RESPONSES OF HOOSIER ENERGY TO THE INDIANA UTILITY REGULATORY COMMISSION'S DRAFT DIRECTOR'S REPORT FOR HOOSIER ENERGY'S 2020 INTEGRATED RESOURCE PLAN

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A. Load Forecast

Future developments in Hoosier Energy Forecasting:

Hoosier Energy is working on new forecasting methodologies that will be incorporated into both the PRS and IRP going forward. These are recent developments still in the early stages of implementation. Specifically, the Forecasting Group is implementing new forecasting modeling software from Itron. Itron is a software company and electric utility forecasting leader, with national and international utility experience. In conjunction with implementation of their software, Hoosier Energy staff is working with an Itron Project Manager to develop the residential econometric models and commercial class models within the software. Itron also provides better capability to consider new technologies, such as EVs and DERs. With Itron's cutting edge resources and tools, as well as their world-class experience, we aim to improve our modeling efforts and properly address rapidly growing EVs and DERs. We hope this effort will assuage the Director's areas of concern going forward.

Responses to Directors Comments on the Hoosier Energy IRP Load Forecasting Section

Page 8, Paragraph one:

The Director is requesting the examination of wider range of scenarios than provided. The Power Requirements Study (PRS), which was utilized for the IRP, is completed in accordance with RUS requirements. The PRS represents a broad range of economic and weather scenarios based on past data and forecasted economic data from reputable sources. The "realistic" scenarios, which are based in fact and not conjecture, are the published and documented scenarios as required by RUS. Additionally, it is difficult for any single economic factor to have a major impact on the forecast, so even an "unrealistic" or "extreme" value will not result in a drastic change of the Hoosier Energy forecast. Hoosier Energy does consider many scenarios for each member cooperative, including those that may have a severe or extreme impact on a specific cooperative. However, taken into the entire HE system as a whole, is unlikely to have a significant impact on the Hoosier Energy forecast. Keep in mind that Hoosier Energy develops a 20-year forecast for each of the 18 member cooperatives, all with the same five scenarios considered in the overall Hoosier Energy forecast.

For weather, Hoosier Energy does consider a "extreme single temperature weather condition" as a part of the demand scenarios (see HE IRP page 25), which can project for demand strain. Still, Hoosier Energy reminds the Director that the forecast is an annual forecast for each of the 20 yrs. Therefore, these "extreme single weather conditions" and other severe weather days, weeks, months or even seasons can be lost in the broader scope of the year. For instance, what may classify as a "severe" winter, may be offset by a "mild" summer, resulting in an "average" weather year.

Page 8, DERs and EVs

DERs: HE is very aware of the trend of increasing rooftop solar and has seen residential solar increase substantially in our service territory over the past couple of years. HE is now working with Itron to include an evaluation of residential solar for the next PRS forecast. However, even if the Itron data had been available for this PRS forecast, the impact would have been statistically insignificant – total 2017 installed residential solar capacity was only 2.89 MW.

EVs: EVs are certainly an important consideration in the future and Hoosier Energy is working with Itron to evaluate the potential impacts. However, currently, EVs have a very low penetration in HE service territory and therefore no projectable growth rate. To project EV adoption rate in a formal 20 year PRS based upon very limited data would be tantamount to guesswork. HE expects that EVs will continue to grow and could have a major impact on future forecasting efforts, operations and planning. Given that the forecast is updated every two years, Hoosier Energy will continue to evaluate EVs for inclusion in the next PRS. Once EV data is available, either from members or from other resources such as Itron, to make reasonable assumptions and a quantifiable significance is shown in the forecast model EVs will be included.

Page 9, Commercial and Industrial Forecasts:

HE is working with Itron to improve forecasting methods for small commercial consumers and individually evaluating for each member multiple economic drivers for their impact on the sector. Large commercial (Industrial) customers will continue to be based on member and Key Accounts information based upon direct conversations with these customers and their plans going forward. This includes any plans for DERs and EVs for these large customers.

Page 9, Alternative Forecast Scenarios:

The PRS forecast and the five alternate scenarios create a band of expected range of energy and demand needs. For the weather scenarios, each year is independent of the previous year. The goal of the scenario is to provide a forecast of potential expectations under a mild or severe weather scenario. The mild and severe weather scenarios are an excursion on the "Base" scenario of the year and have no reliance on the previous year's weather. For example, you could have a scenario where one year you have "severe" weather followed by a "mild" weather year. In both instances you would anticipate seeing the corresponding deviation from the base forecast.

