history (or those assumed to be captured in the economic data). As such, the models will not fully capture the impact of the load from these customer additions in the projections. Thus, Itron recommends that the forecast be adjusted upward for these loads at the point in time when the specific customer load is scheduled to come onto AES Indiana's system. Unless this customer's load is temporary or forecasted to shutdown at some point in the future, the load should reoccur each month after going into service.

d. Street Lighting

Director Comment #10:

> *There is no mention of the Street Lighting category and how it is forecast in the 2019 IRP. Given the energy efficiency improvements in all forms of lighting, this is surprising, especially since the 2016 IRP contained a forecast of street lighting.*

(Director's Report pg. 11)

AES Indiana Response:

Street lighting was included in the 2019 IRP load forecast. It is forecasted using a simple regression model that estimates street lighting MWh volume using monthly binary variables to capture correlation with available sunlight duration across seasons.

As the Director notes, energy efficiency improvements are occurring in all forms of lighting, including AES Indiana's street lighting. As of December 2020, 92% of Company-owned streetlights have been converted which has resulted in a ~40% reduction in energy usage. The

Company is working with the other municipalities within its service territory to convert additional Company-owned street lighting to LED by late 2021 or early 2022. AES Indiana did not include the impacts of the street lighting conversion in the 2019 IRP forecast due to the immateriality of the impact (~20,000 MWh annually). AES Indiana will include a discussion of street lighting usage and how it is captured in the load forecast or other analyses in future IRPs.

e. Forecast Bands

Director Comment #11:

> *After mentioning high and low economic forecast from Moody's, IPL states "The high and low forecasting approach will be described later in this section." (IPL IRP age 33) The discussion of this risk factor is minimal. IPL states the high and low load forecasts were developed from the growth rates from Moody's "Lower Trend" and "Exceptionally Strong Growth" scenarios with one standard deviation from the base forecast mean (as calculated using the Itron models) as the target in 2039. The Base, High, and Low Load Forecasts assume normal weather and do not include the effects of future DSM. (IPL IRP page 35)*

(Director's Report pg. 11)

AES Indiana Response:

In addition to the deterministic base and high and low forecasting approach, load was modeled stochastically in the capacity expansion analyses that were performed to determine the 15 candidate portfolios. This analysis simulated 100 different load futures and used the expected value from these simulations in the candidate portfolios. By considering 100 different possible load simulations/outcomes, this method captures some of the uncertainty associated with load.

AES Indiana will include additional detail regarding how risk and uncertainty is captured either through stochastics or through different load forecasting scenarios in future IRPs.

f. Electric Vehicles, Solar, Distributed Energy Resources Effects on the Load Forecast

Director Comment #12:

> *The Director appreciates the excellent discussion of the EV forecast methodology and the potential implications of increased penetration of EVs. IPL provided a similarly good discussion of their distributed solar forecast. . . .*
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> *The Director reiterates the commendation for IPL being at the leading edge among Indiana utilities in utilizing AMI and other load research data to develop [and] to better understand its customers' needs. The increased customer information will enable development of customer load shapes that will enhance the credibility of IPL's load forecasting and analysis of energy efficiency, demand response, other DERs, rate design/cost of service, and EVs. (IPL IRP page 28 and page 92) IPL states that more granular data will be used in developing its next IRP load forecast. IPL's utilization of North American Industry*

Classification System ("NAICS") codes and stratification by usage characteristics for manufacturing and non-manufacturing customers is a significant advancement. (IPL IRP page 28) IPL's collaboration with the MISO on sharing information on DERs is exemplary.

(Director's Report pp. 11, 12)

AES Indiana Response:

As noted by the Director, AES Indiana plans to use more granular data in its load forecasting efforts in the next IRP. Specifically, AES Indiana plans to further utilize AMI data and work with key partners – like NREL and LBNL – to obtain DSM end use and customer load shapes to enhance DSM planning, DER planning and load forecasting efforts. This data should improve the estimation of the time and locational aspects of DSM and DERs to AES Indiana's load.

II. Energy Efficiency

Director Comment #13:

IPL's discussion of EE bundling on pages 94 – 100 and the EE supply curve to develop bundles was well written and clear. IPL fulfilled its commitment to update its Market Potential Study (MPS). The MPS seemed to be generally well-regarded by stakeholders. . . .

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Currently, the Director's primary concern is each bundle spans the entire planning period 2021 – 2039 and each bundle also combines residential and C&I measures. Combining unrelated measures across residential and C&I measures, except that they have similar levelized costs, makes a questionable load shape obscuring the time aspects of different measures. This is an important consideration since the PowerSimm model is designed to capture how weather effects load shapes and the performance of intermittent resources at an hourly level. In a world increasingly characterized by low marginal costs across most hours, it is important that the hourly impact of DSM measures be given particular attention.

(Director's Report pg. 13)

AES Indiana Response:

The approach to DSM bundling reduced the complexity of the 2019 IRP DSM selection process using the PVRR approach. That said, AES Indiana agrees that the DSM bundling approach for the 2019 IRP (using bundles that span the entire planning period and combining residential and C&I sectors) can be improved.

