Illinois Power Agency
2024 Policy Study
Executive Summary

March 1, 2024

Executive Summary

This Policy Study analyzes three policy proposals discussed during the Spring 2023 Legislative Session of the Illinois General Assembly—two of which were formally introduced as bills, and one of which has been discussed conceptually dating back to the negotiations on what ultimately became the Climate and Equitable Jobst Act (Public Act 102-0662) in 2021, and for which the Illinois Power Agency ("IPA" or "Agency") has obtained a draft bill. While none of these proposals passed out of either the Illinois House or Senate in 2023, during the Spring 2023 Legislative Session, the Illinois Senate introduced a third amendment to House Bill 3445 ("HB 3445") directing the Agency to commission and publish a Policy Study evaluating the potential impacts of these proposals on Illinois' decarbonization goals, the environment, grid reliability, carbon and other pollutant emissions, resource adequacy, long-term and short-term electric rates, environmental justice communities, jobs, and the economy. The schedule outlined in HB 3445 directed the Agency to publish an initial draft of the Policy Study for a 20-day public comment period and publish a final Policy Study no later than March 1, 2024.[1]

Though HB 3445 was never enacted, on November 2, 2023, Senate Bill 1699 ("SB 1699") was amended to include the text from HB 3445 directing the IPA to commission and publish the Policy Study. SB 1699 was signed into law on December 8, 2023, creating Public Act 103-0580. Consistent with Public Act 103-0580, the Agency has published this Policy Study to evaluate the potential impacts of these three proposals on Illinois' decarbonization goals, the environment, grid reliability, carbon and other pollutant emissions, resource adequacy, long-term and short-term electric rates, environmental justice communities, jobs, and the economy.

a) Policy Proposals

i) Energy Storage

The first proposal analyzed is Senate Bill 1587 ("SB 1587") and amendments to Senate Bill 1587 of the 103rd General Assembly filed prior to May 31, 2023, or a similar proposal for the deployment of energy storage systems supported by the State through the development of energy storage credit targets. If passed, the Agency would procure energy storage credits on behalf of Illinois electric utilities via a competitive energy storage procurement developed by the Agency. The energy storage credits would be procured from privately-owned, large-scale energy storage providers using energy storage contracts of at least 15-year durations. The energy storage procurement plan would be designed to enhance overall grid reliability, flexibility, and efficiency, and to lower electricity prices in Illinois. In addition to large-scale

[1] As January 21, 2024 was a Sunday, the Agency published the draft Policy Study on January 22, 2024 with a comment deadline of February 12, 2024 (which was later extended to February 26, 2024). This approach lengthened the time for feedback to 21 days (as opposed to 20 days) and shortened the time for revision of the plan to 19 days. Consistent with Public Act 103-0580, the Agency published the final Policy on March 1, 2024 and delivered copies to the Governor and members of the Illinois General Assembly, including policy recommendations for the General Assembly.

energy storage, the proposal also includes the creation of distribution level energy storage programs through utility tariffs as approved by the Illinois Commerce Commission: residential and commercial storage programs that would allow customer-sited batteries to provide grid benefits and cost-savings to ratepayers; and a community solar energy storage program intended to serve as a peak reduction program by utilizing community solar paired storage projects deployed daily in summer months during peak hours. This proposal is discussed in Chapter 5.

ii) Offshore Wind

The second proposal analyzed is House Bill 2132 ("HB 2132") of the 103rd General Assembly as it passed out of the House on March 24, 2023, or a similar pilot program proposes to establish one new utility-scale offshore wind project capable of producing at least 700,000 megawatt hours annually for at least 20 years in Lake Michigan. This proposed bill requires that the new utility-scale offshore wind project include an equity and inclusion plan to create job opportunities for underrepresented populations in addition to equity investment in eligible communities, and include a fully executed project labor agreement. This proposal is discussed in Chapter 6.