Page 10, DSM

The Director notes a concern for the "lack of detail as to how DSM impacts are being accounted for in the current IRP". The approach, which is included in this Directors Report document, and found on page 30 of the IRP:

> *"In order to attain an accurate DSM program performance forecast for the future, Hoosier Energy uses a two-part approach. The first part requires estimating a realistic forecast on a short-term base tied to the most recent study completed by an outside*

consulting firm. This study incorporates data updated with actual DSM performance through the most recently completed year and the addition of new programs. The second part incorporates Hoosier Marketing Department staff meeting with each of the member systems to develop estimated forecasts, making adjustments as needed, and discussion of long-term forecast impacts."

As far as future improvements in the DSM area, Hoosier Energy is currently in the project development stage to deploy a new system that will incorporate both DERs and DSM. The new system is expected to improve data collection and then evaluate the best methods to incorporate into the forecast.

Page 11, Questions for Clarification:

Comment: Hoosier Energy's calculation of demand is normalized using a "typical" load factor. However, it is not clear how a typical load factor is determined? Is it some type of average (mean/median) or analyst judgment? *(Hoosier Energy IRP page 28)*

Response: The annual load factor was a calculated average for each system based on data from 1975-2017.

Comment: Section 2.2 Methodology – The electricity price equation seems odd. The drivers of price are use per customer, distribution system costs, wholesale costs, and "other variables that may affect price." There is no further explanation of what these variables are. Also note that the variables are in log form except for the "other variables" variable. Further note that other equations have similar unexplained catchall variables.

Response: Each member has its own PRS forecast and cost considerations vary from member to member. Each variable is not listed to avoid creating a vast list of variables that may have minor impacts for some members, but not all. From our PRS:

"The price equation is typically composed of the general variables of real average wholesale powercosts, real actual distribution system costs, the average usage and a system identifier shift variable. On some systems lagged pricing variables are used as well as price and cost shift variables. These shift variables act to model intangible effects not picked up by the other variables. The combination of all these variables working together establishes the relationship that as the wholesale power cost and actual distribution system costs increases, the usage of electricity will decrease and vice versa."

Comment: The C&I forecasts were developed by surveying individual members (survey forecasts tend to be inaccurate in the long term because those surveyed have no basis for long-term changes). They indicate that these were reviewed and checked for being realistic, but there is no indication of what standard was used for realism and what steps were taken if any were found to be unrealistic.

Response: Commercial class growth forecast is based upon three major components:

1) recent commercial consumer growth (last five years)

2) potential residential and industrial growth and

3) infrastructure.

The member cooperative's familiarity with the service territory is a mandatory component of the infrastructure component for the commercial class. Member representatives are a key resource for existing and future developments of the Commercial class in the short term as mentioned. As far as checking for being realistic, past growth rates for the class are taken into consideration. For long-term planning of this class, beyond the next 5-7 years, current and short-term trends are removed and historical class growth is utilized.

For the industrial class, each large retail consumer is forecast individually, and projections are based on the best information available from the consumer itself through the member and Hoosier Energy's Key Accounts group. Adjustments are made for any changes that the consumer is aware of and can confirm (e.g. additional facilities, removal of manufacturing lines, closure, etc.).

Comment: Section 2.2 Methodology - In the residential customers model one of the drivers listed is "Other variables that may affect customers". What are some examples of these variables, how significant were these other variables, and why didn't Hoosier Energy specify them?

Response: Examples include alternative fuel prices and agricultural production. The actual variables vary by member so the entire list was not included in this document. The significance level of each variable was determined by the residential econometric regression model based on their T-statistic value.

Comment: Section 2.2.6 Weather Normalization – Hoosier Energy refers to the historical period for determining normal weather (including ranges) and extreme weather but does not say what that period is. Is the period 20 years? 30 years? Something else?

Response: The normal weather period used in the forecast was based on the 30-year period from 1981 to 2010.

