



**2020 Integrated Resource Plan Annual Update Report**

**The Empire District Electric Company**

**File No. EO-2020-0284**

**March 2020**

**\*\*Denotes Highly Confidential\*\***

## **2020 Integrated Resource Plan Annual Update Report**

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## **The Empire District Electric Company (“Liberty-Empire”) 2020 Integrated Resource Planning Update Report**

### **Executive Summary**

This report and the associated workshop with stakeholders are intended to meet the requirements of 20 CSR 4240-22.080(3) which is an Integrated Resource Plan (“IRP”) Annual Update. Due to the timing of filings, it is not specifically intended to address any stakeholder alleged deficiencies or concerns from the 2019 triennial IRP, nor is it a replacement for any discussions to address any identified deficiencies or concerns that result in a joint filing with the Commission. In order to meet the scheduled filing date of this IRP Annual Update, Liberty-Empire developed most of this report without knowledge of stakeholder comments on its 2019 Triennial IRP. As a result, this report is based on the best information available at the time and is subject to change as conditions warrant.

Liberty-Empire filed its last IRP in June of 2019. The preferred plan resulted from a technically rigorous, balanced, and innovative analysis. The preferred plan strikes a balance between demand-side and supply-side resources as well as utility-scale and distributed resources and includes the retirement of the Asbury coal-fired power plant, investment in solar and storage as near-term capacity and energy options that can take advantage of federal tax credits, investment in distributed energy resources including community solar and distribution substation projects, and investment in demand-side management.

The plan also incorporates the 600 MW of wind that received Certificates of Convenience and Necessity (“CCN”) by the Missouri Public Service Commission (“Commission”) in Docket No. EA-2019-0010 and as described in Liberty-Empire’s 2018 preferred plan update to its 2016 IRP. In its June 2019 Report and Order, the Commission found that the wind projects “promote the public interest” by providing low cost generation, meet policy goals “to diversify energy resources and develop economical renewable energy sources,” satisfy the public interest “in regard to the use of renewables, especially through the sale of RECs to non-residential customers,” and provide local and state economic benefits such as “additional property taxes, land lease payments, and job creation.” Taken as a whole, all of Liberty-Empire’s planned resource investments are expected to reduce resource portfolio costs and portfolio risk, increase the set of resource options for customers, and significantly decrease carbon emissions across the portfolio.

In addition to resource investments, the 2019 IRP also described a set of future grid modernization investments that would enable new technology choices, improve reliability, and increase customer satisfaction. The IRP described Liberty-Empire’s plans for rolling out its advanced metering infrastructure (“AMI”) or smart meter system to all customers by the end of June 2021. After the smart meters are installed, the Company will begin the integration of its corporate meter data management system with its Enterprise Resource Planning (“ERP”) business management software, including

customer care and billing, which will enable new rate design possibilities and better customer interfaces.

Since filing its IRP in June, Liberty-Empire has taken significant steps in executing on the plan:

First, the Company took steps to retire the Asbury plant in 2020, following nearly fifty years of service, including the filing of several informational notices to the Commission. Asbury was de-designated in the market as of the end of March 1, 2020.

Second, the Company has proceeded with the development of the three wind projects approved by the Commission in Docket No. EA-2019-0010. The Neosho Ridge Project is located in Neosho County, Kansas, while the other two projects, Kings Point and North Fork Ridge, are located in Barton, Dade, Lawrence and Jasper counties in Missouri. The Missouri sites are relatively close to the Company's Asbury and Energy Center generation stations. These three projects are expected to be completed by the end of 2020, which will enable them to take advantage of the full federal production tax credit.

As part of its Community Solar Pilot Program, the Company remains on track to offer the first 10 MW of community solar by 2021. The program will provide customers the opportunity to subscribe to the generation of solar facilities owned by Liberty-Empire, which can then provide an offset for energy used by customers.

Fourth, the Company is considering a Missouri Energy Efficiency Investment Act ("MEEIA") filing in 2020 for approval of a new energy efficiency program and an accompanying demand-side investment mechanism in Missouri. If approved, this filing may lead to a substantial change to the demand-side resource plan filed in the 2019 IRP.

Finally, the Company is in the process of implementing its AMI initiative. As of February 2020, the Company has executed contracts with the major vendors, including Itron. The Company expects approximately 50% of the meters to be installed by the end of 2020, with the remaining installed by the end of June 2021. The Company expects the meters to generate significant cost reduction and other benefits for customers.

The Company is making this filing consistent with 20 CSR 4240-22.080(3). This section requires that the utility file an annual update report within 20 days of a stakeholder workshop that shall be held on or about April 1. As stated in this section, the depth and detail of the report shall generally be commensurate with the magnitude and significance of the changing conditions since the last filed IRP, which for Liberty-Empire was June 2019. The purpose of the workshop is to ensure that stakeholders have an opportunity to provide input and stay informed regarding the utility's preferred plan, the status of critical

uncertain factors, the utility's progress in implementing the resource acquisition strategy, analysis and conclusions surrounding identified special contemporary issues, resolution of any deficiencies, and changing conditions generally.

Liberty-Empire's annual update contained herein ("2020 IRP Annual Update") reviews the 2019 IRP preferred plan and the steps the Company has taken toward implementation since the filing of the 2019 IRP. The update also identifies how assumptions surrounding uncertain factors identified as critical in the 2019 IRP have changed since the IRP was filed in June 2019. Finally, the update provides the analysis and responses requested to the special contemporary issues, as identified in EO-2020-0044.

Liberty-Empire will continue to build on the findings and conclusions of its 2019 IRP to ensure the provision of lowest reasonable cost, low-risk service to its customers that meets customers' increasing interest in renewable and distributed energy, improves environmental performance, and protects system safety, reliability, and security for generations to come.

## **1. Introduction**

In March 2019, Liberty-Empire filed a Motion for Extension of Time to the Commission, requesting an extension for its triennial IRP compliance filing of approximately 90 days (from April 1 to July 1). This request was made primarily to incorporate distributed energy resources into the 2019 IRP analysis, which were topics of major discussion during stakeholder meetings for the IRP. Liberty-Empire's triennial IRP compliance filing was made on June 28, 2019 in File No. EO-2019-0049. This filing was pursuant to and in compliance with the requirements of 20 CSR 4240-22 (Rule or IRP Rule).

Partially due to the extension of time to file, during the development of this report, Liberty-Empire had not received stakeholder feedback on its 2019 IRP. Due to the timing of the receipt of stakeholder feedback on its 2019 IRP, and in order to meet the scheduled filing date of the IRP Annual Update, Liberty-Empire developed most of this report without knowledge of stakeholder comments on its 2019 IRP. As a result, this report is based on the best information available at the time and does not address the resolution of any alleged deficiencies or concerns pursuant to 20 CSR 4240-22.080(16). The purpose of the 2020 IRP Annual Update is to ensure that members of the Missouri stakeholder group have the opportunity to provide input and to stay informed regarding the changing conditions since the last triennial IRP filing in 2019. Liberty-Empire's next triennial compliance filing is scheduled for April 1, 2022. Consistent with 20 CSR 4240-22.080(3), this annual update filing includes updates regarding the:

- 1) Utility's current preferred resource plan;
- 2) Status of the identified critical uncertain factors;
- 3) Utility's progress in implementing the resource acquisition strategy;
- 4) Analyses and conclusions regarding any special contemporary issues that may have been identified pursuant to 4 CSR 240-22.080(4); and
- 5) Changing conditions generally.

In developing this report, Liberty-Empire reviewed and updated the critical uncertain factors identified in the 2019 IRP. Most of the critical uncertain factor updates in this report are based on Liberty-Empire's most recent and approved rolling five-year business plan, which is internally referred to as the six-year budget and which is developed on an annual basis as a part of Liberty-Empire's ongoing internal planning process. The 2020 internal budget covers the period 2020-2025.

