Cause No. 45403

VERIFIED DIRECT TESTIMONY OF PATRICK N. AUGUSTINE

Q1. Please state your name, professional position, and business address.

A1. My name is Patrick N. Augustine. I am a Vice President in Charles River Associates' Energy Practice. My business address is 1201 F Street, NW, Washington, DC 20004.

Q2. On whose behalf are you submitting this direct testimony?

A2. I am submitting this testimony on behalf of Northern Indiana Public Service Company LLC ("NIPSCO").

Q3. Please briefly describe your educational and business experience.

A3. I received a Bachelor of Arts degree from Harvard University and received a Master of Environmental Management degree from the Nicholas School of the Environment at Duke University. I have been employed by Charles River Associates ("CRA") for nearly five years and have worked in the energy consulting industry for over fourteen years. Prior to joining CRA, I worked at Pace Global Energy Services, now a Siemens business, for over nine years, performing the roles of analyst, project manager, and director.

At CRA, in my role as Vice President, I oversee the maintenance of the firm's power market modeling tools and processes, I manage consulting assignments in the power and utilities sectors, and I supervise junior staff in performing market, policy, and strategic analyses for our clients.

Q4. Please describe CRA and the work you perform in more detail.

A4. CRA is a consulting firm that offers economic, financial, and strategic expertise to support our clients in business decisions, regulatory and litigation proceedings, and market and policy analysis. My professional experience within CRA's energy practice has focused on power market analysis and utility resource planning work to support project developers, electric utilities, investors, and lenders in energy market forecasting, power asset valuation, and utility portfolio planning. This work involves energy market research and analysis and the use of market models, particularly those that simulate the competitive electric power markets and those used for electric utility portfolio dispatch analysis and cost accounting.

Q5. Have you previously testified before this or any other regulatory commission?

A5. Yes. I previously provided testimony before the Indiana Utility Regulatory Commission in NIPSCO's request for a certificate of public convenience and necessity ("CPCN") to purchase and acquire (indirectly through a joint venture structure) (1) a 102 megawatt ("MW") wind farm (Rosewater Project) in Cause No. 45194, and (2) a 302 MW wind farm (Crossroads Project) in Cause No. 45310; NIPSCO's request for approval and associated cost recovery of a wind purchased power agreement ("PPA") with (1) Jordan Creek Wind Farm LLC in Cause No. 45195, and (2) Roaming Bison Wind Farm LLC in Cause No. 45196; and in NIPSCO's electric rate case in Cause No. 45159. I have also provided testimony and appeared before the Kentucky Public Service Commission with regard to an application for approval of an environmental compliance plan and associated cost recovery in Case No. 2012-00063; on behalf of a power generating asset owner before the Michigan Public Service Commission in the course of a Certificate of Need proceeding in Case No. U-17429; and before the Public Utilities Commission of Ohio with regard to the power market forecasts used in a distribution modernization plan in Case No. 18-1875-EL-GRD.

Q6. What is the purpose of your direct testimony in this proceeding?

A6. The purpose of my direct testimony is to discuss the preferred portfolio from NIPSCO's Integrated Resource Plan submitted October 31, 2018 (the "2018 IRP") and how the assumptions associated with the new solar (and solar plus battery storage) resource options modeled in the 2018 IRP compare with the cost of (1) a Solar Energy Purchase Agreement between NIPSCO and Brickyard Solar, LLC ("Brickyard") dated June 30, 2020 ("Brickyard PPA"), and (2) a Solar Generation and Energy Storage Energy Purchase Agreement between NIPSCO and Greensboro Solar Center, LLC ("Greensboro") dated June 30, 2020 ("Greensboro PPA"), collectively referred to as the "Solar PPAs."

Q7. Are you sponsoring any attachments to your direct testimony?

A7. Yes. I am sponsoring the public version of NIPSCO's 2018 IRP, attached hereto as Attachment 2-A. NIPSCO hired CRA to perform the analysis and modeling for the IRP, and the portfolio analysis produced in Section 9 of the IRP was prepared by me or under my direction and supervision.