iii) High Voltage Transmission Line

Finally, the third proposal analyzed is a policy establishing renewable energy credits for a high voltage direct current transmission line bringing power from Iowa to Illinois. The proposal requires the Agency to procure long-term contracts (25 to 40 years duration) for the delivery of renewable energy credits on behalf of electric utilities in Illinois with at least 300,000 customers. The renewable energy credits would be delivered by a high voltage direct current transmission facility with more than 100 miles of underground transmission lines in this State capable of transmitting electricity at or above 525 kilovolts and delivering power into the PJM market (which the IPA understands to be the SOO Green HVDC Link project). This proposal is discussed in Chapter 7.

b) Policy Study Approach

Chapter 2 describes the State's Renewable Portfolio Standard and provides historical background on Illinois legislation that led to the policy proposals analyzed in this Policy Study, which were introduced during the Illinois General Assembly Spring 2023 legislative session. Chapter 2 also describes the Agency's process for developing this Policy Study, including receiving feedback from technical data requests from proponents of these three policies, as well as receiving broader information and additional perspectives from stakeholders on the policy areas being studied, including any data, information, reports, analyses, considerations, or other information which stakeholders believe should be brought to the IPA's attention for conducting a comprehensive and well-rounded analysis in the Policy Study.

Chapter 3 describes the legislative proposals that were introduced during the Illinois General Assembly's Spring 2023 legislative session including Senate Bill 1587 that would require the Agency to develop an energy storage procurement plan resulting in electric utilities contracting for energy storage credits from contracted storage systems; House Bill 2132 that would require the Agency to develop a procurement process to procure at least 700,000 renewable energy credits, delivered annually for at least 20 years, from one new utility-scale offshore wind project in Lake Michigan; and a policy requiring the Agency to procure high voltage direct current ("HVDC") renewable energy credits related to an HVDC.

Chapter 4 describes the Agency's process using its Planning and Procurement Consultant, Levitan and Associates ("Levitan") and subcontractors, ENTRUST Solutions Group and GE Energy Consulting, for conducting the modeling and analytical work necessary to support the Policy Study. Full reports of each modeling exercise are available as Appendices B to E of the Policy Study, and Chapter 8 provides an overview of the methodology used for each.

Levitan's modeling and analytical work for the Policy Study included using Aurora, a production cost simulation model that is widely used in the power industry. Aurora assesses the policy proposals' impacts on wholesale electricity prices, emissions, and changes to the composition and operation of the generation resource mix in Illinois. Levitan also used IMPLAN economic modeling to evaluate the policy proposals' impacts on the State's employment and the State's economy. IMPLAN estimates the relationship between a given set of demands for final goods and services and the inputs required to satisfy those demands by tracking industry production and domestic consumption, such as household spending.

ENTRUST Solutions Group used Siemens PTI PSS®E and PowerGEM TARA, steady-state power flow software tools which are widely used by transmission organizations and are a critical part of several production tool chains for transmission planning and operations in the U.S., to evaluate the impacts on transmission reliability and grid resilience; and used power flow modeling to evaluate the impacts on grid reliability. Siemens PTI PSS®E and PowerGEM TARA use power flow analysis to analyze a power system in normal steady-state operation, then simulate scenarios that could adversely affect the operation of the system to identify potential contingencies that could be caused by the interconnection of the resources associated with each of the three policy proposals in the Policy Study.

GE Energy Consulting utilized industry standard modeling tools including GE's Multi-Area Reliability Simulation ("GE MARS") to evaluate the proposals' impacts on generation reliability and resource adequacy—the ability of an electric power system to meet demand for electricity—in the years 2030 and 2040. The GE MARS simulation included load forecast uncertainties, transmission outages, equipment failures that would interrupt transmission or generation, and variable renewable generation operations such as when the wind stops blowing unexpectedly.

c) Modeling Results

i) Energy Storage Development

The modeling results for energy storage, as proposed in SB 1587, suggest that the proposed storage would have a positive impact on Illinois' generation reliability and resource adequacy; would increase transmission reliability and grid resilience; would lower wholesale energy costs; would avoid emissions from fossil fuel combustion; and would positively impact the State's economy and lead to job creation.