Additionally, this report provides updates regarding Liberty-Empire's progress on implementing various aspects of the 2019 IRP preferred plan. These updates include the steps taken toward the retirement of Liberty-Empire's Asbury plant in March 2020, the procurement of 600 MW of wind by the end of 2020, the planned rollout of Liberty-Empire's system-wide AMI project by the end of June 2021, and Liberty-Empire's Community Solar Pilot Program, as laid out in the 2019 IRP.

Finally, the 2020 IRP Annual Update analyzes, incorporates, and responds to nine special contemporary issues. As the Rule states, special contemporary issues involve a “written list of issues contained in a Commission order with input from staff, public counsel, and intervenors that are evolving new issues, which may not otherwise have been addressed by the utility or are continuations of unresolved issues from the preceding triennial compliance filing or annual update filing.” The Order establishing the special contemporary resource planning issues to be addressed in this annual update was issued on October 30, 2019 in File No. EO-2020-0044 with an effective date of November 9, 2019. These issues are addressed in Section 7 of this report.

Following section (1) introduction, this report contains sections addressing (2) the status of the critical uncertain factors, (3) a resource acquisition strategy update, (4) transmission and distribution analysis update, (5) other updates, (6) a preferred plan update, and (7) special contemporary issues.

**2. Status of the Identified Critical Uncertain Factors**

In its 2019 IRP filing, Liberty-Empire identified the following critical uncertain factors: environmental standards/carbon pricing, market and fuel prices, load, and capital/transmission/interest rates. This section will address changes in these factors since the last IRP.

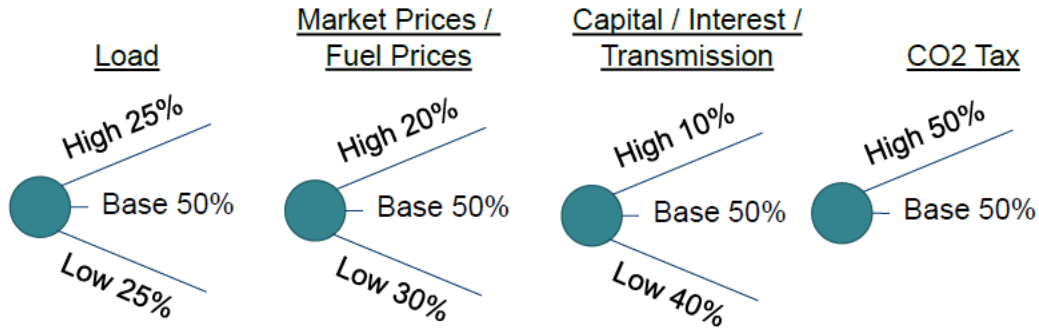


Figure 1: Critical Uncertain Factors and Probability Weightings as Analyzed in the 2019 IRP

**A. Market and Fuel Prices Update**

This section discusses updates to natural gas prices, coal prices, and market prices since the 2019 IRP. A summary of the fuel and market price forecasts used in the 2019 IRP was presented in the 2019 IRP Executive Summary. Additional information on the 2019 IRP fuel and market price forecasts can be found in 2019 IRP Volume 4.

**Natural Gas Price Forecast Update**

For the long-range 2019 IRP study, Liberty-Empire used the natural gas price forecasts from the ABB 2018 Fall Midwest Power Reference Case (considered highly confidential). ABB developed three separate price forecasts for use in modeling base, low, and high gas price scenarios.

For the development of a six-year budget for the 2020-2025 Budget Cycle, Liberty-Empire used gas prices from the Horizons Energy 2020 market forecast. Overall, the gas price forecasts used for the 2020-2025 Budget Cycle were lower than the gas price forecasts modeled in the 2019 IRP Base Case and were more closely aligned with the IRP Low Case forecast. However, the updated gas prices are still within the range of uncertainty analyzed in the 2019 IRP. The EIA AEO 2020 gas price forecast is included below for comparison.



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### **Coal Price Forecast Update**

During each budget cycle, Liberty-Empire updates coal forecasts for internal planning purposes. This includes contract knowledge and input from partners in charge of procuring coal for jointly owned units as it becomes available. When the 2019 IRP was developed, coal price forecasts for owned units were based on the then current budget cycle in the shorter term and ABB forecasted commodity prices in the longer term.

The most recent six-year budget is based on the more recent 2020-2025 budget cycle. Generally, the aggregate weighted average coal price in the 2020-2025 budget is in line with prices in the same period in the 2019 IRP, as shown in the table below. As presented in the 2019 IRP reports, the prices in the table are the freight on board (“FOB”) price and do not include additional delivery costs.

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### **Market Price Forecast Update**

In the 2019 IRP, multiple sets of market prices were developed by ABB based on forecasted fuel prices, emission prices and other scenario assumptions. In order to develop market prices, ABB uses various modules to generate a forward market view of the Southwest Power Pool – Kansas/Missouri (“SPP-KSMO”) pricing hub by modeling the entire Eastern Interconnect, one of the major electrical grids in North America. The output is a set of 8,760 hourly market prices for each year in the study period. This process is both costly and requires a large amount of data and computer processing time.

Liberty-Empire did not re-contract with ABB to update long-term market prices for this report because Liberty-Empire’s updated fuel prices, which are highly correlated with market prices, were found to be within the range of uncertainty identified in the 2019 IRP. In addition, Liberty-Empire used EDE load node market prices developed by Horizons Energy for internal planning purposes.

To adequately compare Liberty-Empire’s most recently updated set of EDE load node annual weighted average prices to the SPP-KSMO market prices used in the 2019 IRP, Liberty-Empire calculated the historical basis between the two sets of historical prices. Liberty-Empire then applied this historical basis to the updated EDE load node annual weighted average price forecast to arrive at a corresponding “SPP-KSMO” market price curve. A comparison of the 2019 IRP market prices and the 2020 Budget Cycle market prices is provided below.

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## **B. Environmental Update**

Liberty-Empire is subject to various federal, state, and local laws and regulations with respect to air and water quality and with respect to hazardous and toxic materials and hazardous and other wastes including their identification, transportation, disposal, record-keeping, and reporting as well as remediation of contaminated sites and other environmental matters. Liberty-Empire operates its coal-fired generating facilities in compliance with environmental laws and regulations.

Environmental laws or regulations that may be imposed at some point within the planning period may impact air emissions, water discharges, or waste material disposal. A brief discussion of the compliance costs that could result from most of the standards above was provided in the 2019 IRP Volume 4 Section 2.5. An update to the standards described in the 2019 IRP is further described below.

### **Affordable Clean Energy Rule**

In December 2017, the EPA issued an advance notice of proposed rulemaking (“ANPRM”) in which the agency proposed emission guidelines to limit greenhouse gas (“GHG”) emissions from existing Electrical Generating Units (“EGUs”) and solicited information on the proper respective roles of the state and federal governments in that process, as well as information on systems of emission reduction that are applicable at or to an existing EGU, information on compliance measures, and information on state planning requirements under the Clean Air Act (“CAA”). This ANPRM did not propose any regulatory requirements.

In June 2019, EPA issued the final Affordable Clean Energy (“ACE”) rule and repealed the Clean Power Plan. The ACE rule established emission guidelines for states to develop plans to address GHG emissions from existing coal-fired power plants.

The ACE rule has several components: a determination of the best system of emission reduction for greenhouse gas emissions from coal-fired power plants, a list of “candidate technologies” states can use when developing their plans, a new preliminary applicability test for determining whether a physical or operational change made to a power plant may be a “major modification” triggering New Source Review, and new implementing regulations for emission guidelines under Clean Air Act section 111(d). Although the Asbury plant will not be impacted, Iatan and Plum Point will come under the requirements of the ACE rule.

