CENTERPOINT'S RESPONSE TO THE DRAFT DIRECTOR'S REPORT ON ITS 2022/2023 IRP

SUBMITTED JUNE 17, 2024

Southern Indiana Gas and Electric Company d/b/a CenterPoint Energy Indiana South and hereinafter referred to as "CEI South" hereby submits this response to the Draft Director's Report on its 2022/2023 Integrated Resource Plan ("IRP") submitted to Dr. Bradley Borum, Director of Research, Policy, and Planning of the Indiana Utility Regulatory Commission ("Commission") on June 17, 2024.

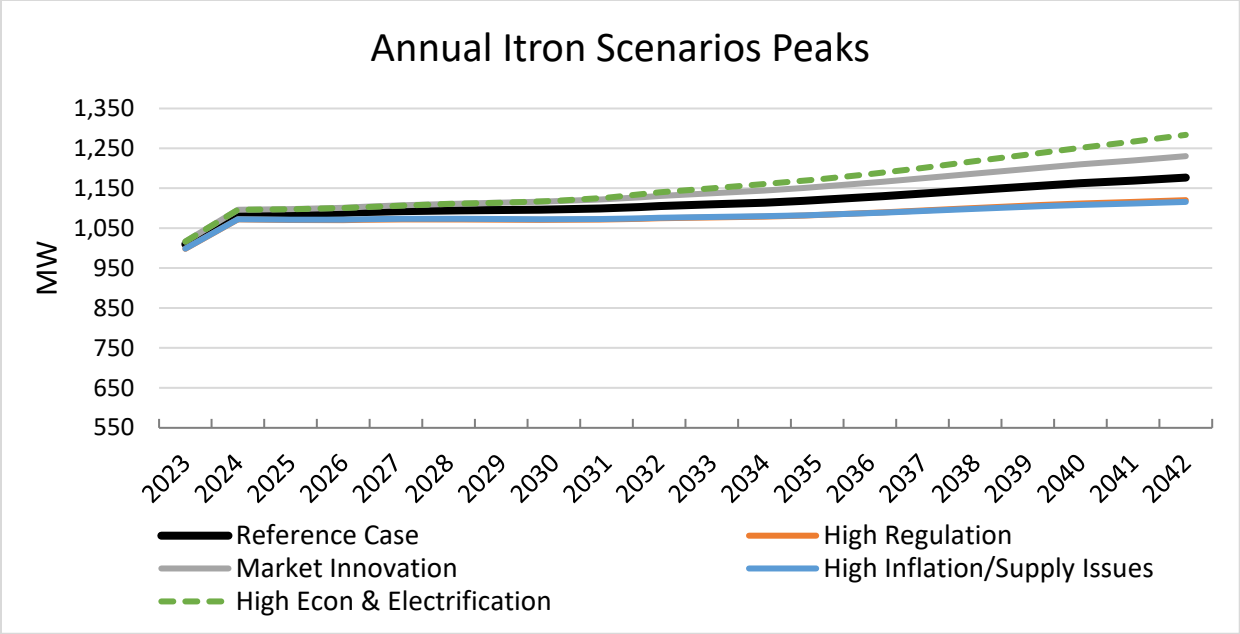
The feedback provided by the Director is an excellent source of information on electric utility best practices with regard to resource planning. We view this guidance with great respect and appreciate the effort put forth by the Commission and other IRP stakeholders in scrutinizing the process, inputs, and outputs. We plan to leverage this feedback for continuous improvement opportunities to shape our future integrated resource planning processes.

In this response, CEI South will generally address the larger themes raised by the director:

- Load Forecasting,
- Energy Efficiency and Demand Response,
- Scenario/Risk Analysis Models,
- The Five Pillars, and
- Stakeholder Comments.

Load Forecasting

CEI South has continued its ongoing partnership with Itron, who utilizes best practices, to produce dependable forecasts for CEI South's long term resource planning. The main critique that CEI South would like to address is the development of high and low, alternative forecast bands. Over the last two IRPs, CEI South has chosen to utilize a methodology for alternative forecast bands rooted in stochastic outputs. This process provides greater flexibility within the scenario development process that is heavily dependent on stakeholder feedback. While CEI South did not ultimately utilize alternative forecasts developed by Itron, we did work closely with Itron to produce alternative forecasts for consideration within the scenario analysis. The forecasts produced by Itron, were nearly identical to what was produced utilizing our scenario development process, as shown below. Within the forecasts modeled by Itron, various levers were pulled to mirror each scenario, including but not limited to EV adoption, Distributed Energy Resources ("DER") adoption, economic outlook, electrification of heating stock, etc. Had CEI south utilized the alternate forecasts produced by Itron, IRP results would not have differed in any meaningful way.



