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Dr. Bradley Borum
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Indian Utility Regulatory Commission
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Dr. Borum:


Regards,

[Signature]

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Question 2.1.1.1

- Question -- The residential energy sales' three equations all include "other" explanatory variables that are not explained or discussed. Would Hoosier Energy please provide more details?
- Response -- Equation variables explicitly stated in the IRP are those used consistently across all member distribution system forecasts. "Other" explanatory variables may or may not be used consistently, depending upon the member. "Other" explanatory variables may represent agricultural production, alternative fuel pricing, miles of distribution line, consumer density levels, conservation affects, and a variety of customized variables that may be used to represent specific trends and/or specific unusual events tied to the member system.

Question 2.1.1.2

- Question -- The C&I forecasts were developed by surveying individual Members. Such surveys tend to be inaccurate in the long-term because the people surveyed have no basis for long-term changes. The Director recognizes the difficulty of projecting C&I load over long periods of time. Has Hoosier Energy considered developing more sophisticated modeling for C&I customers to enhance the credibility of the forecasts? Would Hoosier Energy agree the credibility of C&I forecasts necessitates that a range of load forecasts be developed to adequately represent the uncertainty inherent in the C&I sector?
- Response –
  - Please note that no surveying was completed involving the Commercial & Industrial (C&I) classification forecasting. The only surveying completed was a residential end-use survey.
  - The commercial sector forecast is based upon a trend/pattern analysis and judgmental methodology broken down into an existing and new customer base, examining both customer count and energy usage. In the commercial sector it is believed a more sophisticated model would not enhance quality of the forecast significantly, because the group being forecasted is composed of such a large diversification of types of load. These can vary from a family hair stylist shop located in a garage, to a fast food restaurant, to a gas station, to a machine shop, to a public building, etc. We feel by breaking this sector’s forecast down into an existing customer and new customer mix, we are able to examine details of historical patterns to see what has happened to this group as a whole. In discussing and obtaining knowledge from the member systems on what they have seen happening in this group, as well as what would be expected to happen in this group, we are then able develop very realistic expectation in driving both existing and new consumer forecasts. Completing this process every two years allows us to understand if our forecasts are close to representing what is happening and make adjustments as needed.
  - Hoosier Energy is confident in the industrial sector because we are linking our forecast to real knowledge and plans of each individual industrial customer. We gather knowledge from the end-consumer, the member systems staff, the Hoosier Energy Key Account staff, the Hoosier Energy Economic development group, and historical load experiences. This detailed customer specific methodology provides us the capability to simulate short-term and long-term shifts in loading, whether is it load additions and/or load reductions/closures. For potential new loads, we also stress the need for “dirt to be turning” and/or a contract be established before including such a load in the forecast. This helps prevent over
and/or under forecasting. Again, completing a review of each individual customer every two years permits quality control adjustments and monitoring of forecast assumptions as needed.

- We do create a slight variation across scenarios for the commercial and industrial sector. These adjustments are customized to each member systems based upon the level of commercial and industrial loads they demonstrate on their systems.

**Question 2.1.3.1**

- Question -- Has Hoosier Energy considered the potential ramifications of what would happen to Hoosier Energy resource planning if the largest customer(s) left – leaving or perhaps installing their own generation resources? What would happen if Hoosier Energy added a significant new load(s)? While electric vehicles may be more common in urban areas, would Hoosier Energy agree that, over the 20-year planning horizon, Hoosier Energy may see significant changes due to electric vehicles or other innovation?

- Response –
  - Hoosier Energy does introduce into the scenario fluctuations the addition and loss of a typical sized industrial load on each of the 18 systems, which in many ways could simulate the addition or loss of one large load and/or the addition or loss of several new unplanned loads. Again this is adjusted ever two years, so we are able to adjust as we see changes incurring across the 18 systems.
  - Hoosier Energy has begun monitoring residential electric vehicle (EV) activities on its systems. In fact in our upcoming end-use survey we are incorporating some additional questions related to EV activity. Currently based upon surveying we do not have a great deal of EV activity. We are researching and looking at methodologies to incorporate impact of such technologies into our existing forecast methodologies.

