2021 Integrated Resource Plan Annual Update Report

Liberty – The Empire District Electric Company

File No. EO-2021-0289

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2021 Integrated Resource Plan Annual Update Report

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Liberty – The Empire District Electric Company
(“Liberty-Empire” or the “Company”)
2021 Integrated Resource Plan Annual Update Report

1. Introduction

The purpose of the 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 (“2019 IRP”) filed in June 2019 in File No. EO-2019-0049 and the last IRP Annual Update (“2020 IRP Annual Update”) filed in March 2020 in File No. EO-2020-0284. Consistent with 20 CSR 4240-22.080(3) (the “Rule”), 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);
5) Resolution of any deficiencies or concerns pursuant to 4 CSR 240-22.080(16); and
6) Changing conditions generally.

In developing this report, Liberty-Empire reviewed and updated the critical uncertain factors identified in the 2019 IRP and in the 2020 IRP Annual Update. These updates were based on Liberty-Empire’s 2021-2026 Budget Cycle forecast, which was developed and used for internal short-term budgeting purposes.

Additionally, this report provides updates regarding Liberty-Empire’s progress on implementing various aspects of the 2019 IRP Short-Term Action Plan, including the implementation of 600 MW of wind, the planned rollout of Liberty-Empire’s system-wide AMI project by the end of June 2021, the proposed distributed solar plus storage and utility-scale solar projects, and Liberty-Empire’s Community Solar Pilot Program.

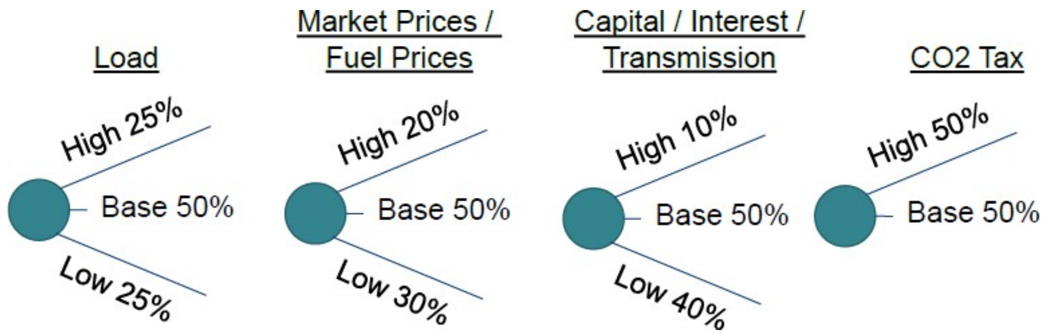
Finally, the 2021 IRP Annual Update report analyzes and responds to nine special contemporary issues. As the Rule states, special contemporary issues involve a “written list of issues contained in a Commission order with input from staff, public counsel, and intervenors that are evolving new issues, 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 issues to be addressed in this annual update was issued on November 4, 2020 in File No. EO-2021-0066 with an effective date of November 14, 2020. 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) a transmission and distribution analysis update, (5) other general updates, (6) a preferred plan update, and (7) responses to the special contemporary issues.

Liberty-Empire’s next triennial IRP compliance filing is scheduled for April 1, 2022.

2. Status of the Identified Critical Uncertain Factors

In the 2019 IRP, Liberty-Empire identified the following critical uncertain factors: (1) load; (2) market and fuel prices; (3) capital costs, transmission costs, interest rates; and (4) environmental standards and carbon pricing.



Following the filing of the 2019 IRP, Liberty-Empire updated these critical uncertain factors in the 2020 IRP Annual Update, which was filed in March 2020.

This section will address the changes to these planning factors since the filing of the 2019 IRP and the 2020 IRP Annual Update. Most of the critical uncertain factor updates in this section are based on Liberty-Empire's most recent rolling six-year business plan, which is internally developed on an annual basis as a part of Liberty-Empire's ongoing internal planning and budgeting process. The 2021 internal budget covers the period 2021-2026.