CEI South's analysis covered the plausible range of outcomes in several ways. As mentioned above, the stochastic methodology produced results that were nearly identical to scenario forecasts produced by Itron. Utilizing standard deviations from stochastic modeling outputs, CEI South could increase bounds further; for example, the gas price was increased by two standard deviations in the high regulatory scenario. The option to adjust load was also available in the stakeholder process; however, no stakeholder made this request and outcomes from Itron modeling were so similar to stochastic modeling outputs that we were comfortable with the chosen meathodology. Additionally, CEI South did not believe an adjustment was nessessary given the inclusion of a large load sensitivity and because load was varied stochastically within probabilistic modeling. As with previous IRPs, CEI South ran a sensitivity to consider the effect of a large load addition (300 MWs in the near term in this IRP) to mimic real world economic development potential. Results from this sensitivity greatly help in responding quickly and accurately to inquiries about how we may most economically serve potential new large loads. As mentioned above, CEI South varied load stochastically within two hundred potential futures. Load distributions covered the full probabilistic range of uncertainty which stretch well beyond one standard deviation up and down.

Clarifications on Load Forecasting (responses in blue)

The Director had the following observations (Pages 7-8): "The inclusion of the DSM (EE) variable in the residential average use model began with its 2019 IRP. The 2019 and 2022 IRPs both include the language "the energy and demand forecasts do not include future DSM energy savings"; however, the 2019 IRP also states "incremental future DSM is then added back to the model results to arrive at an average use forecast that does not include the impact of future DSM" while the 2022 IRP does not include this language. This is unclear. "

> Both the 2019 and 2022 IRP forecasts do not include future DSM program savings. In 2019, the DSM variables used in the regression models were allowed to accumulate and increase throughout the forecast period, because of this the resulting modeling output included future DSM savings. To generate a forecast which did not include future DSM, the cumulative incremental DSM was then added to the model output. In 2022, the DSM variables used in the

regression models are held constant at their June 2022 levels for all future periods, because of this the resulting model output does not include the impact of future DSM savings. Due to this change, there is no need to add future DSM savings. Although the approaches are different, the net result is the same.

"The IRP on page 6 states that the residential model coefficients **bc**, **bh** and **bo** are estimated using linear regression, but it does not mention the coefficient on the DSM (EE) variable **be** for some reason. Why?"

The DSM coefficients are estimated with a linear regression, as with all other model variables. Appendix A, IRP volume II, page 42, lists all variables and the calculated coefficients used in the residential average use model. Page 44 lists the variables for the commercial sales model.

"The new residential (and commercial) COVID variable is mentioned in the text but does not appear in the residential equation in Figure 3.

We will make sure to update the Figure in future IRPs. The modeling statistics are included on page 42 of IRP Vol II, including the COVID variable.

"The commercial economic variable incorporates MSA GDP, employment, and number of households. The 2019 IRP showed an equal weighting for output and employment, but the 2022 IRP does not seem to specify what the weights are."

The commercial economic variable incorporates nonmanufacturing output, nonmanufacturing employment, and population. The weights are 25% nonmanufacturing output, 25% nonmanufacturing employment, and 50% population.

"As with the residential model, the language around how DSM is handled is unclear in the commercial model."

The DSM variables are based on annual verified DSM savings that are converted to a monthly series. In the residential average use model, DSM is expressed as savings per customer. The DSM variables are held constant at their June 2022 levels for all future periods, because of this the resulting model output does not include the impact of future DSM savings.

"The street lighting model was described in the 2019 IRP as "exponential smoothing model with a trend and seasonal component." In the 2022 IRP, it is described as a "regression model with a trend and monthly binaries." It is unclear if the model has changed or is the same."

There is no change; the model specifications are the same.

"The OUCC notes that CEI South does not seem to have included refreshed data relating to its service territory and EV usage. The OUCC states that CEI South uses the same estimation from the 2019/2020 IRP and that there are 238 registered EVs in the counties served by CEI South. The OUCC believes it is unclear whether CEI South updated the number of battery electric vehicles and the number of plug-in hybrid vehicles in the current IRP. (Page 32)."