**Question 2.1.3.2**

- Question -- The discussion on weather normalization in section 2.2.6 of the Hoosier Energy IRP refers to the historical period for determining normal weather (including the upper and lower ranges), but Hoosier Energy does not identify what that period is. How many years of weather history has Hoosier Energy used in the load forecast?

- Response – The period for determining normal weather are the years from 1975 to 2015.

**Question 2.1.4.1**

- Question -- Is there a reason to think 2016 weather was normal (e.g., representative of the next 20 years)? If not, isn’t Hoosier Energy essentially calibrating its forecast to an atypical year? Also, it should be noted that the only difference between the Base-Upper Normal forecast and the Base-Normal forecast is a constant shift in the weather variable throughout the forecast period. Wouldn’t this mean the Base-Normal forecast is shifted up to develop the Base-Upper Normal forecast?

- Response – Hoosier Energy decided to use the Base-Upper Normal forecast as its base reference forecast in the IRP not as a response to weather, but because it was thought to be more representative of the expected system growth over the next 20 years.

**Question 2.1.5.1**

- Question -- The Director appreciates that the timing of the PRS and the IRP was awkward, but has Hoosier Energy considered the potential ramifications for a stale load forecast on the results of the IRP analysis?
• **Question 2.1.6.1**
  - Question -- Has Hoosier Energy considered that a long-term trend may be masking more recent trends? That is, if coincident peak demand grows more than energy use, this may provide an expanded opportunity for demand response or distributed energy resources ("DER") that is not captured in the longer history. By way of examples: ever-increasing efficiencies of appliances/end-use technologies, changes in customer acceptance of demand response or DER, electric vehicles, or other technological changes, may result in changes in both demand and energy use that will further alter the load factor and the relationship between coincident peak and non-coincident peak demands.
  - Response -- Forecasted load factors and coincident peak values are tied primarily to the most recent 5 year relationship, although the database has capability to examine a robust set of historical patterns, events and relationships. Further, member forecasts include the flexibility to modify forecasted load factor and coincident peak values at regular intervals. This flexibility provides the ability for forecasts to capture future changes in relationship between demand and energy, should they be desired.

• **Question 2.1.7.1**
  - Question -- If that is correct and given the Hoosier Energy appreciation for the value of the surveys, has Hoosier Energy considered expanding the surveys to commercial and, even, industrial customers? What is the survey method?
  - Response -- Fortunately, Hoosier Energy has a unique and very valuable link in place enabling a strong understand and monitoring of our member distribution systems’ C&I classifications. Hoosier Energy’s “Key Accounts” staff is assigned to each member system. The Key Account personnel work with the individual systems, as well as the consumers, to monitor and understand their activities, loads, and needs. This minimizes the need to survey C&I. In an average year, Key Accounts staff will regularly monitor and meet with 75 – 100 customers. In the past 12 months alone, Hoosier Energy can document contact with over 250 customers. Over the years, Hoosier Energy has attempted various commercial/industrial type surveying and, due to diversification of customer types and mixing of results, no consistent, reliable results were obtained. However, Hoosier Energy may consider further C&I surveying in the future if it perceives that there is value in doing so.

• **Question 2.1.7.2**
  - Question -- With the industry move to Advanced Metering Infrastructure, has Hoosier Energy considered changes to the survey instrument to collect more detailed appliance/end-use data and better demographic information to improve the explanatory value of the load forecast?
  - Response -- Although all 18 member systems have some form of AMI in place with some member installing a second generation system, these systems do not have the capability
to monitor at an individual appliance level. Our end-use survey instrument is already quite detailed and is constantly reviewed for improvements based on current technology changes, clearer and better defined questions, as well as the capability to better understand needs of member retail customers. If metered data on an end consumer basis did become available, the current structure of the end-use survey, complemented with this data, could assist the forecaster in obtaining a more robust understanding of consumer usage patterns, possibly improving the explanatory value of the load forecast. In addition, the member systems would have to individually request permission from retail customers before sharing the end-use data with Hoosier Energy.