A) Market and Fuel Prices Update

This sub-section discusses updates to natural gas prices, coal prices, and market prices since the filing of the 2020 IRP Annual Update and as compared to the 2019 IRP assumptions. A summary of the fuel and market forecasts used in the 2019 IRP was presented in the 2019 IRP Executive Summary and can be found in more detail in 2019 IRP Volume 4. A summary of the near-term updates to fuel and market price forecasts used in the 2020 IRP can be found in Section 2 of the 2020 IRP Annual Update.

Natural Gas Price Forecast Update

In the 2019 IRP, 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 natural gas price scenarios. For the 2020 IRP Annual Update, Liberty-Empire used natural gas price forecasts from the Horizons Energy 2020 market forecast, which were also used in the development of Liberty-Empire's six-year budget for the 2020-2025 Budget Cycle.

For the 2021 IRP Annual Update, Liberty-Empire used natural gas price forecasts from the Horizons Energy 2021 market forecast, which were also used in the development of Liberty-Empire's six-year budget for the 2021-2026 Budget Cycle. The current and previous natural gas price assumptions are shown below for Southern Star Hub. The U.S. Energy Information Administration's ("EIA") Annual Energy Outlook ("AEO") 2021 Henry Hub natural gas price forecast, adjusted by the Southern Star basis forecast from the 2019 IRP, is also included below for comparison.[1]

Overall, the latest short-term natural gas price forecast as used in the 2021-2026 Budget Cycle was lower than the 2019 IRP Base Case forecast and slightly lower than the 2019 IRP Low Case forecast. While the natural gas prices are outside the range of uncertainty modeled in the 2019 IRP, they are within 5 to 10 percent of the IRP Low Case. In addition, it is important to note that the 2021-2026 Budget Cycle natural gas price forecast does not represent a fundamental long-term view of the Southwest Power Pool ("SPP") market. Liberty-Empire will perform a more comprehensive update of its natural gas prices in the 2022 triennial IRP.

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[1] The "AEO 2021" values above represent the AEO 2021 Henry Hub spot price forecast adjusted by the 2019 IRP Southern Star basis, and therefore should be considered an indicative pricing comparison.

Coal Price Forecast Update

During each budget cycle, Liberty-Empire updates its coal forecasts for internal planning purposes. This update includes contract knowledge and input from the partners in charge of procuring coal for jointly-owned units. 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's forecasted commodity prices in the longer term. In the 2020 IRP Annual Update, the coal prices were based on the coal prices from the six-year budget for the 2020-2025 Budget Cycle.

The most recent coal price forecast is based on the 2021-2026 Budget Cycle coal forecast. Generally, the aggregate weighted average coal price in the 2021-2026 budget is slightly lower than the 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 locational marginal price ("LMP" or "market price") scenarios were developed through ABB fundamental modeling based on forecasted fuel prices, emission prices and other scenario assumptions. To develop market price forecasts, ABB used various planning 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.

In the 2020 IRP Annual Update, Liberty-Empire used the EDE (the SPP designation for Empire District Electric) load node market prices developed by Horizons Energy, which were the market prices used for internal planning purposes in the 2020-2025 Budget Cycle. In the 2021 IRP Annual Update, Liberty-Empire again used EDE load node market prices developed by Horizons Energy, which were used for internal planning purposes in the 2021-2026 Budget Cycle.

To adequately compare Liberty-Empire's most recently updated EDE load node annual weighted average prices to the ABB SPP-KSMO market prices used in the 2019 IRP, Liberty-Empire used the following approach. Liberty-Empire first developed historical "SPP-KSMO" market prices by obtaining historical annual prices of the pricing zones in the Kansas and Missouri area, weighted by historical load in each zone, from ABB Energy Velocity Suite. Liberty-Empire then calculated the historical basis between the EDE load node and the "SPP-KSMO" market prices and applied this historical basis to the latest EDE load node annual weighted average price forecast, ultimately arriving at a comparable 2021 "SPP-KSMO" market price curve. A comparison of the 2019 IRP, the 2020 Budget Cycle, and the resulting 2021 Budget Cycle "SPP-KSMO" market prices is provided in the table below.

Similar to the natural gas price trajectories, the market prices used for the 2021-2026 Budget Cycle were lower than the Base Case and Low Case market price forecasts modeled in the 2019 IRP. However, it is important to note that Liberty-Empire's 2021-2026 market price forecasts do not represent a fundamental long-term view of the SPP market. Liberty-Empire will perform a more comprehensive update of its market power prices in the 2022 triennial IRP.