Q8. Please provide an overview of NIPSCO's preferred portfolio from the 2018 IRP and how it was developed.

A8. NIPSCO's preferred portfolio calls for the retirement of all four coal units at the R.M. Schahfer Generating Station in 2023 and the retirement of the Michigan City Generating Station coal plant in 2028. The preferred portfolio includes the following capacity replacements over time: 125 MWs of energy efficiency and demand side management peak load savings by 2023, growing to 370 MW by 2038; approximately 1,100 MW of installed capacity ("ICAP")[1] wind representing 157 MW of unforced capacity ("UCAP")[2] entering into service in 2020 and 2021; approximately 2,100 MW of ICAP solar representing about 1,050 MW of UCAP in 2023, along with additional generic solar over the long-term; and 175 MW of ICAP solar plus storage capacity representing approximately 90 MW of UCAP in 2023. Section 9.3 of the 2018 IRP provides additional detail associated with the preferred replacement portfolio.

[1] Installed capacity or ICAP represents the nameplate capacity of a resource and the maximum amount of output that can be produced at any given time.

[2] Unforced capacity or UCAP represents the expected capacity available during the system peak. For renewable resources, MISO relies on historical operational data during peak hours or generic planning numbers based on a system-wide effective load carrying capability analysis. The 2018 IRP developed UCAP numbers based on bidder responses to the All-Source RFP (where available) and generic estimates of approximately 15% of ICAP for wind resources and 50% of ICAP for solar resources.

The plan was developed through substantial quantitative and qualitative analysis, including the use of an all-source request for proposal ("All-Source RFP") to identify the most relevant types of resources available in the market, along with their associated costs. Within the 2018 IRP, NIPSCO performed retirement and replacement assessments using robust scenario and risk-based (stochastic) analyses and scored the various portfolio alternatives against a number of cost, risk, environmental, and reliability metrics to arrive at the preferred portfolio. NIPSCO also evaluated the impact each of the retirement and replacement alternatives would have on local communities and NIPSCO's employees.

Q9. Please provide an overview of the 2018 IRP's Short-Term Action Plan and NIPSCO's implementation to date.

A9. In the Short-Term Action Plan, which is detailed in Section 9.4 of the 2018 IRP, NIPSCO identified a phased approach to selecting and acquiring replacement resources needed to fill the capacity gap that develops as a result of the planned retirements in 2023 in the preferred portfolio. The plan called for initially prioritizing replacement resources with expiring or declining tax credits from the All-Source RFP, followed by additional RFPs to acquire resources to fill the remainder of the 2023 supply requirement.

The prioritized replacement resources were wind projects looking to qualify for the federal production tax credit ("PTC"), which is expiring over the next few years. In 2019, NIPSCO requested approvals to either purchase and acquire or enter into PPAs with a total of approximately 1,100 MW of nameplate wind power in Cause Nos. 45194, 45195, 45196,[3] and 45310. NIPSCO then conducted three separate requests for proposals, one for wind resources, one for solar resources and one for thermal/other capacity resources ("Phase II RFPs") to target primarily renewables and storage and acquire the remaining resources in the preferred portfolio.

Q10. Please describe the Phase II RFPs in more detail and how project selection from the Phase II RFPs relates to the 2018 IRP's preferred portfolio.