- **Question 2.1.7.3**
  - Question -- Consistent with the IRP’s expectation of continued enhancements to load forecasting and the IRP generally, what areas of its load forecasting process does Hoosier Energy anticipate improving for future IRPs?
  - Response -- As described in IRP Section 2.6, Hoosier Energy will continue to examine improved forecasting methodologies including estimating the impact of DSM programs and new technologies. We may also attempt to better understand of parameter relationships impacting energy and demand changes and/or growth.

- **Question 2.2.2.1**
  - Question -- In Hoosier Energy’s IRP analysis, were only supply-side alternatives included as resources to be optimized in the modeling or were supply and demand-side resources optimized simultaneously? Was a base level of demand-side resources predetermined and included in the load forecast? If a base level of DSM was estimated, it is not clear how the expected base level of demand-side resources was estimated. Would Hoosier Energy please elaborate?
  - Response - Hoosier Energy included a base level of DSM in its 20-year forecast, but also conducted an additional analysis in which DSM program portfolios that were determined to be economic were placed into the IRP model to determine if their inclusion would lower the overall NPV of the model runs. As stated in Section 5.7, on P. 88 of Hoosier Energy’s IRP,

    "The expected base level impact of demand-side resource programs for the 20-year IRP time horizon have been incorporated into the load forecast employed by Hoosier Energy in this IRP. This forecast is based upon the expected demand-side participation captured in Hoosier Energy’s 2017 PRS."

These forecasts were developed through collaboration between Hoosier Energy and its member systems.

In addition to including a base level of DSM in the 20-year load forecast, Hoosier Energy also collaborated with PA Consulting to conduct an assessment of potential economic additional DSM measures, which was described on P. 88 – 91 of the IRP. In this analysis, each potential DSM program was grouped into portfolios of related measures and the collective potential of the portfolio to reduce the cost to serve load was projected. The Levelized Cost of Energy of each portfolio was calculated and those portfolios which were determined to be economic were then compared to supply-side resources selected to determine if the inclusion of the DSM portfolios would lower the NPV of the individual
model runs. The cases that included the additional DSM programs did not contain enough avoided energy or capacity to defer or avoid a new generic resource. The portfolio construction, resource penetration levels and cost assumption information was included in Appendix G of Hoosier Energy’s IRP.

**Question 2.2.2.2**

- **Question** – Consistent with the IRP’s expectation of continued enhancements to DSM, what areas of Hoosier Energy’s DSM process does Hoosier Energy and its Member systems anticipate improving for future IRPs?
- **Response** – Several areas of the DSM program are under constant review and improvement, including:
  - Measurement and verification: With the implementation of an advanced measurement and tracking system, Hoosier Energy is improving the accuracy of program participation through detailed tracking and reporting, savings calculations, and installation verification.
  - Program review: DSM programs are continually tracked and monitored with ongoing analysis of trends and emerging technologies throughout the year. Hoosier Energy DSM staff formally reviews current programs and proposed future programs for potential implementation on an annual basis.
  - Program oversight: A committee of Member system managers and staff provides oversight of the DSM portfolio. In addition to approving and recommending DSM programming to all Member systems, the committee reviews a periodic scorecard of each program performance and provides recommendations for program improvement.
  - Third-party review: Hoosier Energy continues to use the services of GDS Associates for third-party analysis and verification of DSM program assumptions, reporting, and structure.

