ILLINOIS POWER AGENCY

Illinois Power Agency
105 W Madison Street, Suite 1401
Chicago, IL 60602

March 1, 2024

Governor Pritzker
Senate President Harmon
House Speaker Welch

As required by Section 1-129 of the Illinois Power Agency Act (enacted through Public Act 103-0580), the IPA is pleased to release its Policy Study analyzing the potential impacts of three policy proposals from the Illinois General Assembly's Spring 2023 legislative session:

- A proposal to deploy **energy storage systems** through the development of energy storage credit targets for the Agency to procure on behalf of Illinois electric utilities, including distributed energy storage programs. (SB 1587)
- A pilot program to establish one new utility-scale **offshore wind project** in Lake Michigan that can produce at least 700,000 megawatt hours annually for at least 20 years. (HB 2132)
- A policy requiring the procurement of renewable energy credits to support a new **high voltage direct current (HVDC) transmission line** capable of transmitting electricity at or above 525 kilovolts and delivering power in the PJM market. (no bill formally introduced)

This letter has been included with the Policy Study to 1) describe the process for the Policy Study's development, 2) outline key modeling choices made in determining the impacts of these policies, and 3) walk through what this study attempts to accomplish and how its findings may be understood and used to guide public policy discussions—including what this Policy Study does not attempt to cover.

Process for Development

While the statutory obligation to conduct this Policy Study took effect on December 8, 2023 when Governor Pritzker signed Public Act 103-0580 into law, the IPA began working on the Policy Study during the summer of 2023, as we recognized that legislators and stakeholders would benefit from the Study's analyses even if the Study was not required by Illinois law.

Consequently, in August 2023, the IPA requested data specific from the proponents of the projects that would be supported by these three policy proposals. In September 2023, the IPA issued a broad stakeholder feedback request, and interested stakeholders provided responses in October 2023. In the months that followed, the Agency developed the bulk of the content for this Study and published a draft Policy Study for public comment on January 22, 2024.

Comments on the draft Policy Study were received in February 2024. While not all commenters' suggestions were adopted, the Agency reviewed all comments multiple times, and made informed decisions on what is included in the Policy Study. We have endeavored to address even the comments that were not adopted by discussing the comments and providing explanations and workpapers with the final Policy Study that was delivered to the Illinois General Assembly on March 1, 2024.

Illinois Power Agency
105 W Madison Street, Suite 1401
Chicago, IL 60602

The team that worked on the Policy Study consisted of 1) Illinois Power Agency staff; 2) the IPA's Procurement Planning Consultant, Levitan & Associates ("Levitan"); and 3) Levitan's subcontractors GE Energy Consulting and ENTRUST Solutions Group. More information on these firms and their roles can be found in Chapter 4 of the Policy Study.

Much of the Study is background and narrative intended to provide context for policymakers tasked with making difficult decisions regarding resource allocation. Substantive chapters on each of the three policy proposals from the Spring 2023 legislative session are included, with each topic addressed through analyses of approaches to similar policies taken in other jurisdictions juxtaposed against the approach proposed for Illinois. While quantitative modeling outcomes received far more attention in stakeholder comments, we genuinely hope that all who have interest in these issues diligently read these chapters and review the background provided, which provides discussion that is just as necessary for and pertinent to debate over a bill as the modeling results themselves. Accordingly, these substantive chapters were written largely for an audience composed of legislators, legislative staff, the Governor's Office, and other policymakers, and we hope that this content provides a useful foundation for engaging in informed debate around these proposals.

As mentioned above, several modeling tools were used to transform qualitative attributes—such as environmental impacts, economic impacts, grid reliability, and electric rate impacts—into measurable quantitative outputs. To study power flow and reliability, ENTRUST utilized the Siemens PTI PSS®E and PowerGEM TARA software tools, which are widely licensed and used by transmission organizations. For energy prices, capacity prices, and emissions impacts, Levitan relied on the Aurora production simulation model. To model economic impacts, Levitan utilized IMPLAN, a leading provider of economic impact data and analytical applications. For grid reliability and resource adequacy, GE Energy Consulting utilized the GE MARS model, a sequential Monte Carlo simulation providing a detailed representation of the hourly loads, generating units, and interfaces between the interconnected areas of Illinois.