The 2022 IRP did use updated EV registration data, there were 687 EVs as of the time of the forecast. Unfortunately, the report incorrectly stated there were 238, which was the same number used in the 2019/2020 IRP.

Energy Efficiency and Demand Response

CEI South appreciates the recognition for the continuous improvement efforts around Energy Efficiency and Demand Response. CEI South maintained a constant dialogue with stakeholders on how to best model energy efficiency, including several tech-to-tech meetings where Energy Efficiency modeling inputs were iterated to economically maximize how much Energy Efficiency could be selected.

CEI South fully agrees that more work needs to be done to model alternative rate designs. As such, only an indicative, nominal pilot level amount of alternative rate design (Residential Critical Peak Pricing) was modeled and included in the preferred portfolio. Inputs for this resource were provided as part of the 2022 Market Potential Study on pages 28-34 in the GDS report in IRP volume 2. CEI South utilized this IRP as a first step in exploring alternative rate structures. The next step is a proposed Critical Peak Pricing / Time of Use pilot in Cause No. 45990. This case is still pending before the Commission. CEI South plans on filing its 2025-2027 DSM Plan with the Commission in late June or early July.

Scenario/Risk Analysis Models

The Director raised some concerns with scenario design / pricing because the model consistently selected the same resource across multiple potential plausible futures to replace F.B. Culley 3, and these portfolios generated high market sales. CEI South does not believe that constructing scenarios with more uncertainty will produce fundamentally different results without reasonable constraints built into the modeling. As part of the stakeholder feedback and utilizing guidance from the prior Directors report, CEI South intentionally minimized constraints in the model to the greatest extent possible. See page 24 of the 2019/2020 IRP Director's Report.

It has been our experience that regardless of the model used (Strategist, Aurora, or Encompass), to produce a wide range of portfolios, there are three options 1) constrain the model to produce different, reasonable results or 2) add a key resource and have the model selected additional resources to fill the need, or 3) build a range of portfolios based on modeling and judgement. All are credible options; the goal is to produce a wide range of potential portfolios, which CEI South produced in the 2022/2023 IRP. The largest objective in this IRP was to evaluate options to maintain sufficient capacity while moving to diverse set of resources, first identified in the 2019/2020 IRP and continued in this IRP. This analysis was largely an evaluation of F.B. Culley 3and was designed to evaluate competing alternatives for this 270 MW base load resource. As such, we evaluated whether to continue on coal, convert of F.B. Culley 3 to natural gas, or replacement with various combinations of storage solar and wind, a new combustion turbine, or conversion of two new CTs to a CCGT.

Regardless of how scenarios are constructed, when there is an overwhelmingly economic option such as a large, efficient CCGT, it will most likely be selected even under varying model inputs. This has been the case in two of the last 3 IRPs; note that a large, combined cycle addition was not an option in the 2019/2020 IRP based on Commission feedback in Cause No. 45052.

The reference case portfolio and alternative scenario-based portfolios, which all included a new CCGT unit resulted in high market sales. New CCGTs are the most efficient dispatchable resources in the MISO

market, and frequently generate at high-capacity factors in models and the real world. We believe the intermittent nature of a renewable heavy build out coupled with the efficiency of converted CTs to a CCGT, drove excess energy sold into the MISO market for these scenario-based portfolios rather than a disconnect in the model regarding generated market prices.

As CEI South continues the fleet transition from predominately coal-based generation to a more diverse resource mix, it is expected that IRP models will show portfolios with more purchases and sales from the MISO market than what has traditionally been the case. It is important to consider that a resource's energy and capacity contributions to a portfolio are not always aligned. A portfolio that is required to meet a capacity target as in this analysis, that is made up of more non-dispatchable resources that receive lower capacity accreditation, are expected to sell more energy into the MISO market during times of higher production and purchase energy from the market when these units are not generating.

The Five Pillars

Affordability

Per the Director's comment to consider the minimum probable cost of each portfolio, CEI South did review the potential minimum and maximum probable cost of portfolios over the 20-year planning period; however, it was not described in the IRP. Based on the Director's feedback we plan to highlight these results in future IRPs. CEI South has utilized NPVRR and 95th percentile of NPVRR as affordability measures in the last three IRPs and believe that they are still foundational to long range generational planning. Upon stakeholder request, CEI South added a third affordability measure in the cost risk category, Proportion of Energy Generated by Resources with Exposure to Coal and Gas Markets and Market Purchases. Other affordability measures were not raised in the 2022/2023 IRP stakeholder process. Affordability is a top concern for CEI South; we plan to review new ways to show affordability measures, including those suggested by the Director further in its next IRP.