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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; hazardous and toxic materials; hazardous and other wastes including their identification, transportation, disposal, and record-keeping; reporting; and remediation of contaminated sites and other environmental matters. Liberty-Empire's jointly-owned coal-fired generating facilities, jointly-owned combined cycle facility, and all other wholly-owned resources must be operated 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 expected and existing environmental standards was provided in the 2019 IRP Volume 4 Section 2.5 and was updated in Section 2 of the 2020 IRP Annual Update. An additional update to the standards since the filing of the 2020 IRP Annual Update is further described below.

Affordable Clean Energy Rule

In December 2017, the EPA issued an advance notice of proposed rulemaking ("ANPRM") in which the EPA 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, the 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 GHG 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 CAA 111(d). During 2020, Missouri utilities conducted regular meetings with the Missouri Department of Natural Resources to determine the standard of compliance for this rule. Plum Point Energy Associates has also been working through the standard of compliance with the Arkansas Division of Environmental Quality. However, on January 19, 2021, the United States Court of Appeals for the District of Columbia Circuit struck down the ACE Rule, and the new Biden Administration is now expected to propose a replacement that will be materially different. Liberty-Empire will continue tracking EPA action related to GHG emissions going forward.

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. In the 2020 IRP Annual Update, Liberty-Empire used the load forecast developed for its 2020-2025 Budget Cycle.

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 Cycle covering the period 2021-2026. Liberty-Empire used the 2021-2026 Budget Cycle load forecast update for purposes of this report. The following tables compare the demand and energy forecasts from the 2019 IRP, the 2020 IRP Annual Update, and the 2021 IRP Annual Update for the period 2021-2026.

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As shown in the tables above, the Company's 2021-2026 Budget Cycle forecast is similar to the load forecast presented in the 2020 IRP Annual Update. Relative to the 2020 load forecast for the period 2021-2025, the 2021 update has similar winter peaks, slightly lower summer peaks, and slightly lower native load energy requirements. Comparing the five-year averages of the 2020 update and the 2021 update for the period 2021-2025, the winter peaks are within 0.1%, the summer peaks are within 0.7%, and the native load energy requirement is within 0.3%. The following tables present the deltas between the 2021 IRP Annual Update load forecast and prior forecasts.

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The 2021 IRP Annual Update assumes a higher level of customer-sited solar. Additionally, the 10 MW community solar project in 2021 and the proposed 19.5 MW distributed solar plus storage project in 2022 were treated as behind-the-meter generation and were reductions to the demand and energy forecast in the 2021 update. These solar assumptions, along with more recent historical data in the analysis, led to the slightly lower summer peaks and energy requirement in the 2021-2026 Budget Cycle forecast. The solar impacts were somewhat offset by higher customer growth and expected future growth in the industrial sector based on discussions with the Company's Business and Community Development department. The following tables present the annual average customer count assumptions by year, as well as the deltas between the 2021 IRP Annual Update customer count assumptions and prior forecasts.

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COVID-19 Impacts

The 2021 update forecast does not incorporate any COVID-19 impacts. As might be expected, the Company's actual demand and energy requirements were adversely impacted by the COVID pandemic in calendar year 2020 following the World Health Organization's ("WHO") declaration that COVID-19 had become a global pandemic in March 2020.

While it is difficult to ascertain the exact measure of the pandemic's impact on load, the Company, with the help of Itron consulting models, estimated that sales for the period March through November 2020 were negatively impacted by COVID-19 by about **[redacted]**. In April 2020 the estimated sales volume impact was a reduction of **[redacted]**. At this time, SPP also reported tracking reductions in load due to COVID-19 of approximately 8% to 10% across the entire SPP system when removing the impacts of weather. By May, the estimated negative impact on Liberty-Empire's system was about **[redacted]**. A steady decline of the adverse sales impact continued throughout the summer of 2020, with negative impact estimates for June, July and August of **[redacted]**, **[redacted]** and **[redacted]**, respectively. In September and October, the estimated reduction in load steadied around the **[redacted]** and **[redacted]** range. In November, the estimated negative impact was only about **[redacted]**. December was the first month that modeling showed little or no negative impact on sales due to the pandemic. This decline in the COVID impact throughout the year was consistent with messaging from SPP. In October 2020, SPP leadership reported: "Operationally, after a period of below-average load early in the pandemic, our system has largely returned to pre-pandemic levels. While some specific areas in our region are still experiencing below-average load, on the aggregate, our system has seen average or above-average load consistently since late June."[2]