**Question 2.3.1.1**

- **Question** -- Would Hoosier Energy please provide additional discussion to help us understand how DSM was integrated into the load forecast?
- **Response** -- In “pre-forecast modeling,” historical DSM impacts are extracted from applicable variables, models are developed using these variables without DSM impacts. Member system forecasts without DSM impacts are then developed based on these models. DSM forecast values on a per-member system basis are obtained from separate, stand-alone DSM models. Forecasted DSM impacts are then incorporated into each member forecast through a “post-modeling” DSM adjustment, resulting in a forecast including DSM impacts. Hoosier’s forecast is then obtained through aggregation of all 18 member system forecast results with DSM impacts included.

**Question 2.3.2.1**

- **Question** -- It is unclear how all or any of the eight DSM portfolios are incorporated into the load forecast presented by Hoosier Energy in its IRP. The source of confusion is because the forecasted annual energy savings numbers presented in Appendix G, for example, do not seem to add up to the numbers presented in Appendix A2, “DSM EE program Energy with DSM impacts” table, for the base scenario. Could Hoosier Energy please provide additional commentary?
- **Response** – Hoosier Energy’s 20-year load forecast includes a base level of DSM programs that, at the time of the forecast’s creation, were expected to be economic over the time horizon of the load forecast. These are the energy savings that are shown in...
Appendix A2. The eight DSM portfolios were assembled to analyze which DSM programs may be economic at levels beyond those included in the load forecast, which were discussed in the response to Question 2.2.2.1.

- **Question 2.3.3.1**
  - Question -- Consumer surveys for residential customers should be a valuable source of information for designing, evaluating, and measuring and verifying the effects of DSM programs. However, it is not clear from the IRP how the survey information was used in the DSM programs or the load forecasts. Could Hoosier Energy please provide an expanded discussion to clarify?
  - Response – The consumer survey information provides Hoosier Energy and its 18 member distribution cooperatives a better understanding of their consumers’ demographics, appliance saturation and electricity use. This information is then used, along with other data and information, by Hoosier Energy and a Member Managers’ committee to develop appropriate DSM programs. In addition, through continuous building and maintenance of the survey database, historical appliance and consumer characteristic trends can be examined. Knowledge of these customer characteristics is fundamental in creating Hoosier Energy’s load forecast.

- **Question 2.3.3.2**
  - Question -- Also, with the industry’s move to Advanced Metering Infrastructure, has Hoosier Energy considered changes to the survey instrument to collect more detailed appliance/end-use data and better demographic information to improve the program design (including rate design), evaluation, measurement, and evaluation process for DSM?
  - Response – As the Member system use of AMI expands, the survey design may evolve to capture information obtained through AMI. Currently, AMI only provides whole home (including outbuildings) consumption data to the distribution system. Thus, granular AMI data cannot be supplied to Hoosier Energy.

- **Question 2.4.2.1**
  - Question -- As discussed above, DSM resources do not appear to have been included as a selectable resource in the resource optimization portion of the IRP modeling. Specifically, Hoosier Energy does not explain how they treat DSM as a resource. We ask Hoosier Energy to elaborate. Does Hoosier Energy agree with this assessment?
  - Response – Hoosier Energy does not agree with this assessment. Hoosier Energy included a base level of DSM in its 20-year forecast, but also conducted an additional analysis in which DSM program portfolios that were determined to be economic were placed into the IRP model to determine if their inclusion would lower the overall NPV of the model runs. As stated in Section 5.7, on P. 88 of Hoosier Energy’s IRP,

> “The expected base level impact of demand-side resource programs for the 20-year IRP time horizon have been incorporated into the load forecast employed by Hoosier Energy in this IRP. This forecast is based upon the expected demand-side participation captured in Hoosier Energy’s 2017 PRS.”