The deployment of 7,500 MW of utility-scale energy storage was modeled to demonstrate the impacts on generation reliability, resource adequacy, transmission reliability, and grid resilience. The loss of load expectation ("LOLE") industry standard is 0.1 days/year (or one day in ten years).[2] The modeling results showed that compared to that base case level of 0.1, by 2030 when the storage would not yet be fully deployed, the LOLE for the modeled level of energy storage would drop to 0.01. By 2040, when the 7,500 MW of utility-scale energy storage is modeled to be fully deployed, the LOLE is expected drop to 0.0 versus the 0.1 days/year modeling baseline.

Regarding transmission reliability and grid resilience, modeling results showed that as generation resources are added to the grid, existing overloaded grid conditions or constraints can increase, and new overloads or constraints can develop. The analysis conducted for this policy study identified likely transmission upgrades that would be needed to support additional generation resources, with estimated upgrade costs in MISO and PJM illustrated in Table 5-7 and Table 5-8. The estimated cost of transmission upgrades in MISO ranges from $6,450 to $818,067 per MW of added storage capacity in MISO and $49,125 to $3,864,091 in PJM. Actual costs can only be determined by the completion of full interconnection studies by the applicable RTO.

8,500 MW of energy storage (7,500 MW of utility-scale projects on the transmission system and 1,000 MW of distributed projects paired with solar systems) were used to model impacts on energy costs, the economy, job creation, and emissions.

The proposed 7,500 MW of utility-scale energy storage development projects would impact Illinois electricity costs in two ways: (i) based on estimates of the revenue the projects would receive from capacity and energy sales, the study estimates a net shortfall of $239.1 million per year—this amount would be the annualized cost that would be supported by Illinois ratepayers through the purchase of energy storage credits; and (ii) the storage projects would benefit Illinois ratepayers by lowering wholesale energy costs by $739.1 million over 20 years, or $22.6 million on an annualized basis in real 2022 dollars. Deploying 1,000 MW

[2] LOLE determines the numbers of days in which a loss of load (i.e., a power outage/disconnection) would be expected to occur on average across variety of system conditions. LOLE of 0.1 days/year is a de-facto standard, or criteria, in industry for probabilistic reliability metrics, sometimes referred to as "1 day in 10 years". The criteria of 0.1 days/year LOLE is used as the starting point for analysis of LOLE improvement to allow the impacts to reliability of different resources to be comparable. By using the criteria of a LOLE of 0.1 days/year for this analysis, it shows how each policy improves the reliability of the Illinois system if the system's reliability is at "criteria" (LOLE of 0.1 days/year).

of distributed energy storage would have an annualized cost of $82.2 million, while contributing $4.0 million in lowering wholesale electricity costs.[3]

For the average Ameren residential customer, the modeling indicates that the monthly bill impact from 2030-2040 of implementing the energy storage policy would be $2.88 in nominal dollars and $1.89 in real 2022 dollars. For the average ComEd customer the impact would be $1.85 in nominal dollars and $1.21 in 2022 real dollars. The difference is due to the lower average consumption of ComEd customers compared to Ameren customers. For more information on these comparisons, see Section 8.d.ix.

While avoided emissions from the combustion of fossil fuels, including particulate matter, sulfur dioxide, and nitrogen oxides is uncertain, a range of potential estimates of the monetized value of the avoided emissions from the proposed energy storage projects over the 20-year period is in the range of $531 million to $4.8 billion in 2022 real dollars as shown in Table 5-11.

The introduction of storage resources had a significant impact on the dispatch of ZEFs. Storage reduced the output of ZEFs by 63%. The introduction of storage resources also effectively "idled" approximately 2,100 MW of ZEF capacity that was included in the base case. The idled units had zero output in the second half of the study period (2040-2049) in the Storage case.[4]

Further, IMPLAN modeling estimated the economic impacts from proposed energy storage on employment, labor income, value added, and output. Employment is the number of jobs associated with economic activity and is expressed as 2,080-hour Full Time Equivalent ("FTE")-years. For example, an employment impact of one is equal to a single person working 2,080 hours. Labor income is all forms of employment income, including employee compensation—wages and benefits—and proprietor income. Value added is the difference between an industry's or establishment's total output and the cost of its intermediate inputs—it is a measure of the contribution to GDP. Output is the value of industry production, including the cost of its intermediate inputs. The energy storage modeled was for two scenarios (i) deployment of 7,500 MW of utility-scale energy storage; and (ii) deployment of 1,000 MW of distributed storage (200 MW for residential projects and 800 MW for commercial or community solar projects). The inputs for capital and operating expenditures are higher for distributed storage due to higher equipment and labor costs for smaller scale systems. While not definitive, the IMPLAN modeling found that of the three policies studied, the energy storage projects would have the largest impact in terms of dollars of value added