AES Indiana notes that PowerSimm did not create the load shapes for the DSM bundles included in IPL's 2019 IRP. Rather these load shapes were predefined using data supplied by GDS Associates, Inc. that was specific to the type of measure and the sector (residential or C&I) where it is installed.

AES Indiana is assessing capacity expansion models for use in the next IRP that adequately optimize DSM across a higher volume of bundles. This should allow for both residential and C&I bundles using shorter time segments.

III. Resource Optimization and Risk Analysis

Director Comment #14:

> *As a preface to the Director's review of IPL's discussion of resource optimization and risk analysis, the Director commends IPL management's commitment to continual improvements. . . .*
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> *IPL claimed stochastic capacity expansion was used but it seems all the 15 candidate portfolios came from deterministic capacity expansion runs. If this is not a correct characterization, please explain how those iterations reached only one candidate portfolio for each retirement date and DSM level combination. It is not clear to the Director how the results of the stochastic analysis were used to select the sole candidate portfolio for each retirement date and DSM level combination.*

(Director's Report pg. 18)

AES Indiana Response:

AES Indiana views its analysis as stochastic, not deterministic. As noted by the Director, "the 15 candidate portfolios were created from capacity expansion runs based on different retirement dates on the existing coal units and different levels of DSM decrements. Then each portfolio was evaluated using stochastic analysis against five scenarios defined by high-impact drivers such as natural gas prices, potential carbon legislation and load forecasts." *(Director's Report pg. 17).* All replacement resources selected to fill capacity shortfall for each of the 15 candidate portfolios were chosen within the stochastic capacity expansion model. The capacity expansion analysis for each of the 15 initial portfolios predetermined only the Petersburg retirement dates and DSM levels.

This approach is reasonable. PowerSimm's stochastic capacity expansion model used 100 iterations for each combination of Petersburg retirements and levels of DSM. Each iteration consists of a unique simulation of weather, load, renewables, market prices, and dispatch for AES Indiana's current resources alongside candidate resources. Portfolio costs are determined as an average over all iterations. The objective function for the capacity expansion module is to minimize the portfolio's costs over all iterations while respecting capacity and energy constraints. The output from each candidate portfolio represents the optimal mix of resources based on the range of uncertainty covered in the stochastic iterations with the Petersburg retirement dates and DSM being predetermined. This is how the stochastic capacity expansion model can yield a single optimized candidate portfolio.

Director Comment #15:

> *Second, it seems all 15 candidate portfolios were based on the same set of assumptions and no candidate portfolio was derived from assumptions in different scenarios. The scenario analysis, conducted by IPL, seems to be a test for how those 15 candidate portfolios perform under different scenario assumptions. If this is the case, IPL lacks an appropriate scenario analysis.*

(Director's Report pg. 18)

AES Indiana Response:

It is not the case that "all 15 candidate portfolios were based on the same set of assumptions and no candidate portfolio was derived from assumptions in different scenarios." As stated in AES Indiana's response to Director Comment #14, the stochastic capacity expansion model optimally selected replacement resources to meet the reserve margin requirement in each of the 15 portfolios based on 100 unique iterations of the future. These 100 iterations capture a broad range of uncertainty and in turn act as a substitute for having to use different sets of deterministic assumptions. The resulting optimized portfolio is the most robust candidate portfolio over a wide range of uncertainty. This approach also results in the need to run fewer scenarios since the optimized portfolio performed well across stochastic uncertainty.

In the scenario analysis that AES Indiana conducted, the 15 candidate portfolios were further stressed stochastically using different sets of scenario assumptions and compared to the base case.

AES Indiana will consider including additional capacity expansion scenarios in future IRPs.

Director Comment #16:

> *Third, it seems retirements of coal units and DSM levels were all hard-wired in candidate portfolios. If so, the model was unable to be fully utilize the model's capabilities to perform optimization of a broad array of resources to capture a full range of uncertainties and risk.*
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> *However, concern about hardwiring was mitigated because IPL provided a detailed explanation about why it chose to select candidate retirement dates rather than letting the model make retirement decisions for existing coal units. Those reasons make sense from a computational and modeling standpoint. There are other reasons for hardwiring the resource decisions that were listed by IPL such as power plant operations and market conditions. Future IRPs would benefit from industry experts' judgments to evaluate whether there is a rationale for hardwiring certain resource decisions.*
>
> *If our characterization is correct that only the Reference Case was optimized with five different levels of retirements and three different levels of DSM, the resource planning options may be unduly constrained. Even though the Director understands that capacity optimization using stochastic analysis probably was used as a substitute for performing traditional scenario analysis, the Director believes something is lost at an intuitive level when specific scenarios are not optimized. Perhaps the Director is failing to fully understand but it would be helpful to see a comparison of the stochastic capacity*

optimization conducted by IPL with the more traditional scenario analysis combined with stochastics.