These forecasts were developed through collaboration between Hoosier Energy and its member systems.
In addition to including a base level of DSM in the 20-year load forecast, Hoosier Energy also collaborated with PA Consulting to conduct an assessment of potential economic additional DSM measures, which was described on P. 88 – 91 of the IRP. In this analysis, each potential DSM program was grouped into portfolios of related measures and the collective potential of the portfolio to reduce the cost to serve load was projected. The Levelized Cost of Energy of each portfolio was calculated and those portfolios which were determined to be economic were then compared to supply-side resources selected to determine if the inclusion of the DSM portfolios would lower the NPV of the individual model runs. The cases that included the additional DSM programs did not contain enough avoided energy or capacity to defer or avoid a new generic resource. The portfolio construction, resource penetration levels and cost assumption information was included in Appendix G of Hoosier Energy’s IRP.

Hoosier Energy is committed to working with member systems to provide the lowest reasonable cost of electricity to retail customers, including offering a variety of DSM programs. Hoosier Energy and the member systems have established a committee and meet three to four times a year to review current DSM programs, develop new programs and discuss implementation strategies. One example of this commitment is the appliance recycling program. The primary statewide vendor ceased operations and this program appeared to be doomed. However, Hoosier Energy staff worked diligently to find another partner – a local non-profit (ReStore) – to re-start and continue offering this DSM program.

- **Question 2.4.3.1**
  
  o Question -- What is the basis for assuming that short-term power price spikes resulted from cyber-attacks on the U.S./MISO electric grid in the Coal Upside Scenario? It is concerning that the definition and description of various scenarios is very confusing.
  
  o Response - The assumption was made that a cyber-attack on the U.S./MISO grid system would have the effect of raising power prices in the short-term as a disruption in energy supply would make energy more scarce. The higher energy prices would have a positive impact on coal-fired generation as it would likely cause more coal-fired plants to be economically viable.

- **Question 2.4.4.1**
  
  o Question -- On page 94, Hoosier Energy states it used a discount rate of 5% to calculate the net present value of the resource plans. But for the DSM plans the LCOE analysis used a 7.2% discount rate. The use of either specific discount rate is not explained nor why the two rates differ. Could Hoosier Energy please provide a rationale for the two discount rates and how the differences might have affected the IRP analysis?
  
  o Response - Hoosier Energy selected a discount rate of 5% to reduce a 20-year stream of nominal values, which included expected inflation, into the net present values of the individual resource plans. This rate was selected as a proxy for Hoosier Energy’s estimated incremental borrowing rate.

To conduct an assessment of Hoosier Energy’s DSM programs in the IRP, it collaborated with PA Consulting on a Levelized Cost of Energy analysis. Each potential DSM program was grouped into portfolios of related measures and the collective potential of the portfolio to reduce the cost to serve load was projected. The annual DSM portfolio values were based upon 2016 real costs and then escalated by an assumed 2.2% annual
rate to determine the annual nominal costs. The 2.2% inflation rate was the assumed annual inflation rate used in all IRP analyses.

In order to conduct the Levelized Cost of Energy analysis in the DSM assessment, it was necessary to remove inflation from the DSM cost streams to arrive at the levelized cost. Thus, PA Consulting used a discount rate of 7.2% (5% + 2.2%) in its analysis.

- **Question 2.4.5.1**
  - Question -- In Table 29 on page 86, Hoosier Energy presents modeling results for only 12 of the 36 scenarios developed. Is there a reason that the other scenarios were not discussed?
  - Response - Hoosier Energy did not provide modeling results for any of the 12 cases that modeled a 20% market tolerance as it was decided that level of market exposure was excessive. In addition, the Increased Capital Expenditure and Higher Fixed Costs sensitivities (12 cases) were not included because they were run as upper-boundary sensitivities on the base market cases and not all results were available at the time of filing.

- **Question 2.4.8.1**
  - Question -- What enhancements is Hoosier Energy considering making to databases, scenario development, risk analysis, portfolio naming conventions, enhanced surveys, more discrete load data, and the IRP process generally for future IRPs?
  - Response - Hoosier Energy views the IRP process as one that is continually evolving to incorporate new analytical methods and processes. In addition to the items mentioned above as potential improvements, Hoosier Energy will also investigate potential improvements in resource planning models, as well as potential consulting partners.