[3] The costs and emissions reduction results presented in this section have been revised from the draft Policy Study to reflect several corrections in modeling. The most significant revisions include those described in the Agency's February 8 errata that updated the reporting of energy revenue, and revisions made after receiving comments on the draft Policy Study that include updating retirement schedules for certain plants, adopting an adjustment to the capacity price for the ComEd zone, and including the investment tax credit for the proposed offshore wind project. For details on those corrections please see Section 8.d.i.

[4] ZEFs are Zero Emissions Fuel units included in the Aurora production cost modeling to establish the base case that policy scenarios are compared against. ZEFs are called upon sparingly in the Aurora production cost modeling but are critical during stressed system conditions. 8.5 GW of ZEFs are included in the modeling. See Section 8.d.v for more details on the use of ZEFs.

and employment, with the total employment associated with the utility scale and distributed storage cases taken together ranging from 32,417 FTE-years to 115,329 FTE-years and the total value-added impact ranging from $3.9 billion to $16.3 billion. While the modeling did not specifically address the way in which the employment and total value-added impacts would be distributed in Illinois, several observations can be drawn from the modeling results—the utility-scale storage and distributed storage impacts are likely to be spread around the State but would be concentrated in MISO Zone 4, where most of the ESS queue locations modeled are located, and in the high capital and operating expenditure cases where the battery cell manufacturing facilities would be located.

Finally, the modeling suggests that the economic and employment impacts associated with the high capital and operating expenditure storage cases may offer support for policies designed to encourage battery manufacturers to locate new manufacturing and assembly facilities in Illinois.

ii) Offshore Wind in Lake Michigan

The modeling for the offshore wind project proposed in HB 2132 suggests that the project would have minimal impacts on generation reliability and resource adequacy in Illinois; would not have a significant impact on grid resiliency; would increase the State's RPS rate impact cap and reduce wholesale energy costs; would avoid emissions from fossil fuel combustion; and would positively impact the State's economy.

The modeling of the offshore wind project showed that in both 2030 and 2040, LOLE would decrease from a base case of 0.1 to 0.09, which is a much smaller impact than seen by the energy storage and HVDC transmission line policies that were also studied. The proposed offshore wind project's small impact on generation reliability and resource adequacy is likely due to the project's size of 200 MW. Additionally, the modeling showed the Effective Load Carrying Capability ("ELCC")—which measures the resource's ability to produce electricity when the grid is most likely to experience an electricity shortage and is expressed as a percentage of a resource's total capacity—for of the offshore wind project would be 29% in 2030 and 20% in 2040.

Regarding transmission reliability and grid resilience of offshore wind, five different potential interconnection points in the Lake Calumet area of Chicago were studied.[5] The five points do not differ greatly in projected interconnection costs, and these costs are generally significantly higher than the projected cost per megawatt to interconnect the SOO Green HVDC transmission line or utility-scale energy storage projects, and do not provide a significant improvement of grid resilience.

Modeling of the proposed offshore wind project's impacts on electricity costs showed that the project would impact electricity prices in several ways: (i) HB 2132 would authorize an increase in the RPS rate impact cap from 4.25% to 4.5% which is roughly equivalent to $33-

[5] For additional details on these potential interconnection points, please see Appendix B.