A10. As discussed in further detail by NIPSCO Witness Lee, the Phase II RFPs solicited bids for energy and capacity for many types of resources, including solar, storage, wind, and thermal plants. The Phase II RFPs

[3] Following approval by the Commission, on February 25, 2020, NIPSCO filed a Notice with the Commission that, due to unresolved local zoning issues, Roaming Bison Wind, LLC was unable to meet its deadline associated with the acquisition of property. Thus, NIPSCO provided notice to Roaming Bison Wind, LLC that the Wind Energy Purchase Agreement dated January 18, 2019 was being terminated due to Roaming Bison's inability to perform its obligations under the agreement.

included a specific target for solar and solar plus storage resources based on the conclusions of the 2018 IRP and the Short-Term Action Plan described above. As discussed in further detail by NIPSCO Witness Campbell, NIPSCO has been negotiating with the developers of several renewable and storage resources that were offered into the Phase II RFPs, including the Brickyard PPA and the Greensboro PPA. These solar and solar plus storage PPAs make up a component of the remaining replacement resources necessary to complete the Short-Term Action Plan associated with NIPSCO's preferred portfolio in its 2018 IRP.

Q11. How did NIPSCO use the All-Source RFP to determine the cost and operational performance assumptions of solar resources in its IRP?

A11. As part of the IRP input development process, CRA organized the various bids received in the 2018 All-Source RFP into groupings or tranches according to technology, whether the bid was for a PPA or an asset acquisition, the bid's commitment duration, and the bid's cost and operational characteristics. This approach allowed for the efficient development of planning-level assumptions that could be transparently shared with stakeholders and deployed in the IRP models. This process resulted in the development of distinct solar asset sale and PPA tranches,

which were eligible to be selected in the portfolio analysis in part or as a whole block of capacity. Section 4-10 of the 2018 IRP describes this process in more detail.

Q12. What specific assumptions were used for the solar tranches from the All-Source RFP that were selected in the preferred portfolio in the 2018 IRP?

A12. The preferred portfolio from NIPSCO's 2018 IRP included solar and solar plus storage resources from six different tranches. These included three asset acquisition tranches and three PPA tranches. The three asset acquisition tranches totaled 1,104 MW of ICAP (552 MW of UCAP[4]). The three tranches had a capacity-weighted acquisition price of $1,112/kilowatt ("kW") (in 2023 dollars) and a capacity factor of approximately 26%. Fixed operations and maintenance ("FOM") costs were assumed to be $16.89/kW-year (in 2017 dollars), with ongoing capital expenditures of $5.11/kW-year (in 2017 dollars). Property taxes were assumed to be 2.16% of the net book value of the plant over time. The three PPA tranches totaled 1,176 MW of ICAP (593 MW of UCAP[5]) with an average contract duration of

[4] Per MISO market rules, the starting capacity credit for new solar resources is assumed to be 50% of nameplate capacity.

[5] One of the PPA tranches was made up of a solar plus storage bid, resulting in the total UCAP being higher than 50% of the ICAP rating.

approximately 21 years. The three tranches had a capacity-weighted fixed nominal PPA price of $30.24/MWh, and a capacity factor of approximately 25%.

Q13. Are you able to compare the total cost of the Brickyard and Greensboro PPAs with the total costs of these tranche-level inputs used in the 2018 IRP modeling?

A13. Yes. I made such a comparison through the development of a levelized cost of energy ("LCOE") calculation for the 2018 IRP solar resource options and the Brickyard and Greensboro PPAs. The LCOE develops a levelized, all-in cost of a given resource option over a pre-defined analysis period on a per MWh basis. This approach allows for a direct comparison of the costs of the different solar projects over an extended time frame by distilling all key parameters related to costs and operational performance into a single dollar per MWh number.

Q14. Please explain the inputs that are required to perform an LCOE calculation.

A14. For an owned resource, the following input parameters are included: the acquisition cost of the project in dollars per kW, adjusted for the

contribution of a tax equity partner that can realize the benefits of federal tax incentives; NIPSCO's weighted average cost of capital and capital structure projected as of December 31, 2019[6]; the expected FOM costs and ongoing capital expenditures over the thirty-year planning horizon; the expected property taxes over time; cash payments to the tax equity partner; and the expected generation output, inclusive of expected degradation, in MWh for the resource over time.