B. Energy Efficiency

Comment: It does not appear that energy efficiency and demand response are selectable resources in the resource optimization model. (*Hoosier Energy IRP page 59-60)* If DSM was able to be selected and treated on a comparable basis with other resources, it is unclear how DSM resources were considered, especially within the AURORA portfolio optimization model. It appears DSM resources were just included in the preferred plan without optimizing.

Response: The DSM/EE programs included in the load forecasts were selected by the Energy Management Solutions department with significant input from member system managers and personnel tasked with DSM/EE program implementation. Hoosier Energy did not model energy efficiency and demand side

management as selectable resources in the model, but included those programs that were selected as an offset to the load forecast. The programs are provided in the 2019 Hoosier Energy Demand Side Management Annual Report that is included as Appendix F of the IRP.

The Energy Management Department has begun discussions with GDS Associates to update the DSM/EE Market Potential Study. This is the first step in updating the DSM and Energy Efficiency cost and modeling assumptions that will be included in Hoosier Energy's 2023 IRP and potentially developing new DSM/EE programs. Member input, and their opinions on customer acceptance, will be a critical consideration.

Comment: The IRP review raised the following questions:

When Hoosier Energy says that the DSM short-term forecast uses a recent study completed by a consulting firm, does it refer to the "2016 Update of Avoided Costs and DSM Modeling Assumptions" document?

Response: The statement refers to the 2016 Energy Efficiency & Demand Response Potential Report that was performed by GDS Associates.

Comment: Has Hoosier Energy updated the DSM costs and modeling assumptions in advance of the IRP?

Response: Hoosier Energy included updated DSM costs and modeling assumptions in the 2020 PRS. As stated above, these updated assumptions were not optimized in the model, but will be updated for inclusion in the 2023 IRP.

Comment: What is meant by "applied where necessary" *(HE's IRP page 30*) Further clarification about this step and the overall methodology would help explain Hoosier Energy's DSM modeling process.

Response: This information is provided in the response above to the Director's comments on Page 10 of the IRP.

C. Resource Optimization and Risk Analysis

Included within the 2020 IRP and consistent with that of the Stakeholder meetings required of Indiana electric IOUs, Hoosier Energy's Board of Directors participated in a year-long integrated resource planning process. The stakeholder process was designed to promote discussion, elicit feedback and provide ownership stake in the IRP and in selection of the Preferred Plan. The process began at the February 2019 Board meeting, where Hoosier Energy Staff and CRA began the process by presenting an overview of Resource Planning concepts, along with key milestones and deliverables for the process. At every subsequent Board meeting between March 2019 and January 2020, CRA, Hoosier Energy staff and the Board collaboratively worked through the process of developing the criteria scorecard, creating assumptions, performing the analysis and discussing the model output. During each meeting, the Board was encouraged to ask detailed questions and to provide feedback.

The initial step was to develop a list of significant factors to consider in designing Hoosier Energy's future generation resource portfolio. The Board was divided into small teams and requested to vote on which of the factors they considered most important in constructing a portfolio. When the Survey results were tabulated, it became apparent that the most important factors to the Board were:

- Wholesale Rates
- Rate Stability and Predictability
- Sustainability of the Portfolio
- Resource Diversity
- Employee Impacts.

Fulfillment of these portfolio objectives became the primary conditions in developing Hoosier Energy's Preferred Plan.

Comment: There are serious problems with Hoosier Energy's scenarios analysis that may have unduly limited the range of risks that Hoosier Energy might confront. As a result, Hoosier Energy's Board of Directors and Member Boards may have been deprived of useful information to help the Board(s) evaluate potential risks. These include:

• Hoosier Energy's narrative detailing the comparison between the base case to the other scenarios was very confusing.

• Hoosier Energy limited the range of scenarios to include only events that were deemed most likely to occur. Hoosier Energy's decision to restrict the range of risks to those most likely to occur limited potentially valuable information. Hoosier Energy's decision to truncate risk analysis, without articulating what types of events constitute most likely, is also concerning.

Response: Hoosier Energy appreciates the difficulty in understanding and interpreting the narrative describing its modeling process and results. Hoosier Energy will strive to enhance its narrative description of the modeling efforts in its 2023 IRP.

Comment: The lack of clarity made it difficult to assess whether there was useful information and whether the range of risk was significant. Hoosier Energy's decision to constrain the scenario analysis, to those that were reasonably likely, may have unduly limited risk.