$34 million per year; (ii) the revenue the project would receive from capacity and energy sales, and the sale of RECs, would be less than what is required to support the project, with a projected annualized shortfall (in 2022 dollars) of $10.6 million. This suggests that for the project to be viable, the proposed increase in the RPS rate impact cap may not be quite sufficient to support the project and a higher level might be required to support the project's development; and (iii) the project would benefit ratepayers by impacting wholesale energy costs, lowering those costs for Illinois ratepayers by $301.6 million over 20 years, or $8.9 million on an annualized cost in 2022 dollars.[6]

For the average Ameren residential customer, the modeling indicates that the monthly bill impact from 2030-2040 of implementing the offshore wind policy would be $0.39 in nominal dollars and $0.25 in real 2022 dollars. For the average ComEd customer the impact would be $0.25 in nominal dollars and $0.16 in 2022 real dollars. The difference is due to the lower average consumption of ComEd customers compared to Ameren customers. For more information on these comparisons, see Section 8.d.ix.

While avoided emissions from the combustion of fossil fuels, including particulate matter, sulfur dioxide, and nitrogen oxides is uncertain, a range of potential estimates of the monetized value of the avoided emissions from the proposed offshore wind projects over the 20-year period is in the range of $115 million to $1.1 billion as shown in Table 6-5.

Lastly, IMPLAN modeling of the offshore wind project's economic impacts and job creation estimates that the project could create 764 to 1,893 FTE-years with total value added impacts in the range of $97.8 million to $265.1 million.

iii) SOO Green HVDC Transmission Line

The modeling for the proposed SOO Green HVDC transmission line suggests that the line would positively impact generation reliability and resource adequacy (although uncertainty remains regarding its recognition as a capacity resource and eventual accreditation);that transmission system upgrades for the HVDC transmission line would likely be needed to ensure reliability and grid resilience; that the HVDC transmission line would lower wholesale energy costs and avoid emissions from fossil fuel combustion; and that the HVDC transmission line would positively impact the State's economy and lead to job creation.

Regarding generation reliability and resource adequacy, the modeling shows that the proposed SOO Green transmission line would reduce the LOLE from the base case level of 0.1 to 0 in 2030 and to 0.01 in 2040. Similarly, based on the profile of generating facilities submitted by SOO Green, the modeled ELCC for SOO Green would be 96% in 2030 and 92%

[6] The costs and emissions reduction results presented in this section have been revised from the draft Policy Study to reflect several corrections in modeling. The most significant revisions include those described in the Agency's February 8 errata that updated the reporting of energy revenue, and revisions made after receiving comments on the draft Policy Study that include updating retirement schedules for certain plants, adopting an adjustment to the capacity price for the ComEd zone, and including the investment tax credit for the proposed offshore wind project. For details on those corrections please see Section 8.d.i.

in 2040, indicating that a significant portion of the energy delivered by SOO Green would contribute to generation and resource adequacy. The modeling also showed that, for transmission reliability and grid resilience, transmission system upgrades would be needed, however, the actual costs these upgrades can only be determined by the completion of full interconnection studies by the applicable RTO (PJM).

Further, the proposed SOO Green Line would impact electricity prices in two ways: (i) based on the estimate of the revenue the project would receive from capacity and energy sales, and an estimated strike price of $115.39/MWh, the study estimates a $430.7 million per year difference—this amount would be the annualized cost (revenue shortfall) that would be supported by Illinois ratepayers through the purchase of RECs from the project; and (ii) the project would benefit ratepayers by impacting wholesale energy costs, lowering those costs for Illinois ratepayers by $5.85 billion over 20 years, or $178.3 million on an annualized cost in 2022 dollars.[7]

For the average Ameren residential customer, the modeling indicates that the monthly bill impact from 2030-2040 of implementing the high voltage direct current transmission line policy would be $4.99 in nominal dollars and $3.42 in real 2022 dollars. For the average ComEd customer the impact would be $3.21 in nominal dollars and $2.20 in 2022 real dollars. The difference is due to the lower average consumption of ComEd customers compared to Ameren customers. For more information on these comparisons, see Section 8.d.ix.

The introduction of SOO Green had a significant impact on the dispatch of ZEFs. SOO Green reduced the output of ZEFs by 29%. The introduction of SOO Green also effectively "idled" approximately 700 MW of ZEF capacity that was included in the base case.[8]

While avoided emissions from the combustion of fossil fuels, including particulate matter, sulfur dioxide, and nitrogen oxides is uncertain, a range of potential estimates of the monetized value of the avoided emissions from SOO Green over the 20-year period is in the range of $2.5 billion to $23.7 billion as shown in Table 7-8.