For a PPA resource, the following input parameters are included: the PPA price in dollars per MWh or dollars per kW-month over the term of the contract; the expected generation output, inclusive of expected degradation, in MWh for the resource over time; and the expected market cost to replace the resource after the expiration of the PPA contract term if it falls within the thirty-year planning horizon.[7]

The expected difference between the nodal price at the project and NIPSCO's load node is an input for both owned and PPA resources in order

[6] Note that owned resources from the 2018 IRP use the capital structure as of 2018.

[7] Given the expectation that growth in solar capacity in the MISO market will reduce the effective load carrying capability of solar resources and the capacity credit of solar over time, post-PPA capacity replacement needs for solar capacity are assumed to be 30% of a PPA's solar ICAP rating.

to quantify the expected congestion risk over time, as discussed further by NIPSCO Witness Campbell.

Q15. Are there other costs associated with a PPA resource that are not accounted for in your LCOE calculation?

A15. PPAs are long-term financial commitments for a utility, and certain credit rating agencies view such contracts as debt-like financial obligations that represent substitutes for debt-financed investments in generation capacity. These obligations are considered when evaluating the utility's capital structure and overall creditworthiness. To the extent that these obligations negatively impact the credit worthiness and capital structure of a utility, they could result in increased borrowing costs and/or a shift of financing from debt to equity, increasing the overall cost of financing and negatively impacting costs to customers. Such potential costs associated with imputed debt, however, are not included in my LCOE calculations.

Q16. What LCOE values did you calculate for the solar resource tranches incorporated in the 2018 IRP's preferred portfolio?

A16. The 30-year LCOE of the combined 2023 solar acquisition tranches was calculated to be $52.62/MWh, based on the acquisition price, capacity factor,

FOM costs, ongoing capital expenditures, and property taxes summarized above and an assumed 30-year project life. The 30-year LCOE of the combined 2023 solar and solar plus storage PPA tranches was calculated to be $39.50/MWh based on the 21-year PPA price summarized above plus an additional nine years of market-based energy and capacity costs over the full planning horizon.

Q17. What LCOE values did you calculate for the Brickyard PPA?

A17. The 30-year LCOE of the Brickyard PPA was calculated to be [redacted]. This is based on a 20-year nominal fixed PPA price of [redacted] plus ten years of equivalent market-based energy and UCAP capacity costs after the expiration of the contract.

Q18. What LCOE values did you calculate for the Greensboro PPA?

A18. The 30-year LCOE of the Greensboro PPA was calculated to be [redacted]. This is based on a 20-year nominal fixed PPA price of [redacted] for energy and [redacted]-month for the storage capacity plus ten years of equivalent market-based energy and UCAP capacity costs after the expiration of the contract.

Q19. How does the Greensboro PPA's storage component, and accompanying fixed charge, impact the LCOE?

A19. The fixed charge for the 30 MW of storage capacity increases the LCOE by approximately [redacted]. This premium represents the cost associated with the extra capacity credit that can be achieved by shifting the resource's energy output to times that are more coincident with load peaks.

Q20. Did the 2018 IRP contemplate solar resources with similar amounts of storage as the Greensboro PPA?

A20. The preferred portfolio did incorporate one solar plus storage PPA tranche, although the ratio of storage to solar was lower than the 30 MW of storage associated with 100 MW of solar in the Greensboro PPA. However, NIPSCO's 2018 IRP preferred portfolio and Short-Term Action Plan were designed to be flexible and incorporate small changes in final resource selection based on evolving market conditions. In Section 9.3.4 of the 2018 IRP, NIPSCO noted that capacity credit rules may change and that a seasonal capacity construct may develop that would "expand resource adequacy from a single summer peak view to look at seasonal needs with greater emphasis on the ability of resources to provide energy all year

around."[8] The IRP also emphasized that NIPSCO's preferred portfolio intentionally "leaves room to evaluate market and technology changes on a dynamic basis"[9] and to adjust accordingly. As MISO's Resource Availability and Need initiative moves towards some type of seasonal construct[10] and as the market anticipates more and more solar additions, which could impact future capacity credit, energy price volatility, and ancillary services prices, storage capacity will provide additional value to NIPSCO's portfolio. Thus, the inclusion of some paired solar and storage resources, such as the Greensboro PPA, is one way NIPSCO is adjusting its preferred portfolio in response to market changes and the evolving technology options offered in the Phase II RFPs.