### **C. Load Forecast Update**

A summary of the 2019 IRP load forecast can be found in the 2019 IRP Executive Summary. Additional information can be found in 2019 IRP Volume 3, which is dedicated to load analysis and load forecasting.

As a part of its ongoing internal planning process, Liberty-Empire developed a new six-year load forecast for the Company’s six-year budget covering the period 2020-2025. The 2019 IRP projected a summer peak of \*\* \_\_\_\_\_ \*\* MW for 2020 without the impacts of new DSM. This compares to a projection of \*\* \_\_\_\_\_ \*\* MW from the new six-year load forecast. The latter forecast incorporates more recent energy efficiency trends, updated distributed solar impacts, updated customer counts and known major customer expansions and contractions. The 2020 Budget Cycle forecast demonstrates annual summer peak compound annual growth rates of \*\* \_\_\_\_\_ \*\*. This compares to an annual

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summer peak compound annual growth rate of                     \*\* percent for the same time period in the 2019 IRP.

Liberty-Empire's actual 2019 peak demand of 1,111 MW occurred on March 4, 2019. A March peak is highly unusual as most of the Company's winter peaks have occurred in January and December. Liberty-Empire has had its system peak occur during the winter season in six of the past ten years. Liberty-Empire is different from some other electric utilities in the region due to this dual seasonal (winter/summer) system peaks that are roughly commensurate to one another. The 2019 summer peak was 1,085 MW and occurred in August.

The following tables compare the demand and energy forecasts from the 2019 IRP and Liberty-Empire's current six-year budget. The six-year budget's short-term forecast covers the period 2020-2025 and incorporates recent economic and efficiency trends, distributed solar impacts, and the Company's field knowledge regarding potential expansions and reductions over that period.

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As shown in the tables above, the energy forecast (MWh) is slightly higher in the 2020 Budget Cycle forecast than the 2019 IRP Base Case, while both the winter and summer peak demand forecasts (MW) are slightly lower in the 2020 Budget Cycle forecast. It should be noted that the 2020 Budget Cycle forecast was completed more than a year after the 2019 IRP forecast was developed and that each forecast employed different forecasting methodologies. Specifically, the 2019 IRP forecast utilized a Statistically Adjusted End-Use (“SAE”) approach (as required by the IRP Rule) in order to capture long-term end-use efficiency trends. Notably, the 2019 IRP forecast matched very closely to the Company’s 2019 Budget Cycle forecast for peaks and energy, which were developed in the same timeframe.

A key driver of the higher energy forecasted in the 2020 Budget Cycle is a higher customer count forecast. The increase in customer count is based on the level of customer growth that Liberty-Empire experienced since the development of the 2019 IRP. For example, the actual customer count at the end of December 2019 was 175,512 (a 0.88% annual increase from December 2018). This already exceeds the 2019 IRP customer count forecast for year 2020. The customer count comparison for the forecast period is provided below. The customer count values represent the estimated average number of customers for the year.

	<b>Customer Counts</b>	
	<b>2019 IRP Base</b>	<b>2020 Budget Cycle</b>
2020	174,711	175,620
2021	175,531	176,797
2022	176,461	177,902
2023	177,430	178,969
2024	178,417	179,954
2025	179,339	180,899

Additionally, the 2020 Budget Cycle forecast included an assumed expansion by a large, high-load factor industrial customer. Due to the high load factor of this customer, this assumption had a higher impact on the energy forecast than on the peak forecast. While both forecasts assumed that system wholesale customers would no longer be on-system customers as of June 1, 2020, the 2020 Budget Cycle forecast assumed that the city of Lockwood would remain an on-system customer.

The impact of these customer forecast changes was offset somewhat by a higher customer-sited solar assumption level in the 2020 Budget Cycle forecast. This updated assumption was made primarily due to more recent historical data in the analysis. This led to the slightly lower summer and winter peaks in the 2020 Budget Cycle forecast.

In the Motion for Extension of Time related to File No. EO-2019-0049, Liberty-Empire agreed to produce its monthly energy usage and demand forecasts based on Liberty-Empire's cost-of-service classes (residential, commercial, small heating service, general power, special transmission service contract, total electric building, feed mill and grain service, and large power service) in conjunction with the filing of its 2020 IRP Annual Update and to continue to comply with Rules 4 CSR 240-22.030(7)(A) and 4 CSR 240-22.020(37) in its subsequent IRP filings. For the purposes of this annual IRP update, Liberty-Empire has attached an estimate of this forecast as a workpaper along with this filing.

#### **D. Capital Costs and Interest Rates Update**

After reviewing the long-term planning interest rates and capital costs for generic resources in the 2019 IRP, Liberty-Empire determined that there are no updates to report at this time. Liberty-Empire will reevaluate the capital costs and all other planning assumptions during the development of the 2021 Annual Update.

### **3. Resource Acquisition Strategy Update**

This section provides a status update on the supply-side and demand-side implementation plan and describes progress made since the filing of the 2019 IRP. For the 2020 IRP Annual Update, this includes the status of the 600 MW of planned wind in Kansas and Missouri, the Asbury coal plant retirement, the Community Solar Pilot Program, and the demand-side management implementation plan.

#### **Wind Implementation Status Update (As of January 2020)**

##### *North Fork Ridge Wind Project*

North Fork Ridge Wind Farm is a 150 MW wind farm located in Barton and Jasper counties, Missouri. Engineering for North Fork Ridge was completed on December 16, 2019 and construction activities commenced in mid-December.

Major construction efforts to date have been focused on site preparation activities and civil works. As of March 19, 64% of the access roads have been completed, 35% of the turbine foundations have been installed, and 62% of the collection cable has been installed. Turbine equipment deliveries are scheduled to begin on March 23, and the main transformer is scheduled to be delivered to the project substation on March 31. The project is on track to begin commercial operations by December 31, 2020 and is expected to receive the full value of the Production Tax Credits available to the project.

##### *Kings Point Wind Project*

Kings Point is a nominally 150 MW wind farm located in Barton, Dade, Jasper and Lawrence counties, Missouri. The Engineering, Procurement, and Construction (“EPC”) contractor mobilized to the site on February 10, 2020. As of March 19, the laydown yard has been installed, 5% of the access roads have been completed, and 2 of the 69 turbine foundations have been excavated. Turbine deliveries are scheduled to begin in late May. The project is on track to begin commercial operations by December 31, 2020 and is expected to receive the full value of the Production Tax Credits available to the project.

##### *Neosho Ridge Wind Project*

Neosho Ridge Wind is a 300 MW wind farm located in Neosho County, Kansas. As of January 2020, aside from construction related permits, all material permits for the Project were put in place. Construction activities began in late 2019. As of March 19, 85% of the access roads have been completed, 95% of the turbine foundations have been installed, and 13% of the collection cable has been installed. Turbine equipment deliveries are scheduled to begin in late April. The project is on track to begin commercial operations by December 31, 2020 and is expected to receive the full value of the Production Tax Credits available to the project.



**Asbury Retirement Status Update**

Following nearly fifty years of service, the Asbury generation plant was de-designated in the market as of the end of March 1, 2020.

By way of background, on August 9, 2019, Liberty-Empire filed an Informational Notice to the Commission stating its definitive decision to retire its Asbury generation plant no later than June 2020. Liberty-Empire then filed an Updated Informational Notice on November 13, 2019, updating the Asbury retirement date to March 2020 based on current coal supplies and other factors.

Liberty-Empire engaged Black and Veatch, an engineering, procurement, consulting, and construction company, in July 2019 to perform a decommissioning study. The final plan for the Asbury facility and other structures on the property has not yet been determined, and the Company is actively exploring multiple opportunities to reuse the existing facility to support ongoing customer and Company needs. For example, some large pieces of equipment may be sold rather than scrapped for salvage, the turbine deck and structure may be repurposed for the placement of flow batteries, and the cooling tower and some associated pumps may be reused.