Response: Hoosier Energy selected a group of scenarios that covered a wide range of potential events. These risks include potential limitations on fuel cost and usage, a range of economic uncertainty, consideration of potential environmental factors, and a variety of customer behaviors.

Comment: All of the 12 candidate portfolios in the final modeling process included many predetermined factors and constraints including the retirement dates of Merom and Holland facilities.

Response: The portfolio optimization modeling required that the retirement dates of Merom and Holland be predetermined in order set targets that would allow Hoosier Energy to minimize modeling time and cost. The retirement dates were determined through a lengthy discussion involving Charles River Associates and Hoosier Energy staff and considered such factors as labor availability, fuel availability and cost, environmental regulations and resource maintenance requirements.

Comment: Hoosier Energy should have developed optimized portfolios from various scenarios as candidate portfolios.

Response: CRA did develop optimized portfolios from the scenarios as candidate portfolios. These portfolios were compared against each other to limit the number of portfolios that were ultimately considered in the final round of portfolio optimization.

Comment: Hoosier Energy's final group of portfolios were developed based on a combination of least cost analysis and consideration of other scorecard objectives. It is not clear if the Board(s) initially understood the scenarios and resulting portfolios were significantly constrained and influenced the optimization processes.

Response: The scenarios and resulting portfolios represent an appropriate range of potential outcomes.

Comment: In the final state of portfolio development, the IRP analysis is not clear that intervening portfolio optimization was done. Hoosier Energy then tested the final portfolios against various scenarios and considered this step as part of the scenario analysis. In fact, this appears to be more like a sensitivity analysis.

Response: CRA conducted intervening portfolio optimization to limit the number of portfolios that were ultimately considered in its final round of modeling.

Comment: A major factor in the development of the Hoosier Energy's Preferred Plan was the effect of potential CO2 legislation and/or regulatory changes. For example, additional environmental restrictions have the potential to further affect cost assumption tradeoffs between the type, quality and availability of fuel burned and the allowable emissions level at existing and future generating stations.

Question for Hoosier Energy from the Director: ***Did Hoosier Energy build this carbon price forecast into any of the scenarios? If so, did Hoosier Energy adjust costs for resource capacity (renewables - $/kw) in their model?***

Response: Table 16, Summary of Scenario Modeling Assumptions, located on page 80 of the IRP, provides a summary of the quantitative assumptions that were used in modeling each scenario. Carbon price assumptions were included in two of the scenarios, a Base CO2 price for the Base Case, and a high CO2 price for the U.S. Economy Decarbonizes scenario. The carbon price assumption in both scenarios is assumed to begin in 2028.

Table 16 also provides a summary of the costs assumptions used in each scenario. These cost curves correspond to the base, high and low price curves provided for each resource type on pages 84 and 85 of the IRP.

Comment: It is not clear what Hoosier Energy assumed for the Unforced Capacity (UCAP) contribution of future resources, especially wind and solar. Given that Hoosier Energy is anticipating a significant change in the resource mix and the speculative nature of the replacement resources, it seems inappropriate to redact this information in Appendix C without a clear justification.

Response: The assumed UCAP contribution is initially based on the current MISO accreditation for resources using an annual construct. These assumptions include a 50% capacity credit for solar resources and an approximate 15% capacity credit for wind. The UCAP contribution of the current thermal resources is based upon a three-year rolling average of the resource's XEFORd rate.

The Unforced Capacity assumptions for future resources was based upon CRA's projections of MISO capacity accreditation in future years under a two-season construct. The solar capacity assumption was an accreditation of 50% for the Summer season and 5% for the Winter season beginning in Planning Year 2023-24. The Summer accreditation would decrease to 30% by the early 2030's. The seasonal wind accreditation was 15% in the Summer season and 13% during the Winter season. Seasonal accreditation for thermal resources was assumed to be the same as in a single-season construct.

D. Future Enhancements to Hoosier Energy's IRP Processes

Comment: Hoosier Energy should develop a more expansive list of potential risks. Understanding the possible ramifications of these risks and how they might be integrated into the IRPs will be beneficial to Hoosier Energy and its members.

Response: Hoosier Energy provides a discussion of future enhancements to its Load Forecasting in comments above. Hoosier Energy appreciates the Director's comments and will strive to improve its modeling and narrative description of those efforts in its 2023 IRP.