Extreme Weather Peak in February 2021

In February 2021, SPP and much of the central part of the United States experienced a sustained extreme weather event from approximately February 9 to February 19. Liberty-Empire's system peak during this period was 1,220 MW, which occurred on February 16 at hour ending 7:00 AM, creating a new all-time system peak for the Company. This peak could have been even higher, but around 6:15 AM on that date, SPP declared an Energy Emergency Alert (EEA) Level 3 due to extremely low temperatures and inadequate supplies of generation. As a result, SPP directed member utilities to implement controlled, temporary interruptions of service. Based on SPP's direction, the Company shed about 60 MW of load during the peak hour. Additionally, the Company requested conservation efforts from all customers. The Company also called on its interruptible customers to curtail load during this period and attained about 9.25 MW of industrial load reductions during the peak hour. Liberty-Empire's previous all-time system peak was 1,211 MW which occurred in January 2018 prior to the loss of some on-system wholesale load. The budget winter peak for 2021 was 1,126 MW (budgeted for January). The budgeted peak for February 2021 was 1,029 MW. The budget is based on more normal weather, and the recent system peak that occurred in February 2021 is considered an extreme weather peak.

The load forecast assumptions for the 2021 IRP Annual Update report were developed prior to the occurrence of the extreme weather event. Additionally, Liberty-Empire's budget cycle load forecasts typically do not include the impact of extreme weather events. Liberty-Empire plans to further evaluate future extreme weather events in the upcoming 2022 triennial IRP.

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 2022 triennial IRP.

[2] https://spp.org/newsroom/covid-19/spps-covid-19-response-oct-1-2020/

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 2020 IRP Annual Update. For the 2021 IRP Annual Update, this includes the status of the 600 MW of planned wind in Kansas and Missouri, the status of Asbury decommissioning, the status of the Community Solar Pilot Program, the status of the proposed distributed solar plus storage and the proposed utility-scale solar projects, and the status of the demand-side management implementation plan.

Wind Implementation Status (As of January 2021)

On June 19, 2019, the Missouri Public Service Commission voted unanimously to grant Liberty-Empire certificates of convenience and necessity ("CCNs") to build and acquire three wind farms generating up to 600 MW of energy for its customers. Together, the three wind projects represent about a $1.2 billion investment. Approximately half of this amount will be funded by tax equity, with the final amount yet to be determined. These projects are expected to provide significant customer savings over the long term. The savings are primarily based on lower wind production costs, wind technology advancements, and the ability of all projects to take advantage of federal Production Tax Credits. The three wind farms are also expected to provide sustained community benefits to the regional economy and address tightening environmental regulations on existing thermal units, high costs to operate an aging generation fleet, and increasing customer demands for renewable energy.

North Fork Ridge Wind Farm and Kings Point Wind Farm

North Fork Ridge Wind Farm and Kings Point Wind Farm are each wind farms of about 150 MW consisting of 69 turbines (for a total of about 300 MW). North Fork Ridge Wind Farm is located in Barton and Jasper counties in Missouri and Kings Point Wind Farm is located in Dade, Jasper and Lawrence counties in Missouri.

Liberty-Empire partnered with Tenaska and Steelhead, Vestas' development arm in North America, to develop and construct both projects. In October 2019, Tenaska elected to terminate its participation in the projects, and Liberty Utilities, a holding company that is an indirect parent to Liberty-Empire, agreed to purchase Tenaska's interests in the project and continue the development and construction of the projects with Steelhead.

Construction activities for North Fork Ridge Wind Farm and Kings Point Wind Farm began in December 2019 and continued through the first quarter of 2021. Construction of North Fork Ridge Wind Farm was delayed by the turbine supplier's failure to provide the required quantities of rigging and tooling to maintain maximum productivity. Kings Point Wind Farm also experienced construction delays due to delays in turbine component deliveries. The turbine supplier claimed that the delivery delays were caused by measures taken in response to the COVID-19 public health emergency by governments in countries where components were manufactured.