**Community Solar Implementation Status Update**

As part of its Community Solar Pilot Program, Liberty-Empire remains on track to offer 10 MW of community solar by 2021. Liberty-Empire's Community Solar Pilot Program will provide customers the opportunity to voluntarily subscribe to the generation output of solar facilities owned and operated by Liberty-Empire within its Missouri service territory. The solar facilities will be connected to Liberty-Empire's distribution system, and the generation output will provide an offset for energy used by participating customers. Liberty-Empire released a Request for Information and Qualifications in late February 2020 to multiple developers, responses have yet to be received. Upon review of the responses, the Company will shortlist bidders and issue a request for proposals from selected bidders. Construction is currently planned to begin in 2020.

**Demand-Side Management (“DSM”) Implementation Plan Update**

The 2019 IRP preferred plan included the low- and mid-cost bundle of the Realistically Achievable Potential (“RAP”) DSM Plan. At this time, Liberty-Empire is currently continuing to offer the energy efficiency programs approved by the stipulation and agreement in File No. ER-2016-0023. The portfolio has a total budget of \$1.25 million and consists of the Commercial and Industrial Rebate program, the Heating, Ventilation, and Air-Conditioning Program, the Low-income Multi-family Direct Install program, and the Multi-family Direct Install program. Liberty-Empire is considering filing an application for new programs under the Missouri Energy Efficiency Investment Act (“MEEIA”) in 2020. If approved, this may produce a noteworthy change to the demand-side resource plan filed in 2019.

#### **4. Transmission and Distribution (T&D) Analysis**

This section of the report will update stakeholders about Liberty-Empire's T&D system reliability efforts, including recent SPP interconnection studies conducted for the new wind projects.

##### **SPP Generation Interconnection & Transmission Studies**

All three wind facilities were placed into the Generation Interconnection Queue ("GI Queue") in early 2017. Neosho Ridge Wind was placed in the GI Queue first by Apex, followed shortly by Kings Point Wind and North Fork Wind. Given the backlog of requests in the GI Queue, Liberty Utilities-Empire decided to proceed by requesting Transmission Service in order to be prepared for the wind facilities becoming operational in 2020. This was done in May 2019 via the Aggregate Facilities Study labeled 2019-AG1. A second iteration of the study was published in November 2019 and the Network Integrated Transmission Service Agreement ("NITSA") with the three new wind facilities was executed prior to the deadline.

##### **North Fork Ridge Wind**

North Fork Ridge Wind is a planned 150 MW wind plant located in Jasper County, Missouri. North Fork Ridge Wind was placed into the SPP GI Queue under Interconnection Study No. GEN-2017-082 and has an interim interconnection agreement effective November 8, 2019. With the exception of final commissioning, construction of interconnection facilities for North Fork Ridge were completed in January 2020. Final commissioning will be performed when North Fork Ridge's generation tie line has been constructed and interconnected to the transmission system at Asbury substation.

##### **Kings Point Wind**

Kings Point Wind is a planned 150 MW wind plant located in Barton County, Missouri. Kings Point Wind was placed into the SPP GI Queue under Interconnection Study No. GEN-2017-060 and requested transmission service under the OASIS Transmission Service Request ("TSR") number 89220085. Construction of interconnection facilities at the LaRussell substation is in progress and on schedule to achieve substantial completion by April 15, 2020.

##### **Neosho Ridge Wind**

Neosho Ridge Wind is a planned 301 MW wind plant located in Neosho County, Kansas. Neosho Ridge Wind was placed into the SPP GI Queue under Interconnection Study No. GEN-2017-009 and requested transmission service under request 89219810 (confirmed as 90221255).

**Advanced Metering Infrastructure (“AMI”) Implementation and Grid Modernization Update**

The Company is working on advanced grid modernization projects. This includes Distribution Automation Projects, SCADA additions, and AMI. As laid out in its 2019 IRP, Liberty-Empire is currently in the process of implementing AMI and remains on track for full AMI system rollout by the end of June 2021. When completed, approximately 173,000 residential and commercial electric meters across the Company’s four-state jurisdiction of Missouri, Arkansas, Kansas, and Oklahoma will have advanced meters installed. As of the writing of this report, Liberty-Empire expects to install approximately 50% of its AMI meters by the end of 2020, with the remaining to be installed by the end of June 2021.

To ensure timely deployment of AMI in the 2020-2021 timeframe, Liberty-Empire has executed contracts with technical vendors such as Itron, who will be primarily responsible for completing the removal of legacy meters and the installation of AMI meters. Additionally, Liberty-Empire has coordinated closely with Liberty Utilities’ corporate staff to engage in detailed, company-wide planning.

## **5. Other Updates**

This section of the 2020 IRP Annual Update will provide updates to other IRP related issues, or what the IRP Rule refers to as “changing conditions generally.”

### **Demand-Side Management (“DSM”) Update for Arkansas**

As stated in the 2019 IRP, Liberty-Empire serves about 4,800 customers in northwest Arkansas. Besides Missouri, Arkansas is the only other jurisdiction where Liberty-Empire offers electric demand-side programs. Liberty-Empire has been granted variance from statewide energy efficiency savings targets for 2017-2019 due to the small customer count, the rural nature of Liberty-Empire’s Arkansas service territory, and other factors. However, Liberty-Empire continues to make improvements and offer a portfolio of programs with a proven record of success. In 2020, Liberty-Empire introduced a new portfolio, which offers a residential products program and features lighting and other direct install measures, a school-based energy education program for residential customers, and prescriptive and custom rebates for Commercial and Industrial customers. Liberty-Empire also contributes its share to the statewide energy education program, Energy Efficiency Arkansas. Liberty-Empire has offered customer programs in Arkansas since October 2007.

### **State Line Combined Cycle (“SLCC”) Upgrade Project**

SLCC is a Siemens, natural gas-fired, combined cycle unit that consists of two Combustion Turbines (CTs 2-1 and 2-2) with a Heat Recovery Steam Generator (HRSG) on the back of each CT. Steam from the HRSGs is fed to a single steam turbine (ST 2-3). The SLCC upgrade project will consist of upgrades that will add about 70 additional MW (42 MW Liberty-Empire’s share) to the existing winter capacity of the unit, and 36 MW (22 MW Liberty-Empire’s share) to the summer capacity after completing the necessary SPP studies. In addition, efficiency increases are expected via heat rate improvements. The project is expected to be completed in phases, with upgrades to CT 2-2 scheduled to be completed by the end of May 2021 and upgrades to CT 2-1 to be completed by the end of October 2021.

The original CT for SLCC was installed at the State Line power plant in Joplin, Missouri in 1997 as a simple cycle unit. The combined cycle additions (the additional CT, ST and HRSGs), were built in 2001 in partnership with Evergy of Topeka, Kansas, with Liberty-Empire owning a 60 percent share of the total SLCC and serving as the operator. SLCC is currently rated at approximately 552 MW (331 MW Liberty-Empire’s share) for the winter peak season and 488 MW (293 MW Liberty-Empire’s share) for the summer peak season.

### **On-System Wholesale Load and MJMEUC Power Purchase Agreement Update**

For many years, Liberty-Empire has served multiple municipal electric customers as on-system wholesale customers. Currently, this includes the cities of Monett, Mount Vernon, and Lockwood in Missouri and the city of Chetopa in Kansas. As of June 1, 2020, the two largest customers, Monett and Mount Vernon, along with Chetopa will no longer be on-system wholesale customers. This loss of system load beginning June 1, 2020 was reflected in the 2019 IRP load forecast and in the Company's 2020 Budget Cycle forecast referenced in Section 2 of this report. On an annual basis, this represents approximately a 6 percent energy reduction for the Liberty-Empire system. This change is also represented in the net peak demands found in the Load and Capability Balance Report Update in section 6 of this report.