These processes are described further in Chapters 4 and 8 of the Policy Study, and standalone documents of the modeling results are included as appendices to the Policy Study.

Key Modeling Choices

Using modeling tools to determine the likely impacts from policy proposals *on* a future world requires making assumptions *about* that future world. No predictions are failsafe, and a fair critique of this Policy Study – and of any other analysis attempting to model the same – is that the future may look very different that the scenario assumed in the modeling. Consequently, the projected costs and benefits of the policies operating against that backdrop may be different as well.

Nevertheless, hard choices must be made. The IPA, Levitan, and our team of subcontractors did our best to outline a scenario which best served the goal of the Study: to "evaluate the potential impacts of the proposals" across qualitative criteria reduced, where possible, to discrete quantifiable impacts. A sampling of key modeling choices made in this effort is outlined below.

Illinois Power Agency
105 W Madison Street, Suite 1401
Chicago, IL 60602

Additive Storage from Projects Paired with Distributed Generation and Community Solar Projects

Senate Amendment 1 to Senate Bill 1587 includes three policy proposals intended to incent the development of new behind-the-meter energy storage systems paired with rooftop solar, and to incent the development of energy storage systems paired with community solar projects. However, these proposals contain no procurement targets, enrollment estimates, or estimates of the incentive values. Where applicable to modeling, the IPA assumed an additional 1,000 MW of storage projects resultant from these policy proposals (additive to the 7,500 MW of utility-scale storage included in SB 1587).

Reliance on Publicly Available Data Where Possible

The IPA used publicly available information and data sources for the development of modeling inputs to maximize modeling transparency to the greatest extent possible. For example, the key assumptions used in the GE MARS modeling were based on information in GE's internal non-proprietary database, supplemented by publicly available information. However, in limited cases, the team needed to rely on data and information available only under a license. For example, due to the proprietary nature of information maintained by Energy Exemplar in the Aurora database, the limits of specific zonal links for inter-zonal transfer limitations in the model cannot be disclosed.

Choice of MISO Futures Study 1

The IPA elected to utilize the MISO Futures Study as the starting point for generation expansion, retirement, and demand. The Futures Study has been extensively documented in the MISO stakeholder process, so that many interested parties were likely familiar with the study. In the Policy Study team's view, the selection of MISO Future 1A scenario represented the use of the most "known and knowable" assumptions. Relative to Futures 2A and 3A scenarios, more of the resources included in the model are real projects under development or are identified as the result of accepted utility Integrated Resource Plans. Notably, the Futures 1A study period ends in 2042, so Levitan had to develop resource expansion for 2043 on, including positing resource retirements mandated under CEJA.

Zero Emissions Fuel Resources

After Levitan conducted capacity expansion modeling, we found that Illinois required dispatchable generation resources in the Base Case following CEJA-mandated retirements in 2040 and 2045. Storage resources were not included in the capacity expansion options to ensure the Base Case storage buildout allowed for a useful evaluation of the marginal impacts of policies supporting new energy storage projects. While many other technologies, such as flexible demand, might help mitigate the need for a zero emissions fuel ("ZEF") resource, coming up with the optimal portfolio to minimize the long-term cost impacts of CEJA was not the goal of this study. ZEFs are modeled at a high variable cost and represent a limited impact to the commitment and dispatch of proven technologies in the Aurora production cost model, and were thus included in modeling. Furthermore, the energy storage and high voltage transmission line polices studied also demonstrated reductions in the need for ZEFs.

As outlined in Appendix E, this approach mirrors the approach taken in similar forecasting exercises by MISO, NYISO, and other planning bodies.