Lastly, the proposed HVDC transmission line could provide economic impacts in Illinois of 3,470 FTE-years and total value added of $414.5 million. In contrast, according to filings made by SOO Green before the Iowa Utilities Board, the project would create $663 million in capital expenditures in Iowa and 5,439 FTE-years in job creation for the construction of the line. In addition, according to SOO Green's filing the development of the renewable resources

[7] The costs and emissions reduction results presented in this section have been revised from the draft Policy Study to reflect several corrections in modeling. The most significant revisions include those described in the Agency's February 8 errata that updated the reporting of energy revenue, and revisions made after receiving comments on the draft Policy Study that include updating retirement schedules for certain plants, adopting an adjustment to the capacity price for the ComEd zone, and including the investment tax credit for the proposed offshore wind project. For details on those corrections please see Section 8.d.i..

[8] ZEFs are Zero Emissions Fuel units included in the Aurora production cost modeling to establish the base case that policy scenarios are compared against. ZEFs are called upon sparingly in the Aurora production cost modeling but are critical during stressed system conditions. 8.5 GW of ZEFs are included in the modeling. See Section 8.d.v for more details on the use of ZEFs.

in Iowa that would supply the line would create an additional $1.3 billion to 1.6 billion in wages and an additional 19,683 and 24,030 FTE-years.

d) Recommendations

Chapter 9 provides policy recommendations that Illinois Power Agency has developed for the General Assembly to consider regarding the three proposed policies.

These recommendations include:

i) General Recommendations

The Agency's recommendations include general recommendations such as considering how market volatility could impact project developers and Illinois ratepayers; ensuring developed policies include the equity and labor standards outlined in CEJA; accounting for flexibility in procurements under each of the three proposed policies; and ensuring the policies are planned in conjunction with other initiatives focused on Illinois' transition to a decarbonized, clean energy economy.

ii) Energy Storage

The Agency's recommendations specific to energy storage policy include ensuring that the Agency has flexibility to determine and adjust energy storage procurement goals in a manner necessary for supporting Illinois' clean energy goals; authorizing a dedicated program modeled from the Illinois Solar for All Program to support storage for income-eligible customers and customers residing in environmental justice communities; ensuring that the incentives from an Energy Storage Tariff Credit are calibrated with the smart inverter rebate for storage to ensure that the total compensation received by customers is appropriate; exploring opportunities for long-duration energy storage systems; considering initial forward procurements; and adopting requirements for storage valuation.

iii) Offshore Wind

The Agency's recommendations specific to an offshore wind policy include analyzing and factoring in in similar challenges faced by other states with offshore wind project cancellations; requiring robust information on project economics before authorizing a procurement event; considering federal funding application status for port development and construction when approving procurements to support an offshore wind project; adopting the recommendations of the Lake Michigan Offshore Wind Advisory Report that clarify securing rights to the lakebed for offshore wind development; thoroughly reviewing environmental impacts of offshore wind that may require further review by other agencies; authorizing and funding additional research on the geophysical characteristics of the potential areas for wind development; and requiring additional information on the offshore wind project interconnection point and associated site improvements as a prerequisite condition for a contract award.

iv) High Voltage Transmission Line

The Agency's recommendations specific to a policy supporting an HVDC transmission line include requiring additional information from SOO Green regarding the renewable energy resources that will supply the HVDC transmission line prior to obtaining approval of public support for the line; requiring equity commitments to both the SOO Green HVDC transmission line construction and to any renewable energy development in Iowa for projects producing RECs paid for by Illinois ratepayers; ensuring any unresolved capacity market participation issues for SOO Green are satisfactorily resolved prior to committing ratepayer funds to support the project; considering the timing of cost recovery to support the SOO Green HVDC transmission line, and in the alternative, consider if collections should not begin until a later date in order to decrease the short-term rate impacts to Illinois ratepayers; and creating a different system for managing maximum bid prices and determining the level of public financial support for the HVDC transmission line

Please refer to Chapter 9 for more detailed discussion of these recommendations.