Reliability

CEI South would like to address the Director's questions / comments around unserved energy and provide a little more context for how it was considered within the analysis. Unserved energy is the amount the load is exceeding generation in each hour of the study period. In the modeling, unserved energy had a cost of $10,000/MWh. This influenced the model to build sufficient generation to meet load and avoid unserved energy violations.

Unserved energy was calculated for all portfolios using the IRP EnCompass model. Each portfolio experienced limited hours of unserved energy, these primarily occurred in the near-term years of the modeling analysis prior to new resources being built in the model. While unserved energy was not included in the scorecard the unserved energy of the portfolios was reviewed, a maximum of 0.05% was seen across all portfolios over the 20-year period. There are also unit operational decisions that CEI South will make, for example, planned outage scheduling, that may differ from what is included in the model to enable sufficient energy to serve load. CEI South does not believe the existing portfolio will experience unserved energy over the next year under normal operating conditions. Additional analysis and modeling around unserved energy is a step CEI South can incorporate into future IRPs.

To clarify, CEI South included a measure which shows the maximum seasonal capacity deficit in the summer/winter from 2030-2042. This measure captures the risk that a portfolio may have to purchase capacity in the future to cover load by highlighting the largest necessary annual capacity purchase. Load was modified stochastically, while portfolios were built to meet expected reference case load. As a

result, portfolios with less length are more exposed to the capacity market. This measure highlights that risk; it is not a measure of unserved energy.

Stability
CEI South appreciates the Director's confirmation that our discussion on stability was appropriate for an IRP and helpful.

Resiliency
Reliability and resiliency in an IRP evaluation are by nature linked concepts. Reliability includes a focus on the ability of the system to withstand sudden disturbances, and resilience focuses on adapting to changing conditions and rapidly recovering from disruptions. When examining different resource decisions, there can be overlap in the reliability and resiliency that different units add to the system and a portfolio's overall reliability and resilience. For instance, all portfolios include CTs which provide reliability and resilience benefits in the form of fast start, fast ramp, and black start capabilities. The preferred portfolio also includes the conversion of FB Culley 3 to natural gas, which being a dispatchable unit can help contribute to a portfolio's ability to adapt to changing conditions and the ability of a portfolio to supply customer demand at all times.

Firm gas supply for gas resources helps ensure reliability and resilience on CEI South's system. As explained on page 187, firm gas supply is non-interruptible. In other words, it is there when it is needed, particularly in the winter months. CEI South shared details on how firm gas expense was derived and included within the Encompass model with technical stakeholders in the fall of 2022. In the recent IRP contemporary issues meeting, representatives from both MISO and PJM mentioned that the largest reliability risk is in the winter months. CEI South shares this view and incorporated the necessary cost of a firm gas supply contract for new gas resources. CEI South utilized two recent bids for firm gas supply from two different sites to incorporate a reasonable estimate for a generic location. As the Director mentions, this is a very site-specific cost, but CEI South's cost estimates were reasonable and based on the best available information for resource planning.

CEI South agrees with the Director that Figure 2.2 could have been clearer. CEI South should have labeled "System Flexibility" as "Operational Flexibility." The terms were inadvertently used interchangeably. Operational Flexibility was discussed in detail on pages 269-270 of the IRP. Separately, CEI South discussed flexibility of the plan as the ability to change paths if the future turns out to be different than expected, as described on page 267. This could have been highlighted in Figure 2.2.

Environmental Sustainability
The Director did not provide commentary on environmental sustainability.

Missing Qualitative Discussion of Alternate Portfolios

CEI South provided the makeup of resources within each portfolio and the ability of the portfolio to balance CEI South's energy and demand over the planning horizon; it discussed qualitative aspects of various resources throughout the IRP. Ultimately, the selection of the preferred portfolio was largely about what resources could best provide capacity to support the build-up of renewable resources identified in the 2019/2020 IRP and the renewables selected in this IRP. CEI South built portfolios that supported renewables with **coal** (Business as Usual – Continue F.B. Culley 3 on Coal), **battery storage**

(Diversified Renewables, Replace FB Culley with Storage and Wind, and Replace FB Culley 3 with Storage and Solar), or various forms of gas (**CTs** – CT Portfolio, **CCGT** – Reference Case, or conversion of FB Culley 3 – **Convert F.B. Culley 3 to Natural Gas** by 2030, Convert F.B. Culley 3 to natural gas by 2027, or Convert F.B. Culley to Natural Gas by 2027 with wind and Solar).