Reliance on Available RTO Base Case Modeling Data

As is standard in interconnection studies, ENTRUST relied on the models that have been developed by the RTOs, PJM, and MISO. These are the latest models provided by the RTOs for generation interconnection. The rationale behind using these models for the Policy Study is that these are the same models that each RTO would use in conducting interconnection studies for interconnecting customers. The data in the models is vetted by the respective stakeholders in each RTO. Additionally, the RTO models are considered Critical Energy/Electric Infrastructure Information ("CEII") and release of the data required the execution of non-disclosure agreements by ENTRUST.

Load, Capacity, and Transfer Limit Assumptions

With respect to GE MARS, for MISO's load inputs, a forecast from Purdue University was used; and for PJM's load inputs, a forecast from PJM was used. Load forecast uncertainty multipliers from the NPCC Long Range Adequacy Overview ("LRAO") was also used for both forecasts.

Capacity data was based on GE's internal non-proprietary database, supplemented by publicly available information. Renewable capacity was added to meet announced policy mandates.

- For energy storage systems, the modeling included 7,460 MW of energy storage with 4-hour storage duration and 85% round trip efficiency, and 40 MW of energy storage with 10-hour storage duration. By 2030, 1,460 MW of energy storage with 4-hour storage duration and 40 MW of energy storage with 10-hour storage duration are available.

- For offshore wind, 200 MW offshore wind in Lake Michigan was modeled with hourly profiles from NREL's WIND TOOLKIT for the historical years 2007-2013.

- For the SOO Green HVDC transmission line, 2,650 MW of wind in Iowa was modeled with hourly profiles from NREL's WIND TOOLKIT for the historical years 2007-2013; 1,850 MW of solar in Iowa was modeled with hourly profiles from NREL's National Solar Radiation Database for the historical years 2007-2013; and 650 MW of 4-hour energy storage was modeled. A transfer limit from Iowa to Illinois of 2,100 MW was also applied.

Transmission interface limits (import and export limits) between PJM and MISO regions are also included in the GE database. Interface transfer limits between MISO and PJM are based on the Northeast Power Coordinating Council's Long Range Adequacy Overview as well as the MISO Loss of Load Expectation Working Group.

What This Study Is – and What It Is Not

The Policy Study seeks to measure and quantify the anticipated marginal impacts from three discrete policy proposals. That process involves, first, determining a base case against which the introduction of a policy proposal can be modeled. Once that base case is established, one must next model the before and after cases, with the "after" reflecting the impacts of the underlying policy proposal. The

Illinois Power Agency
105 W Madison Street, Suite 1401
Chicago, IL 60602

measured differences then provide quantitative data and demonstrates the "potential impacts" of that proposal across the qualitative criteria flagged for analysis in Public Act 103-0580.

As with all such analyses, the uncertainty inherent in predicting impacts only expands as impacts are analyzed further into the future. Not only is the world we know constantly changing, but the world we expect is shifting dramatically as well: PJM latest load forecast issued in January 2024 now projects nearly a 40% increase in total energy use by 2039, driven in part by the growth in data centers, electric vehicle adoption, and other electrification initiatives. This 2024 updated load forecast substantially increased expected energy consumption relative to the 2023 forecasts used for Policy Study modeling—by about 14.5% on a net energy basis by 2038 and 12.6% for the ComEd zone over the same period. As both the SOO Green HVDC transmission line and the offshore wind project assume deployment near the end of the decade (energy storage projects may begin rolling out more quickly, but still require multi-year development timelines), the period across which the three policy proposals will demonstrate impacts is laced with uncertainty.

In presenting counterpoints to this Policy Study, others may choose to utilize a different snapshot of future conditions to further magnify the benefits of analyzed policies or to restate expected costs. These efforts should not be dismissed simply because they provide narrative support for that party's objectives, as doing so would assume that there are right or wrong answers. From our experience assembling this Study, one should instead assume that there are instead more or less justified choices, and we approached this analysis by making methodological choices that our team believes feature the strongest justification.