However, Liberty-Empire has entered into a five-year power purchase agreement with the Missouri Joint Municipal Utility Commission ("MJMEUC") for a capacity and energy sale beginning June 1, 2020 and ending May 31, 2025 for the two Missouri municipals. The capacity sale is based on a "slice of Liberty-Empire system" approach, with a total capacity sale of 78 MW during the agreement period. This 78 MW sale is shown in the load-capacity balance tables in Section 6 of this report. Although the loss of system load was modeled in the 2019 IRP load forecast, the addition of the MJMEUC contract closes Liberty-Empire's capacity gap for the five contracted years. The MJMEUC agreement also enables MJMEUC to receive payment from SPP for energy sold into the market from Liberty-Empire resources that are allocated to MJMEUC by this agreement. MJMEUC will pay Liberty-Empire for the capacity and for their allocated portion of the fuel costs, startup costs, an additional amount per unit of energy and some transmission costs as described by the agreement.

### **Missouri Senate Bill ("SB") 564 Updates**

Section 393.1610 of Senate Bill 564, passed in August 2018, allows the Commission to approve small-scale or pilot project investments for innovative technology such as renewable generation, micro grids, and energy storage, provided that the investments are expected to advance the utility's operational knowledge of deploying the technology, such as through improved operational efficiencies that lead to customer savings and benefits. Liberty-Empire's investment in a Community Solar Pilot Program and its associated tariff are eligible for approval under section 393.1610 of Senate Bill 564 based on the ability of the program to provide customers with the opportunity to voluntarily subscribe to the generation output of solar facilities that are owned and operated by Liberty-Empire. In addition, Liberty-Empire continues to research and develop pilot programs related to other innovative technologies, such as a battery storage program that may increase distribution system reliability and provide other benefits to customers in need of backup power during outages. As Liberty-Empire moves forward in the rollout of its AMI system by 2021, Liberty-Empire will continue to monitor updates to SB 564 in anticipation of future investments in AMI-enabled innovative technologies.

## **6. Preferred Plan Update**

### **Load and Capability Balance Report Update**

The 2019 IRP preferred plan was described in the 2019 IRP Executive Summary. Additional information can be found in Volume 7 of the IRP. No notable changes or updates to the preferred plan are expected. However, stakeholder feedback on the 2019 IRP preferred plan has not yet been received at the writing of this report.

The Load and Capability Balance Report for the 2020 IRP Annual Update is presented on the following pages and is consistent with the requirements of SPP Resource Adequacy and consistent with the Company's recent 2020 SPP Resource Adequacy submission. Due to the nature of the requirements of SPP Resource Adequacy, there are notable differences in certain assumptions between the 2019 IRP Load and Capability Balance Report and the 2020 IRP Annual Update Load and Capability Balance Report. For example, the new DSM that is included in the 2019 IRP is not included below because it is still a "prospective" resource addition that is still lacking certain planning details that are required by SPP, such as a tariff rate.

Another assumption that differs between the 2019 IRP and 2020 IRP Annual Update Load and Capability Balance Reports is the capacity credit assumed for specific wind resources. Because an insufficient amount of wind data had been collected at the time of the development of the 2019 IRP, a 15% summer capacity credit assumption and a 30% winter capacity credit assumption were used to calculate the accredited capacity of wind resources. At the time of the writing of this 2020 IRP Annual Update, however, Liberty-Empire has collected enough wind data to satisfy SPP Resource Adequacy as required by Attachment AA of the SPP OATT and Section 7 of the SPP Planning Criteria. For facilities in commercial operation three years or less, Section 7 of the SPP Planning Criteria calls for the collection of the most recent three years' worth of wind data. Liberty-Empire ran this data through SPP's planning model to get the summer and winter ratings for the wind projects that are used in the Load and Capability Balance Report below.

Finally, Liberty-Empire included the community solar and distributed solar and solar + storage resources as Tier 3 resources, which is used to designate resources that are not firm or under construction yet but can still be put in for future years. These resources were included in the Load and Capability Balance Report using the capacity accreditation rules as outlined by SPP the Resource Adequacy process.

**Forecast of Load and Capability Balance (MW)**

Based on Load Forecast 2020-2025

2019 IRP – 2020 IRP Annual Update (Mar-2020) Summer Ratings

**\*\*HIGHLY CONFIDENTIAL in its entirety\*\***



**Notes:**

1. Includes updated capacity ratings for existing wind resources. The winter is based on January and the summer is based on July to match the seasonal peaks.
2. Most recent unit ratings are included in this load and capability table (as of January 2019)
3. Asbury assumed to retire prior to the 2020 summer peak.
4. New wind accredited rating based upon SPP Renewable Accreditation Calculation using 8760 profile from UL

**Forecast of Load and Capability Balance (MW)**

Based on Load Forecast 2020-2025

2019 IRP – 2020 IRP Annual Update (Mar-2020) Winter Ratings

**\*\*HIGHLY CONFIDENTIAL in its entirety\*\***

**Notes:**

1. Includes the most recent budgeted net peaks from the 2020 Budget Cycle
2. Capacity responsibility is based on a 12% reserve margin which equates to about a 10.7% capacity margin
3. Assumes loss of System Wholesale load (except Lockwood) on June 1, 2020
4. Assumes a system sale of 78 MW beginning June 1, 2020
5. New solar assumes 10% accreditation rating per SPP Effective Planning Criteria

## **7. Liberty-Empire Special Contemporary Issues**

According to the Chapter 22 — Electric Utility Resource Planning Rules, special contemporary issues means “a written list of issues contained in a Commission order with input from staff, public counsel, and interveners that are evolving new issues, which may not otherwise have been addressed by the utility or are continuations of unresolved issues from the preceding triennial compliance filing or annual update filing.” In this section of the report, Liberty-Empire will address the nine special contemporary issues (issue A through I) that were established by Commission Order in File No. EO-2020-0044. It should be noted that some special contemporary issues for this IRP Annual Update references sections of the IRP Rule that are very specific to the triennial compliance requirements. In those cases, the Company has attempted to address the special contemporary issue as completely as possible within the scope of the IRP Annual Update process.

- A. When complying with 20 CSR 4240-22.060(5)(M), include the following as uncertain factors that may be critical to the performance of alternative resource plans:***
- i. Foreseeable demand response technologies, including, but not limited to, integrated energy management control systems, linking smart thermostats, lighting controls and other load-control technologies with smart end-use devices;***
  - ii. Foreseeable energy storage technologies; and***
  - iii. Foreseeable distributed energy resources, including, but not limited to, distributed solar generation, distributed wind generation, combined heat and power (CHP), and microgrid formation. Develop and provide a database of information on distributed generation (both utility owned and customer owned) and distributed energy storage (both utility owned and customer owned) for purposes of evaluating current penetration and planning for future increases in the levels of distributed generation and energy storage.***

In compliance with this requirement, Liberty-Empire systematically and rigorously evaluated uncertainty around the development of demand response, energy storage, and distributed energy resources in Volumes 4 and 5 of its 2019 IRP. To do so, Liberty-Empire treated each resource type as a potential supply-side resource option available to Liberty-Empire in constructing its 16 alternative resource plans.

For example, Liberty-Empire carefully evaluated demand side management (“DSM”) options in its 2019 IRP through its robust DSM Potential Study (as presented in 2019 IRP Volume 5). As documented in Volume 5, Liberty-Empire engaged Applied Energy Group (“AEG”) to conduct this DSM Potential Study. AEG analyzed potential demand-

side resources for all major end uses (including cooling, space heating, water heating, interior and exterior lighting, appliances, and electronics) as identified by the Residential Customer Energy Survey and by secondary sources. Ultimately, AEG developed nine program design scenarios, and used these scenarios to assess the optimal demand-side programs to propose for implementation.