(Director's Report pg. 18)

AES Indiana Response:

As stated in response to Director's Comments #14 and #15, the capacity expansion model is able to optimally select replacement resources under a wide range of uncertainty. This approach is reasonable and not unduly constrained given the other reasons for the retirement dates discussed in the IRP and recognized by the Director.

AES Indiana is considering methods and models to improve the process for the next IRP.

IV. The Stakeholder Process

Director Comment #17:

IPL received considerable accolades and appreciation for its efforts to communicate the very complex information to improve stakeholder understanding. IPL is also to be commended for its efforts to broaden the diversity of the stakeholder community. Top level management of IPL were involved throughout the process. As the resource decisions become more imminent, IPL expects the number and diversity of stakeholders to increase.

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With expected increases in the number and diversity of the stakeholder community, IPL should expect there will be a need for stakeholder education to better participate in the IRP processes of the future. IPL will need to provide discussions of important changes that IPL is undertaking or anticipates undertaking. Stakeholders will need to understand the value proposition of AMI and other customer information, the development of load shapes that reflect the time and locational value of full avoided costs. The data obtained will help stakeholders better understand the potential operational attributes of EE, DRs, DERs and HES constraints on the integration of DERs. The ramifications of changes in the resource mix, the rationale for integrating IRPs with DSP, and how these affect MISO's operations and planning should be discussed in future stakeholder processes.

(Director's Report pp. 19-20)

AES Indiana Response:

In the 2019 IRP, AES Indiana received generally positive responses from stakeholders regarding the overall process. The Company attributes this to being very transparent and providing opportunities for key stakeholders to collaborate during technical meetings (open to stakeholders with NDAs). AES Indiana thanks the stakeholders for their review and participation in IPL's 2019 IRP and anticipates continued collaboration.

AES Indiana plans to continue this approach in the next IRP. Also, the Company plans to increase the utilization of AMI data and to further integrate DSP into the IRP modeling. As such, it will be a priority to educate stakeholders and customers on the attributes and value of these topics.

Stakeholders and customers also will need to understand how these important planning topics, along with the AES Indiana's changing resource mix, affect MISO's operations and planning.

V. Future Enhancements to IPL's Load Forecasts & Director's Summary

Director Comment #18 & #19:

> *IPL provided very well-written narratives about its plans for future improvements to the IRP process. In the Director's opinion, despite some relatively minor concerns, IPL's IRP is exemplary. IPL's strong commitment to develop improved databases, acquire state-of-the-art planning tools, continue to advance analytical methods, continual development of IPL's staff expertise, and the appropriate use of outside experts establishes an excellent foundation for addressing resource requirements.*
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> *Because different types of DERs will be an increasing component of IPL's resource mix, it will be necessary for IPL to explain the ramifications of DERs with and without HES. IPL understands the integration of DERs, HES, and EVs adds significant complexities to DSP. Some DERs and HE may participate in the wholesale markets. Therefore, there is growing urgency for IPL and MISO to continue their collaboration on sharing planning and operational for mutual benefit.*
>
> ***
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> *To be clear, IPL's demonstrated willingness to use new state-of-the-art software is commendable for this and future IRPs. So, the Director trusts IPL will consider the use of advanced models that integrate DSP with IRPs. The integration of DSP and IRP software should, as the models develop, provide mutual planning benefits to MISO's planning and operations. The Director recognizes there is substantial amounts of analytical work that needs to be done to better understand the potential benefits and costs of energy efficiency, demand response, other forms of DERs and the implications of EVs. IPL has a good appreciation that, in addition to the analytical work, IPL will need to develop customer-specific data that is required to gain maximum benefits from the advances in modeling to accurately characterize the very complex distribution system and the increasing coordination with the MISO,13 Because IPL is on the cutting-edge, IPL may want to engage experts from the National Laboratories and others. This work provides an opportunity to educate IPL's stakeholders.*

(Director's Report pp. 20-21)

AES Indiana Response:

AES Indiana aims to improve integration of the Distribution System Planning (DSP) analysis into the next round of IRP modeling. This includes locational forecasting of Electric Vehicles (EVs) and Distributed Energy Resource (DER) adoption on AES Indiana L substations and circuits, developing the market potential for DSM and DR resources on specific substations or circuits, and improving DSM avoided costs by calculating cost savings that DSM may provide for strained circuits. Additionally, AES Indiana recognizes the importance of its relationship with MISO and will continue coordination on DSP forecasts and efforts.

VI. Summary

AES Indiana appreciates the Director's "commendation for the high quality of IPL's IRP" (Director's Report p. 21) and feedback. AES Indiana looks forward to implementing many of the suggestions that have been provided. The Resource Planning team is confident the Company's IRPs will continue to improve as we adjust our planning approaches to address changing resource mixes and EV and DER adoption.

Overall, AES Indiana endeavors to develop IRPs that consider the Five Pillars of Utility Electric Service and State Energy Policy identified by the 21st Century Task Force in its report. As utility portfolios shift away from baseload coal-fired generation to emerging intermittent resources, it is of ever-increasing importance that the Company ensure the power that it delivers to its customers is reliable, resilient, stable, affordable, and environmentally sustainable.