Q21. Is it possible to adjust the 2018 IRP tranches to include additional costs associated with the additional storage capacity value?

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[8] Attachment 2-A (NIPSCO 2018 IRP), p. 177.

[9] Attachment 2-A (NIPSCO 2018 IRP), p. 178.

[10] MISO's Resource Availability and Need initiative is ongoing and incorporates multiple aspects of resource adequacy and capacity planning, with a recent focus on seasonal capacity credit rules changes and the impacts of growing levels of renewable penetration. More information is available here: https://www.misoenergy.org/stakeholder-engagement/issue-tracking/resource-availability-and-need-ran/.

A21. Yes. Since the addition of paired storage only shifts solar energy from certain hours to others, one major value associated with adding paired storage capacity is that it provides incremental UCAP. For the Greensboro PPA, instead of realizing [redacted] of UCAP for [redacted] of solar, the project is expected to receive credit for approximately [redacted] UCAP. Thus, an adjusted IRP LCOE can be calculated by adding capacity costs that would result in an equivalent UCAP for a given amount of solar capacity.

Q22. What LCOE value did you calculate for the 2018 IRP tranches when adjusted to account for the extra capacity value that is embedded in the Greensboro (solar plus storage) PPA?

A22. When accounting for additional capacity costs at the assumed market price of capacity from the 2018 IRP associated with the amount of storage in the Greensboro PPA, the 30-year LCOE of the combined 2023 solar acquisition tranches was calculated to be $57.30/MWh, and the 30-year LCOE of the combined 2023 solar and solar plus storage PPA tranches was calculated to be $44.20/MWh.[11]

[11] These calculations add capacity costs to the IRP tranches such that the resulting UCAP for each MW of solar ICAP is the same as in the Greensboro PPA.

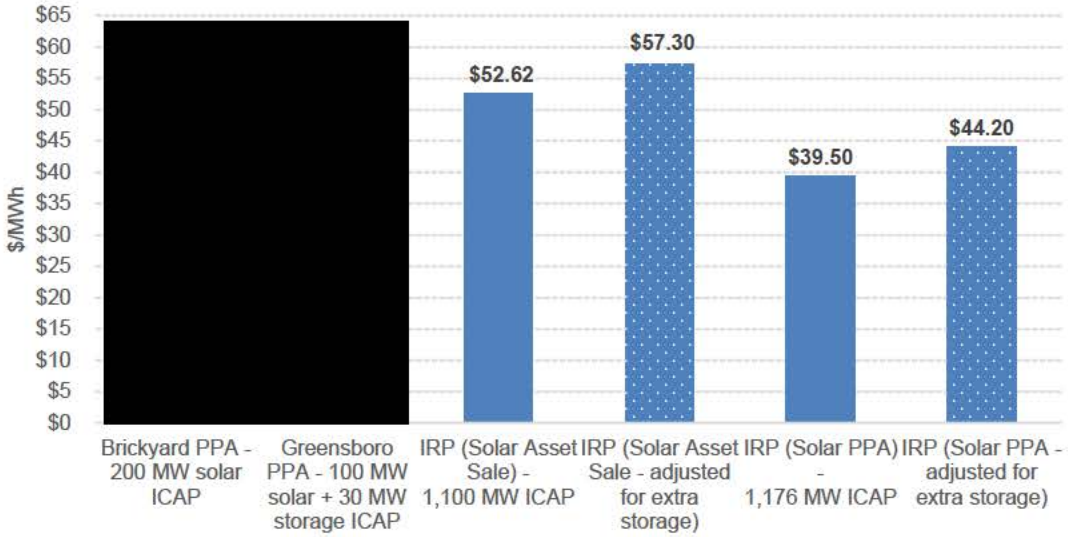
This adjustment may be considered conservative, since the long-term price of available capacity could be higher than the values assumed in the 2018 IRP (reaching only approximately $2/kW-month in real dollars over the long-term forecast horizon), especially as market rules evolve. The adjustment also does not account for any potential ancillary services value nor the potential benefits associated with mitigation against energy price volatility that storage capacity may provide.