Accounting for technology trends, and informed by market research, Liberty-Empire and AEG further determined the potential range of effects of these programs based on technical and economic feasibility considerations. Through these estimation means, a final Realistic Achievable Potential (“RAP”) result and a final Maximum Achievable Potential (“MAP”) result were determined. The RAP and MAP were then incorporated into Liberty-Empire’s alternative resource plans. In this way, the RAP and MAP were fully considered in conjunction with other resources in developing and analyzing the 16 alternative resource plans presented in the IRP.

Liberty-Empire also treated energy storage as a potential supply-side resource option available to Liberty-Empire in constructing its alternative resource plan. Several of the alternative resource plans presented in the 2019 IRP include build out assumptions of solar + storage units. Uncertainty of the future cost of storage resources was modeled through the capital cost uncertainty variable.

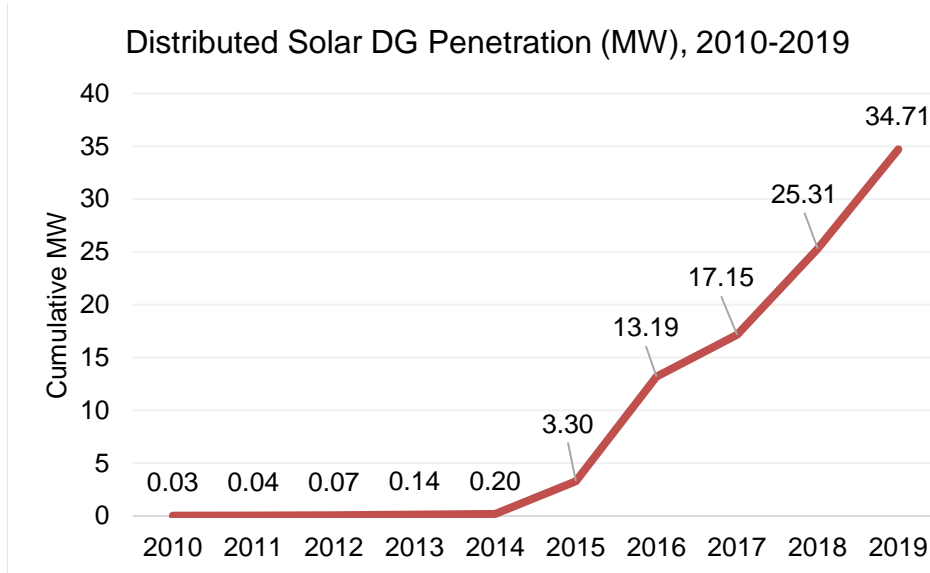
A process identical to that used for energy storage was used for distributed energy resources (“DERs”). While DERs include distributed solar generation, distributed wind generation, combined heat and power (“CHP”), and micro grid formation, some DER options were initially screened out. For example, CHP options were screened out as a potential resource option due to uncertainty regarding feasible sites within Liberty-Empire’s service territory and the lack of potential partners that have shown interest in pursuing CHP relationships with Liberty-Empire.

In summary, each of the identified resources – demand response, energy storage, and DER – were evaluated systematically and rigorously as part of several of the alternative resource plans, and uncertainty on future costs was captured as part of the systematic, rigorous critical uncertain factor analysis.

Liberty-Empire developed a database of customer-owned solar distributed generation for purposes of evaluating current and planned future increases in penetration. Generally, and as forecasted in the 2019 IRP, Liberty-Empire has continued to see growth in its customer-owned solar DG penetration. As of the end of 2019, 34.7 MW of customer-owned solar DG was installed in Liberty-Empire’s service territory, representing an increase of 9.4 MW since the end of 2018. However, as proportion of total system load, DG load is still quite small.

**Liberty-Empire Cumulative Solar DG (MW)**

2010	0.03
2011	0.04
2012	0.07
2013	0.14
2014	0.20
2015	3.30
2016	13.19
2017	17.15
2018	25.31
2019	34.71



As part of the 2019 IRP load forecasting exercise, Liberty-Empire engaged Itron to develop a solar PV forecast, which is further described in Volume 3 of the IRP. The solar PV forecast was based on actual installations identified from Liberty-Empire’s Solar Rebate program and EIA’s national solar forecast. Eighty percent of EIA’s annual growth rates were applied to Liberty-Empire’s actual installation base to create Itron’s Base Case solar forecast.

Finally, Liberty-Empire is currently planning to implement distributed storage and community solar, and as such, no data is available to analyze at present. However, Liberty-Empire will plan to develop a database of these resources as they are made available.

***B. In addition to the exercise prescribed in 20 CSR 4240-22.045, analyze integrated distribution planning as a way to manage the distribution grid in a manner that reduces peaks and fills valleys in load profiles, and lowers overall system costs with a combination of energy efficiency, demand response, electric vehicles, distributed generation, storage, advanced metering, and pricing strategies such as time-of-use rates (TOU) and inclining block rates (IBR).***

Liberty-Empire views integrated distribution planning as an important way to manage the distribution grid and to navigate future uncertainties, including uncertainties in load profiles and overall system costs. To manage these uncertainties, the 2019 IRP preferred plan proposes a combination of energy efficiency, demand response, distributed generation, storage, and AMI to support other major resource planning decisions. While these technologies each offer their own challenges to system planning, used in concert, supply-side and demand-side resources can also have a large benefit in ensuring the continued reliability and cost-effectiveness of the system despite any high-impact portfolio changes, such as the planned addition of 600 MW of wind and retirement of the Asbury coal plant.

Integrated distribution planning also improves the efficiency of energy generation and transmission. For example, load shifting via the implementation of time-of-use rates and energy storage provides an economical way to store inexpensive renewable power that is generated at off peak times, leading to less transmission congestion and lowering customer costs.

To illustrate some of these benefits, a description of several Liberty-Empire distribution planning examples is provided below.

### **Time-of-Use Rate Designs, Storage, and AMI**

Energy storage resources provide a way to store excess energy produced in low load hours – such as windy overnight periods – for use during high usage periods when demand exceeds renewable output. Combined with distributed renewable generation, energy storage can further smooth energy usage trends across peak and off-peak times, creating a more consistent demand for utility generation. Other roles that battery storage might play on the grid include providing emergency backup power for customers during outage events, providing local distribution system support to correct for under- and over-voltage problems that could arise due to net metering customers, and shifting load requirements to less expensive periods for wholesale market purchases. In addition, energy storage is likely to reduce the excess energy crossing transmission and distribution lines during low usage periods.

Liberty-Empire is actively evaluating the role that batteries might play in improving the performance of the grid. Battery deployments may require new rate programs that align incentives to ensure that batteries are being optimally dispatched and costs are fully

recovered. Working in concert, energy storage and TOU rates can provide a number of benefits, including reduced system costs, a more stable load profile, and increased system reliability. Because the designated peak and off-peak periods are typically defined by the season, day, and time of day, effective TOU rate design requires an interval meter. As noted previously in this report, Liberty-Empire is currently in the process of implementing its AMI system. In parallel with AMI implementation, Liberty-Empire will be starting discussions around rate design in the fall of 2020.

### **Distributed Generation and Storage**

Liberty-Empire defines DG as generating resources below a nameplate rating threshold of 10 kW, interconnected to the Liberty-Empire distribution system, and capable of serving customer load requirements. A diverse range of DG technologies – both utility-scale and “behind-the-meter” (i.e. independent of the utility’s involvement) – are currently available to customers. Both utility-scale and customer-owned DG technologies can provide a number of diverse benefits to customers, such as backup power in the event of power outages and energy for day-to-day home and facility operations. Depending on the nature of the technology and its point of interconnection, DG may provide additional benefits such as line loss reduction, deferred capital expense to address localized distribution grid capacity problems, and improved power quality. Combined with energy storage, DG can further smooth energy usage trends across peak and off-peak times, creating a more consistent demand for utility generation.