As discussed on page 46, **coal** is not a good option in the long-term:

> "The move toward renewable and gas energy has come at the expense of coal generation, which has been rapidly retiring for several reasons. Coal plants have not been able to consistently compete on short term marginal price with renewable and gas energy. Operationally, the move toward intermittent renewable energy requires coal plants to more frequently cycle on and off. These plants were not designed to operate in this manner. The result is increased maintenance costs and more frequent outages. Additionally, older, inefficient coal plants are being retired to avoid spending significant dollars on necessary upgrades to achieve compliance with Environmental Protection Agency ("EPA") regulations. Two recent rule changes are further examples of the continued pressure on coal. EPA finalized revisions to the Cross-State Air Pollution Rule and the Good Neighbor Rule which require further reductions in emissions of NOx during the Ozone Season. EPA has also recently proposed revisions to the Mercury Air Toxics rule that could further ratchet down particulates for F.B. Culley by 2026-2027and on January 6, 2023 EPA proposed a new rulemaking to reduce the National Ambient Air Quality Standard PM2.5 standard and review state's attainment designations. It can be challenging for F.B. Culley to maintain compliance under current regulations and will be more difficult to continue operating the unit on coal in 2027 and beyond. Finally, public and investor pressure, coupled with future cost risk associated with the objective of decreasing carbon emissions, has driven unit retirements. Based on these and other major factors, according to MISO's Regional Resource Assessment, they project wind and solar to contribute up to 42% of the energy in 2031. Some large nuclear plants remain but have also found it challenging to compete on cost."

As described on page 49, **battery storage** (Diversified Renewables, Replace FB Culley with Storage and Wind, and Replace FB Culley 3 with Storage and Solar) is not the best selection at this time:

> "…there are some limitations to keep in mind as utility scale battery storage is still evolving. Commercially feasible batteries remain short duration, typically four hours. There are some longer-duration batteries that show promise, such as iron-air, but these are still very expensive and not proven on a utility-scale. Future IRPs will continue to monitor for when these technologies become commercially viable. Additionally, safety standards are being developed and fire departments are being trained for the fire risk posed by L-ion batteries. Other chemistries are being developed to account for this issue but are not commercially imminent. Moreover, batteries today are a net energy draw on the system. L-ion can produce about 85-95 percent of the energy that is stored in them. Part of this loss is due to the need to be well ventilated, cool and dry, which takes energy. Batteries are promising and have their place in current and future energy infrastructure, but they do not yet replace the need for other forms of dispatchable generation during extended periods without sun and wind."

As described on page 263, a **CCGT** (Reference Case) is not the best selection at this time:

> "The Reference case portfolio, which converts CEI South's two F-class combustion turbines into a large, combined cycle, was found to be the least cost portfolio by a wide margin across multiple potential future states; however, CEI South does not plan to convert either or both CTs to a combined cycle in the absence of a large load addition. The reference case, generated by computer modeling, is overbuilt for CEI South customer needs and relies on vastly more market energy sales to lower the NPVRR well below all other portfolios. The Indiana Commission instructed that this is a risky proposition for a company of this size in Cause No. 45052. CEI South's preferred portfolio complies with this view."

Some of the qualitative aspects of the **CT** Portfolio per described on page 245.

> "As shown in Figures 8.18-8.20, this portfolio meets capacity obligations well throughout the study period. There is a near to mid-term reliance on the energy market; however, this portfolio contains a high level of dispatchable generation that can help shield customers from high energy prices. The F-class CTs in this portfolio can start fast and ramp quickly." This portfolio also had much more cost risk than conversion of F.B. Culley 3 to natural gas, and it also emitted more CO_2. Also, while not expressly stated in the IRP another CT was offer less diversity of resources, would have cost more for firm gas capacity than a conversion of F.B. Culley 3 to natural gas, and could remove tax base in Warrick county, and potentially lead to stranded assets.

As the Director acknowledged, the benefits of **FB Culley 3** Conversion were discussed throughout the IRP.

CEI South can work to provide a summary of qualitative benefits for each portfolio in one place in future IRPs and provide more discussion of the company's thought process on why alternate portfolios where not selected to be the preferred portfolio.