North Fork Ridge Wind Farm began commercial operations in December 2020, and Kings Point

Wind Farm is expected to begin commercial operations in late March or early April 2021. Both projects are qualified for and receive the full value of the Production Tax Credits available to the project.

Neosho Ridge Wind Project

Neosho Ridge Wind Project is about a 300 MW wind farm located in Neosho County, Kansas consisting of 139 turbines. Liberty-Empire partnered with Apex Clean Energy and Steelhead to develop and construct Neosho Ridge Wind Project.

Engineering and construction work at Neosho Ridge Wind Project began in fall 2019 and included modifying public roads, building access roads and turbine foundations, installing underground electrical connection lines, foundation work for substations and operations buildings, and building gen-tie lines. The project is expected to begin commercial operations in late March or early April 2021 and qualifies for the full value of the Production Tax Credits available to the project.

Asbury Decommissioning Status

The Asbury Power Plant ("Asbury") was an approximately 200 MW mine-mouth coal-fired electric power plant located in Jasper County, Missouri, first operational in 1970. The unit was wholly-owned and operated by the Company until being officially de-designated from SPP as of the end of March 1, 2020. The electric generating unit is no longer in service.

The Asbury Power Plant campus includes facilities and buildings that were necessary to support the operations of the original plant. Some of these facilities are now repurposed to support the Asbury Renewable Operations Center ("AROC") used to maintain the new North Fork Ridge Wind Farm, Neosho Ridge Wind Project, and Kings Point Wind Farm, as well as the Prosperity Solar Facility. The AROC could also potentially be used to support other renewable facilities in the future. The Asbury 161kV substation is also the point of interconnection for the North Fork Ridge Wind Farm, which provides 150 MW of wind energy onto the SPP grid.

The Company is continuously looking for opportunities to further repurpose the site for new green technologies and generation and will provide updates as they become available. As SPP market products change, battery technology improves and cheapens, and reliability requirements increase, the Company will continue exploring the development of a renewable energy campus that repurposes the Company's current assets at the AROC.

Community Solar Pilot Program Implementation Status (As of January 2021)

As part of its Community Solar Pilot Program, Liberty-Empire successfully completed the development and is continuing with construction of its first 2.2-MW solar farm in Jasper County, Missouri. Liberty-Empire released a Request for Information and Qualifications ("RFI") in late February 2020 to multiple developers. This RFI was prepared and released prior to the approval of the Community Solar Tariff. The Company reviewed the responses in conjunction with the approval of the Community Solar Tariff, based upon the tariff requirement that 100% of available generation output blocks must be subscribed. Prior to constructing, the Company found that the scope of the project needed to be reduced to a $3.5 million pilot project.[3] The Company moved forward with an "Open Book - Engineering Procurement Construction" contract with Burns and McDonnell Engineering Company. Construction began on the "Prosperity Solar Facility" in September 2020 and is expected to be in-service in March 2021.

In practice, Liberty-Empire's community solar pilot program will provide customers the opportunity to voluntarily subscribe to the generation output of distributed solar facilities owned and operated by Liberty-Empire within its service territory. Under the program, customers can subscribe for blocks of energy from the solar facilities to serve up to half of their load. The generation output from the solar facilities will provide an offset for total energy consumed by participating customers. Liberty-Empire will leverage the findings of this pilot project to continue to effectively deploy small-scale solar projects in areas where it will benefit the transmission and distribution systems as the subscription base grows.

Distributed Solar Plus Storage

The 2019 IRP preferred plan included a 19.5 MW distributed solar plus storage project in 2022. At this time, it is assumed Liberty-Empire will strategically deploy smaller distributed solar generation facilities with integrated energy storage capacity across its electric grid to provide renewable power supply and simultaneously mitigate delivery congestion, constraints, or power quality issues. These facilities will help ensure robust and reliable delivery of electricity to customers without performing expensive upgrades to the grid infrastructure. The exact locations and scale of facilities is currently under evaluation. Recent changes in the Investment Tax Credit availability may also impact the timing of this deployment and is under evaluation.