Q23. How do the LCOE values of the solar resource tranches incorporated in the 2018 IRP's preferred portfolio compare to the LCOE of the Solar PPAs?

A23. Figure 1 illustrates that the LCOE of the Brickyard PPA is between the LCOE of the PPA resource tranches and the LCOE of the asset acquisition tranches evaluated in the 2018 IRP and [redacted] the generation-weighted LCOE of all IRP solar resources ($46.02/MWh). Figure 1 also illustrates that the LCOE of the Greensboro PPA is higher than the LCOE of the PPA resource tranches and the LCOE of the asset acquisition tranches evaluated in the 2018 IRP and approximately [redacted] higher than the generation weighted LCOE of all IRP solar resources ($46.02/MWh). However, if the IRP tranches are adjusted to account for the incremental

capacity value associated with the 30 MW of storage incorporated in the Greensboro PPA, the premium above the generation weighted LCOE of all IRP solar resources drops to approximately [redacted].

Figure 1. Levelized cost of solar and solar plus storage energy



Q24. What is the expected impact of this premium for the Greensboro PPA versus the IRP tranche average on a net present value of revenue requirements ("NPVRR") basis?

A24. For all of the expected MWh generated by the Greensboro PPA over its 20-year contract period plus the 10-year extension period, [redacted]. This

represents a very small component of the overall revenue requirement[12] and the savings associated with NIPSCO's 2018 IRP preferred plan relative to continuing to operate the existing fleet.[13]

Q25. How does the relief requested in this proceeding support the conclusions of the 2018 IRP and its Short-Term Action Plan?

A25. The operational and cost characteristics of the Solar PPAs are generally consistent with the assumptions for new solar resources used in the 2018 IRP, which developed a preferred portfolio with approximately 2,300 MW (ICAP) of solar additions in the 2023 time period. On an LCOE basis, the cost of the Brickyard PPA is between the costs of the PPA and owned resource tranches evaluated in the 2018 IRP and [redacted] the average LCOE for all IRP solar resources. While the cost of the Greensboro PPA is higher than the LCOE of the IRP solar resources, the NPVRR impact is small, and the storage capacity in the Greensboro PPA is likely to help

[12] The NPVRR of NIPSCO's preferred portfolio F was approximately $11.8 Billion in the 2018 IRP. See Attachment 2-A (NIPSCO 2018 IRP), Figure 9-27 on p. 171.

[13] The preferred retirement portfolio (Portfolio 6) provided approximately $4 Billion in NPVRR savings versus the portfolio that retained all coal through end-of-life (Portfolio 1) and between approximately $1-1.5 Billion versus portfolios that extended the life of some units at Schahfer beyond 2023 (Portfolios 2, 3, and 4). See Attachment 2-A (NIPSCO 2018 IRP), Figure 9-9 on p. 155.

NIPSCO minimize future market capacity credit risk and provide additional value in the energy and ancillary services markets. The Short-Term Action Plan called for acquiring such solar and solar plus storage projects by 2023 in order to produce substantial savings for NIPSCO's customers versus the alternatives. Thus, the addition of the Solar PPAs to NIPSCO's portfolio in 2023 is fully supportive of and consistent with the conclusions of the 2018 IRP and the recommended Short-Term Action Plan.

Q26. Does this conclude your prefiled direct testimony?

A26. Yes.

VERIFICATION

I, Patrick N. Augustine, Vice President, Charles River Associates, affirm under penalties of perjury that the foregoing representations are true and correct to the best of my knowledge, information and belief.

Patrick N. Augustine

Dated: July 17, 2020