Stakeholder Comments

Inclusion of DER and Time Varying Rates

CEI South viewed DERs as an opportunity and a resource in the IRP and included them in its analysis. First, CEI South included a portfolio with DG Solar as described in 8.1.4.3.5 Diversified Renewables (Early Storage & DG Solar), which was developed to help explore an opportunity to place distributed solar resources on its distribution system. Customer owned resources were also included as a load reduction. CEI South has experience with DER in its portfolio, as described on page 278 of the IRP. "CEI South, in partnership with Scannell and DOE installed rooftop solar comprising about 120 kW that entered commercial operation in December 2022. As with pilots that proceeded this project (Oak Hill and Volkman) this project helped CEI South understand what is needed to design, construct, and operate a facility on a leased rooftop." However, rooftop solar resources offer less economies of scale and are more complicated to site/maintain. Therefore, they are more expensive and would not be selected economically within IRP modeling. It is important to note that CEI South conducted an all-source RFP and only received one credible bid for DER, even though we opened the RFP up to such resources. Not only did CEI South model aggregated DR, but we also selected it in the preferred portfolio. CEI South is currently pursuing this DR aggregation resource in Cause No. 45990. Future expected customer owned DG solar was netted out of the load forecast. CEI South is closely monitoring the FERC 2222 developments and will continue to incorporate any insights into its future analyses.

Advanced Energy United is a proponent of time varying rates. As the Director pointed out CEI South took the initial step of modeling indicative time varying rates, and selected a pilot amount in its preferred

portfolio. We agree with the Director that "…there is much required to adequately model price-based DR in IRP processes. Considerations include a thorough discussion of the following:

- The types of DR being considered.
- The types of rates.
- Transparency of participation rate assumptions for both opt-in and opt-out forms of DR.
- The assumed load reduction by rate type and customer class.
- The achievable potential of the price-based DR.
- The uncertainty of price-based DR and how it is evaluated."

Precisely for these reasons, CEI South is pursuing a pilot of Critical Peak Pricing with a Time of use Rate in Cause No. 45990. While CEI South included CPP/TOU in the preferred portfolio, indicative information from the MPS must be validated with CEI South's unique customers.

Gas Conversion Cost Assumptions
Transparency was a priority in the 2022/2023 IRP. 1898 conducted a specific study to develop coal to gas conversion costs, specific to F.B. Culley 3. The Coal to Gas conversion Feasibility Study (included in Technical Appendix 6.5) is a 41-page report describing how cost estimates for FB Culley 3 were derived. CEI South utilized the Encompass model, which shows all inputs/outputs in Excel format. CEI South hosted tech-to-tech meetings and encouraged stakeholders to submit data requests throughout the process. While CEI South could have explicitly discussed the firm gas cost assumption further, stakeholders were provided the necessary information to assess modeling of a gas conversion. As mentioned above, CEI South incorporated the necessary cost of a firm gas supply contract within its modeling and shared assumptions with stakeholders who signed an NDA and attended tech-to-tech meetings. CEI South utilized two recent bids for firm gas supply from two different sites to incorporate a reasonable estimate for a generic location. Taking an average of these two bids and scaling for resource type was reasonable and based on the best available information for long-term planning. CEI South regularly communicates with gas transmission companies and understands options for serving its existing sites.

Salvage Costs
Decommissioning and net salvage costs were applicable for existing resource retirement, and overall portfolio cost calculations. They aid in a comprehensive view of each portfolio's net present value revenue requirement when retirement is the optimal solution. Costs associated with decommissioning and salvage were consistently not included in the costs for new resources.

Historic energy and peak demand by Customer Class
Historic energy and peak demand data was broken out annually (actual and weather normalized) and shown on slide 60 of the IRP Public Stakeholder Meeting Deck on August 18, 2022, which is included in IRP volume 2 (page 45 of 1123 of the PDF). Additionally, an overview of past forecasts is included in section 11.1.3 by customer class. CEI South will endeavor to include this information in the load forecast chapter of the IRP going forward. Per the Director's suggestion to break out historic load with and without Energy Efficiency, weather normalizing peak information is hard to do, as one is normalizing for one hour in the year. It would become much more subjective to estimate weather normalized peak without EE. CEI South can explore providing this view within the IRP but does not believe that it will be that meaningful, particularly on peak.

Affordability Measures
As mentioned above, CEI South will work to include other views of affordability within its next IRP. We will explore how to best show annual revenue requirements by portfolio.

Conclusion

CenterPoint South would like to thank the Director and his team for these thoughtful comments. As mentioned above, this report is a key component of continuous improvement efforts.

Sincerely,

Matt Rice

Director, Indiana Electric Regulatory and Rates