Utility-Scale Solar

The 2019 IRP preferred plan included approximately 50 MW of utility-scale solar facilities as part of the Company's core energy supply fleet for the 2023 timeframe. The exact locations, scale and timing of these facilities is currently under evaluation and could be further evaluated in the next triennial IRP. The Company released a Request for Information and Qualifications to multiple developers in December of 2020. The responses to the RFI are under evaluation to develop a short-list of bidders and further refine the Request for Proposals to be released mid-2021. Further, the recent changes in Investment Tax Credit availability due to the COVID-19 pandemic has also created the need to reevaluate the scope of this additional capacity.

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.

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[3] The $3.5 million threshold was set by Senate Bill 564 and this approach has been discussed with regulators.

Liberty-Empire intends to file an application for new programs under the Missouri Energy Efficiency Investment Act ("MEEIA") in the second quarter of 2021. Pursuant to Commission Rule 20 CSR 4240-4.017, Liberty-Empire has already submitted to the Commission its notice of intent to file an application to implement robust and mutually beneficial energy efficiency offerings under the framework prescribed by MEEIA (EO-2021-0247). If approved, Liberty-Empire's MEEIA is likely to represent a noteworthy change in both the scope and the scale of Liberty-Empire's DSM offerings over both its current DSM offerings and the 2019 IRP.

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 new wind projects.

SPP Generation Interconnection & Transmission Studies

All three of Liberty-Empire's new wind facilities (Neosho Ridge Wind Project, North Fork Ridge Wind Farm, and Kings Point Wind Farm) were placed into the Generation Interconnection Queue ("GI Queue") in early 2017. Neosho Ridge Wind Project was placed in the GI Queue first by Apex, followed shortly by Kings Point Wind Farm and North Fork Ridge Wind Farm. Given the backlog of requests in the GI Queue, Liberty-Empire decided to proceed by requesting Transmission Service in order to be prepared for the wind facilities becoming operational in 2020. This request was completed 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. All three wind facilities were granted transmission service dependent on the completion of assigned system upgrades.

In October 2020, the interim generator interconnection agreements ("IGIAs") for all three projects were amended. All three IGIAs were amended to update the list of higher queued interconnection requests and the Appendix B milestone schedule. The amended interconnection agreement for Neosho Ridge Wind Project also accounted for changes to the transformer rating and turbine configuration.

North Fork Ridge Wind Farm

North Fork Ridge Wind Farm is about a 150 MW wind plant located in Barton and Jasper Counties in Missouri. North Fork Ridge Wind Farm was placed into the SPP GI Queue under Interconnection Study No. GEN-2017-082 and has an interim interconnection agreement effective November 8, 2019. On December 21st, 2020, all 69 turbines achieved final commissioning status, and the facility was declared commercially operational on December 31st, 2020.

Kings Point Wind Farm

Kings Point Wind Farm is about a 150 MW wind plant located in Dade, Lawrence, and Jasper Counties in Missouri. Kings Point Wind Farm 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. Final commissioning for Kings Point Wind Farm is expected to be completed at the end of March 2021.

Neosho Ridge Wind Project

Neosho Ridge Wind Project is a 301 MW wind plant located in Neosho County, Kansas. Neosho Ridge Wind Project was placed into the SPP GI Queue under Interconnection Study No. GEN-

2017-009 and requested transmission service under request 89219810 (confirmed as 90221255). Final commissioning for Neosho Ridge Wind Project is expected to be completed at the end of March 2021.

State Line Combined Cycle

The existing State Line Combined Cycle ("SLCC") generator was placed into service in 1997 and converted to a combined cycle in 2001. Liberty-Empire identified potential upgrades to the facility that would increase both the capacity (approximately 64 MW being studied) and efficiency of the generators. These upgrades were included in the GI Queue (GEN-2020-064) and subsequently placed in the Definitive Interconnection System Impact Study (DISIS-2020-001) in June of 2020. The new three-phase Generator Interconnection process for SPP is expected to span approximately 485 days once the backlog of requests is cleared from the GI queue. According to SPP, the study results for DISIS-2020-001 are not expected until 2025. Liberty-Empire and its customers will benefit from the increased efficiencies once the project is complete, but will not be able to count the additional capacity for resource adequacy until the completion of the generation interconnection process and aggregate transmission service study.