This Policy Study also seeks only to analyze the potential impacts of the three discrete legislative proposals selected for analysis through Public Act 103-0580. While comparative information about other approaches taken by different jurisdictions is provided in narrative form, modeling alternative approaches is both outside of the scope of Public Act 103-0580's directives to the IPA and not within our bandwidth while developing the Study within the directed timeline. Consequently, this Study is <u>not</u> an attempt at integrated resource planning, at comprehensive transmission expansion planning, or at devising the optimal mix of energy policies for the State. Further, this Study is not an effort at determining the optimal deployment level for a given technology, nor is it an effort to determine the optimal use of potential subsidy dollars across all possible uses. Instead, as directed by law, this Study is an effort to determine "before" and "after" snapshots demonstrating the potential impacts from three specific policy proposals across various criteria, with inputs in analysis—how much storage, how large of a transmission line, how large of an offshore wind project, and so forth—reflecting choices made through the proposals themselves (to the extent that those choices were clear).

Along those lines, only known and expected results from the policy proposals themselves were modeled and are presented as conclusions. While certain parties argued in comments about the benefits of jumpstarting an industry or spurring various indirect impacts, the IPA sought to model and quantify only that which it could credibly stand behind. In cases where the IPA felt that a benefit or cost could not be reliably measured—for example, the full suite of potential economic impacts resultant from a loss of load event— it was generally not included. This is <u>not</u> to say that such benefits or costs *do not exist*, but that quantification seemed too specious or speculative for the Agency to

Illinois Power Agency
105 W Madison Street, Suite 1401
Chicago, IL 60602

model and stand behind. Relatedly, external capital sources or support through other jurisdictional entities were folded into the analysis where such support was reasonably likely to occur (such as with qualification for a tax credit), but generally not if a future discretionary decision was required (such as receiving grant funding or offering to make community-development commitments).

We also sought to mirror the specific terminology used in the law while assessing impacts. For example, even if a party believes that a policy provides benefits to "disadvantaged communities," the IPA sought to analyze impacts to "environmental justice communities"—a term with a specific meaning under the IPA Act—as directed through Public Act 103-0580. But we recognize that benefits to a broader and geographically distinct array of "disadvantaged communities" may exist and could be important to policymakers. By heeding to statutory directives in analysis, the IPA is not intending to invalidate other lines of argument.

Lastly, this Study is not intended to preempt the pending resource adequacy report due to be developed by Illinois Environmental Protection Agency ("IEPA"), the Illinois Commerce Commission ("ICC"), and the IPA in 2025. Pursuant to Section 9.15(o) of the Illinois Environmental Protection Agency Act, the IEPA, IPA, and ICC must jointly prepare and release a report "that examines the State's current progress toward its renewable energy resource development goals, the status of CO2e and copollutant emissions reductions, the current status and progress toward developing and implementing green hydrogen technologies, the current and projected status of electric resource adequacy and reliability throughout the State for the period beginning 5 years ahead, and proposed solutions for any findings." The first such report is due to be released publicly no later than December 15, 2025. Should that report find that there are concerns related to sufficient resource adequacy or reliability, then the IPA and IEPA "shall develop a plan to reduce or delay CO2e and copollutant emissions reductions requirements only to the extent and for the duration necessary to meet the resource adequacy and reliability needs of the State" with that Plan then filed with and litigated before the ICC. Modeling assumptions and outputs from this Policy Study should not be viewed as precursors to conclusions from that analysis, as this Study requires simplifying assumptions to best measure the potential impacts of discrete policy proposals.

We genuinely hope that this Policy Study proves useful and informative as parties debate these and other energy policy options during the General Assembly's Spring 2024 legislative session and across the years to come.

Sincerely,

Brian P. Granahan

Acting Director, Illinois Power Agency