### **Demand Response and Grid Modernization**

Liberty-Empire evaluated a range of demand side management (“DSM”) options in the 2019 IRP. The DSM options are presented within Volume 5 – Demand-side Resource Analysis. Accounting for technology trends and informed by market research, Liberty-Empire determined the potential range of effects of the optimal demand-side programs as determined by the study. This range of effects was based on technical and economic feasibility considerations. Through these estimation means, both a final Realistic Achievable Potential (“RAP”) result and a final Maximum Achievable Potential (“MAP”) result were determined. The RAP and MAP are then used in conjunction with other resources as part of the process to develop and analyze the 16 alternative resource plans presented in Volume 6. The optimal DSM option was included in the Liberty-Empire preferred portfolio, offsetting supply resources.

In Volume 045, Liberty-Empire further described the specific technology requirements (such as AMI) needed to support the various DSM options. Over time, Liberty-Empire’s AMI effort will provide the utility and its customers with additional information about load patterns, creating more insights into DSM potential effects and opportunities. DSM-related rate programs and new DSM-related technologies may also play a role in the future.



***C. Analyze and assess the use of mechanisms such as green tariffs and community solar to increase the availability of distributed generation for large and small customers.***

Green tariffs allow customers the choice to supply a fixed part of the generation portion of their bills with renewable resources. Although this typically ends up in a higher rate, the additional revenue is used by the utility to fund incremental renewable procurement, thereby increasing the availability of distributed generation for customers. Liberty-Empire plans to file its proposed opt in tariff for its Community Solar Pilot Program in March or April of 2020.

Community solar programs can increase the availability of distributed generation (“DG”) for large and small customers to the extent that they reduce barriers that limit distributed solar deployments. These barriers include high upfront costs, financing costs, the burden of handling installation logistics such as vendor selection, and ongoing system maintenance costs and responsibilities.

To maximize the availability of DG for customers, community solar program designs can be customized by the sponsoring utility to meet a wide range of customer needs and preferences, for example in terms of subscription size, contract duration, and payment. When offered a variety of choices through a community solar program in this way, the customer can choose a subscription size that fits their specific energy need.

As part of Liberty-Empire’s Community Solar Pilot Program, the Company remains on track to implement 10 MW of Liberty-Empire-sited community solar in 2021. The Community Solar Pilot Program will provide customers the opportunity to voluntarily subscribe to the generation output of solar facilities owned and operated by Liberty-Empire within its Missouri service territory. The solar facilities will be connected to Liberty-Empire’s distribution system, and the generation output will be assigned to participating customers.

***D. Analyze and assess the benefits of supporting the development and funding of a High-Performance Building Hub to address information and financing (including bridge financing for project development) for building owners – especially affordable housing. Look at Building Energy Exchange (an informational resource for the building industry in New York) and NYC Energy Efficiency Corporation (a specialty financing corporation) as possible models.***

According to the Center for Climate and Energy Solutions (“C2ES”), fossil-fuel combustion attributed to residential and commercial buildings accounts for roughly 29 percent of total U.S. greenhouse gas emissions. As such, improving the performance of the building envelope could provide economic and environmental benefits, such as achieving energy efficiency and emissions goals or requirements and lowering electric

rates for customers. However, a lack of flexible financing often prevents building owners from implementing projects that could potentially reduce their monthly energy bills.

To facilitate these benefits, some cities have built and implemented High-Performance Building Hubs to provide informational resources and financial support to building industry professionals such as private building owners, developers, builders, and designers who are seeking to secure building retrofit project financing, integrate clean energy projects, and generally locate information on green building requirements or state or national emission goals. Major examples from leading cities include the Building Energy Exchange (“BE-Ex”) and the New York City Energy Efficiency Corporation (“NYCEEC”) in New York.

### **Building Energy Exchange (“BE-Ex”)**

Building Energy Exchange (“BE-Ex”) is an independent non-profit organization that provides educational programs, tools, and exhibits to the building industry to help accelerate the transition to energy efficient buildings. By serving as a trusted expert to the building industry, BE-Ex advances progressive discourse on the benefits of progressive buildings. Moreover, BE-Ex introduces innovative efficiency solutions to New York City’s real estate and design communities.

With an exhibit space in downtown New York City, BE-Ex has hosted forums, trainings, exhibits, and other events aimed at accelerating the adoption of certain energy efficient design principles. Monthly events introduce and facilitate discussion around high-performance, low-carbon construction concepts for building architects, engineers, building owners, managers, and contractors. Past exhibits have been on the topics of Passive House, NYPA’s NY Energy Manager, and various energy efficiency retrofit projects throughout buildings in New York City.

In order to develop these exhibits, BE-Ex actively seeks strategic partnerships with design, building industry, energy, and real estate organizations who provide support to BE-Ex through collaborative development of programs and educational opportunities.

### **New York City Energy Efficiency Corporation (“NYCEEC”)**

Established in 2011, the NYCEEC is a non-profit specialty finance company that provides flexible loans and other financing solutions for clean energy projects. NYCEEC’s stated goal is to remove existing barriers to energy efficiency investment (such as obstacles to lender consent, high transaction costs, and low levels of standardization) and to empower building owners and tenants to make environmentally beneficial, cost-saving investments. To this end, NYCEEC’s provides loans that account for energy savings and leverage all available incentives in order to maximize investment performance.

To be eligible for NYCEEC financing products, projects must result in energy savings and avoided GHG emissions. Specifically, these projects include: EE (e.g. HVAC,

lighting, and Passive House), cogeneration (e.g. CHP and fuel cells), demand management (e.g. DR enablement and battery storage), renewables (e.g. solar PV, solar thermal, and ground source heat pumps integration), and clean fuel conversion (e.g. fuel oil to natural gas). Examples of past NYCEEC projects include financing energy storage at Marcus Garvey Apartments, the nation's first affordable housing microgrid, and financing fuel conversions and energy efficiency improvements across six of Annual Management's affordable multifamily properties in the Bronx. These projects have ultimately resulted in substantial savings on energy and water bills for both building owners and tenants and generally transformed properties into greener, more affordable buildings.

To date, NYCEEC's debt products include pre-development loans, equipment loans (secured and unsecured), energy services agreements, PPAs, and green mortgages. For example, NYCEEC offers direct loans to building owners, which can be used to fund up to 100 percent of clean energy project costs, including equipment costs, construction costs, and eligible soft costs such as energy surveys and building operations training. To this end, NYCEEC can commit to a minimum of \$35,000 and up to \$6 million per project for a term of up to 12 years. On average, NYCEEC's loans have been financed at a rate of 6-8% over a term of 5-7 year, which are commercially equivalent market rates.

As of September 2019, NYCEEC financed over \$150 million of clean energy projects (primarily in multifamily and commercial buildings, including over 5,400 units of affordable housing) and eliminated 750,000 metric tonnes of GHG emissions in the city of New York. NYCEEC focuses on building sectors in NYC that have the greatest contribution to GHG emissions and the highest obstacles to EE investment, namely large private commercial and multifamily buildings, including the affordable housing sector. By financing projects at competitive rates in these sectors, NYCEEC is able to demonstrate the commercial feasibility of efficiency and clean energy projects, thereby attracting other lenders to the sector and improving access to capital.

A major part of NYCEEC's mission is to multiply its impact through strategic lender partnerships, typically with private sector lenders and public financing institutions (often focused on affordable housing). NYCEEC's design as a highly flexible, mission-focused specialty lender has helped to attract additional funding from both the private and public sectors, which have resulted in greater capital access for efficiency. Through these partner organizations, NYCEEC ultimately seeks to facilitate the integration of efficiency-focused financing and investment into the wider mainstream building finance markets (such as the mortgage lender market).