Additional details on the SLCC upgrade can be found in Section 5 ("Other Updates") of this report.

AMI Implementation and Grid Modernization Update (As of January 2021)

Liberty-Empire is currently working on advanced grid modernization projects. This includes distribution automation projects, SCADA additions, and advanced metering infrastructure ("AMI"). As laid out in its 2019 IRP, Liberty-Empire is currently in the process of installing AMI meters and when completed, approximately 177,000 residential and commercial electric meters will be installed across the Company's four-state jurisdiction of Missouri, Arkansas, Kansas, and Oklahoma.

As of the end of January 2021, Liberty-Empire had installed approximately 125,000 meters, representing 70% of the total meter count. The current installation rate is an average of 1,600 meters per day, with an expected completion date of June 2021.To ensure timely deployment of AMI in the 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.

Time-of-Use Rate Pilot

Time-of-use ("TOU") rates present different power prices associated with the corresponding costs to provide electricity during pre-determined times of the day. This type of rate structure usually includes on-peak and off-peak pricing. The on-peak period is broadly defined by the periods of the day in which system loads are highest and off-peak times are associated with the remaining periods in which loads are typically lower. The cost of providing electricity varies within these pre-defined time periods. A goal of a TOU rate is to provide a tool for customers to have more control of their electricity bill. When a customer shifts load with the intent of reducing their bill, the customer uses system resources more efficiently and reduces the overall cost of providing service to all customers. While there is no direct bill impact to non-participants, as TOU participants shift load away from the on-peak period, overall costs are reduced for the utility and all customers benefit.

These proposed TOU rate schedules are an integral part of the Company's strategy to modernize its pricing portfolio. AMI further supports the introduction of TOU rates since time-based energy consumption data becomes available to support the introduction of more advanced pricing structures. In the near future, Liberty-Empire plans to introduce a Residential Time-of-Use Pilot schedule and a Commercial Building Time-of-Use Pilot schedule for its residential and small commercial customers. Additionally, Liberty will be proposing a Large Power Time-of-Use rate schedule applicable for certain very large customers.

5. Other Updates

This section of the report 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 of December 31, 2020, Liberty-Empire serves about 5,020 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 2020-2022 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 offers 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 will also reintroduce its Weatherization program in 2021, which it plans to co-deliver with Black Hills Energy Arkansas. Liberty-Empire has offered customer programs in Arkansas since October 2007.

State Line Combined Cycle (“SLCC”) Upgrade Project Status

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 in mid-November 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 555 MW (333 MW Liberty-Empire’s share) for the winter peak season and 500 MW (300 MW Liberty-Empire’s share) for the summer peak season.

Transportation Electrification

Decarbonizing transportation through electrification contributes to safer and healthier communities. Liberty-Empire is supporting this objective through a diverse portfolio of proposed projects and programs that enables transportation electrification across its service territory through education, technology, charging infrastructure, financial incentives, and hands-on support with customers as they transition to electric vehicles and equipment. This five-year proposed transportation electrification portfolio consists of (1) an on-road component, (2) a non-road component and (3) an administrative component.

The on-road component can be summarized into the following categories:

- Residential Smart Charge Program
- Ready Charge Program
- Fast Charge Program
- Commercial Electric Vehicle (EV) Rate
- Fleet Advisory Services Program
- Commercial Electrification Program
- Electric School Bus Program

The non-road component provides incentives to encourage the adoption of non-road electrical equipment, including forklifts, Transport Refrigeration Units ("TRUs"), Truck Stop Electrification ("TSEs"), and agricultural irrigation well pumps. Finally, the administrative component seeks to inform prospective site hosts of program offerings and broadly educate customers on the use of electricity as a transportation fuel and includes:

- Customer Education & Outreach
- Annual Reporting
- Program Implementation

In addition, Liberty will work toward decarbonization of its own fleet of vehicles.

Elk River Windfarm Purchased Power Agreement (PPA) Contract Expiration in 2025

The 150 MW Elk River Windfarm PPA is a 20-year contract that began in mid-December 2005. This resource is located in Butler County, Kansas near the town of Beaumont. During the duration of this contract, the Company receives 100% of the output from this facility at a net energy price established by contract. This contract will expire in mid-December 2025.