Offering financing through funds like NYCEEC gives cities a way to develop and test innovative approaches. NYCEEC maintains a close relationship with city and state policymakers, sharing lessons learned to help shape effective policies that drive greater clean energy investment in sectors with both high opportunity and impact.

As described above, supporting the development and funding of a High-Performance Building Hub like BE-Ex or NYCEEC may have numerous benefits for building industry

professionals, facilitate the implementation of clean energy projects, and enable access by residents of affordable housing to greener energy resources.

*E. Staff's report in EW-2019-0370 regarding its investigation of utility self-scheduling practices in the RTO market concluded that ratepayers were not being "actively harmed" by the practice of self-scheduling, but admitted that Staff lacked the data and resources to answer the fundamental questions of whether Missouri utilities are bidding into the markets at below production costs or otherwise harming ratepayers through "increased outage rates, decreased off-system sales revenue, increased operations and maintenance costs, shortened life of assets, increased outage frequency, decreased reliability, increased LMPs at the load node, and/or generally increased energy prices across the RTO's footprint" (Staff Report at 13). Liberty-Empire shall address these issues in its annual update since only it possesses the necessary bid formulation and production cost data.*

In 2019, Missouri Public Service Commission opened an investigation into the self-scheduling of generators in Docket No. EW-2019-0370. Liberty-Empire fully participated in the investigation, working with Missouri Staff to submit data and detailing commitment strategies and practices used in the SPP Integrated Market.

As mentioned in the investigation, generation owners can self-schedule for various reasons, and Liberty-Empire self-schedules generators periodically (as further explained below). However, Liberty-Empire's general strategy is to market all available generation into the Day-Ahead Market of the SPP IM at the estimated production costs.

### **Plum Point Generating Station – Self-Scheduling Practices**

Liberty-Empire self-schedules its ownership share and PPA share of Plum Point Generating Station. Plum Point is an approximate 670 MW coal-fired generator located in Osceola, Arkansas. Liberty-Empire owns 7.52% of Plum Point, roughly a 50 MW share, and has an additional 50 MW under contract through a thirty-year PPA. This unit resides in MISO, a separate RTO from SPP, and the energy is pseudo-tied into the SPP footprint. Liberty-Empire does not have the ability to control the status of the plant due to its minority share and therefore must self-schedule the generator daily in the SPP IM's Day-Ahead Market to avoid Real-Time price volatility risk.

### **Iatan Unit 1 – Self-Scheduling Practices**

Liberty-Empire owns minority shares of 12% in Iatan Unit 1 (approximately 84 MW share) and Iatan Unit 2 (approximately 106 MW share). These units are located near Weston, Missouri. Due to the minority share, Liberty-Empire does not have the ability to

control the status of these generators. The status of these generators is offered by the majority owner and operator, Evergy.

### **Asbury Unit 1 – Self-Scheduling Practices**

As previously mentioned, Asbury was de-designated in the market as of the end of March 1, 2020. The following explanation is still being provided since discussions of Asbury was included in EW-2019-0370 and to more completely respond to this special contemporary issue.

Liberty-Empire has self-scheduled the Asbury Unit 1 in the past. At the start of the SPP IM in March 2014, Liberty-Empire had pre-existing coal contracts that delivered a fixed amount of fuel on an annual basis to Asbury. These contracts existed prior to the SPP IM, when Asbury was utilized mainly as a base load generator. Until the expiration of these contracts, Asbury was self-scheduled to ensure that the generator was online and consuming the delivered fuel. However, once these contracts expired in October of 2016, new contracts were negotiated that allowed Liberty-Empire to operate the generator based on economic commitment rather than self-scheduling.

Although Liberty-Empire does self-schedule generators periodically. Liberty-Empire's general strategy is to market all available generation into the Day-Ahead Market of the SPP IM at the estimated production costs. This allows generators to be committed when they are economic and remain offline when the market prices are insufficient. Although economic dispatch lowers the total volume of energy sold into the market, total margin on the sales increases since the unit is only operating when there is positive margin.

Liberty-Empire believes that participating in the SPP IM is beneficial and the self-scheduling of generation units provides less than optimal market solutions. Self-scheduling on a daily basis undermines the market solving engine, increasing the cost of total RTO pricing solutions, and potentially leading to increased pricing of load and decreased pricing of generation nodes. As mentioned above, Liberty-Empire utilizes a strategy that allows the IM to select marginal units for commitment to reduce RTO production costs.

#### ***F. Analyze and screen electric vehicle charging infrastructure as a candidate resource option.***

Electric vehicle charging infrastructure was screened out in the 2019 IRP as a potential resource option due to a lack of commercial applicability as a supply-side resource option and inability to consider this option as a firm, controllable capacity resource. Please refer to Volume 4 Section 1.8 for details.

#### ***G. Analyze, document and screen renewable energy + battery storage as an alternative to existing coal-fired generation.***

Renewable energy and battery storage combinations were included in the 2019 IRP as resource options in the portfolio optimization analysis. Some of those resources were selected for alternative resource plans. Please refer to 2019 IRP Volume 4 Section 2.3 and Volume 6 Section 3.1.14 for details.

***H. Analyze and document the future capital and operating costs faced by each Liberty-Empire coal-fired generating unit in order to comply with all existing, pending, or potential environmental standards, including until they have been finally withdrawn or replaced:***

- i. Clean Air Act New Source Review provisions;***
- ii. 1-hour Sulfur-Dioxide National Ambient Air Quality Standard;***
- iii. National Ambient Air Quality Standards for ozone and fine particulate matter;***
- iv. Cross-State Air Pollution Rule;***
- v. Clean Air Interstate Rule;***
- vi. Mercury and Air Toxics Standards;***
- vii. Clean Water Act Section 316(b) Cooling Water Intake Standards;***
- viii. Clean Water Act Steam Electric Effluent Limitation Guidelines;***
- ix. Coal Combustion Waste rules using cost of removal as well as cap-and-cover; and***
- x. Clean Air Act Regional Haze requirements.***

Liberty-Empire published the de-designation, of the Asbury plant, in the Market as of the end of March 1, 2020. In addition, Liberty-Empire had previously published a Closure Plan for the Asbury Plant CCR Impoundment in accordance with the CCR Rule. Final closure of the existing ash impoundment will begin in 2020 and will be complete within the coming years. Expected costs for closure are in the \$15-20 million range.

Riverton Unit 7 was retired from service in June 2014, and Riverton Units 8 and 9 were retired from service in July 2015. Those units were decommissioned and dismantled in 2017.\*\*

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***I. Analyze and document the criteria by which units are assigned various operational designations (e.g., “must run”) for use in all Company economic modeling and resource planning.***

In both Liberty-Empire’s budget models and resource planning models, thermal units are generally not designated as “must run” and are modeled for economic commitment. Based on market economics, these units generally dispatch based on the unit’s individual startup and operating characteristics. However, some exceptions are made for thermal units in the Company’s budget models. Because the SPP IM has a reliability aspect, some thermal units tend to run for reliability purposes. SPP refers to this type of run as a Reliability Unit Commitment (“RUC”). In its budget models, Liberty-Empire accounts for RUCs by modeling peaking type units that have historically run due to RUC commitments (rather than on economic dispatch) with a defined capacity factor based on history, which the model optimizes during a defined period. Explicitly modeling RUC commitments is not necessary for resource planning due to the longer-term modeling horizon of the resource planning models.

In addition, the Company’s renewable generating resources are modeled in both its budget models and resource planning models using a generation shape based upon historical data. The models use these generation shapes to commit and dispatch these resources.

Again, at this time, the Company does not utilize a must run requirement on any of its generating resources for internal modeling or resource planning.