Missouri Renewable Energy Standard Requirement

The Missouri Renewable Energy Standard ("RES") requires Liberty-Empire and other investor-owned utilities in Missouri to generate or purchase electricity from renewable energy sources or purchase Renewable Energy Credits (RECs) to meet a specified percentage of the Missouri retail energy requirement. The RES portfolio requirement has increased to 15% of Missouri retail electric sales by 2021. The Company currently complies with the RES by utilizing the Elk River Windfarm PPA, the Ozark Beach hydroelectric facility, and a solar component supplied by the Customer Solar Rebate program (the Meridian Way Windfarm PPA, which expires in late 2028, could be used if needed).

The addition of the Neosho Ridge Wind Project, North Fork Ridge Wind Farm, and Kings Point Wind Farm will provide RECs that can be used for compliance after the expiration of the Elk

River and Meridian Way Windfarm PPAs. Additionally, the Company shall propose a tariff to offer RECs to its Missouri retail non-residential customers. In the future, if new renewable energy requirements are implemented, the Company is in a favorable position to meet additional requirements.

6. Preferred Plan Update

During the period covered by this IRP Annual Update (2021-2026), the preferred plan from the 2019 IRP consisted of supply-side and demand-side resource additions and the expiration of a wind farm PPA contract. As previously mentioned, the Company has submitted a notice of its intent to make a MEEIA filing for new Missouri demand-side programs. The supply-side resources from the 2019 IRP are included in the load and capability balance tables presented in the next section and can be summarized as follows:

- 600 MW Wind in 2021
- 10 MW Community Solar in 2021
- 19.5 MW Distributed Solar plus Storage in 2022
- 50 MW Utility-Scale Solar in 2023
- 150 MW Elk River Windfarm PPA contract expiration in December 2025

Additional descriptions for the preferred plan resources can be found in Section 3 – Resource Acquisition Strategy Update.

Load and Capability Balance Report

The 2019 IRP preferred plan was described in the 2019 IRP Executive Summary. Additional information on the 2019 IRP preferred plan can be found in Volume 7 of the IRP. As of the writing of this report, no notable changes or updates to the preferred plan are known. However, as noted in Section 3 of this report, the timing and size of the solar resources are still being evaluated, due in part to changes in the Investment Tax Credit availability.

The Load and Capability Balance Report for the 2021 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 2021 SPP Resource Adequacy submission.

Due to the nature of the evolving requirements of SPP Resource Adequacy, there are notable differences in certain assumptions between the 2019 IRP Load and Capability Balance Report and the 2021 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 2021 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 2021 IRP Annual Update, Liberty-Empire used a 5% accreditation rating as allowed by Section 7.1.2 of the SPP Planning Criteria for new wind resources in commercial operation 3 years or less. However, the Company expects a higher accreditation rating for these new resources in the future once these resources have additional wind generation history, and when SPP adopts new renewable accreditation standards (see the sub-section on the Effective Load Carrying Capability ("ELCC") Solar and Wind Accreditation in SPP below).

Liberty-Empire also included a 78 MW system sale for the 2021 through 2024 (Summer) period, representing Liberty-Empire's five-year power purchase agreement with the Missouri Joint Municipal Utility Commission ("MJMEUC") for capacity and energy beginning June 1, 2020 and ending May 31, 2025. 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. The addition of the MJMEUC contract was not included in the 2019 IRP but is included in the tables below.

In addition, Liberty-Empire included the community solar, distributed solar, and solar plus storage resources as behind-the-meter resources as a reduction to the peak forecasts rather than as separate resources, as it is assumed that these resources will not be registered in the SPP Integrated Marketplace based upon SPP Business Practices Section 2.0.

Effective Load Carrying Capability ("ELCC") Solar and Wind Accreditation in SPP

Beginning with the 2023 summer season, the accreditation for wind and solar resources in SPP is expected to be determined using the Effective Load Carrying Capability ("ELCC") methodology.

ELCC is defined as the amount of incremental load that a resource (in this case wind and solar) can reliably serve while accounting for the probabilistic nature of generation shortfalls and random forced outages. ELCC is an industry-wide accepted methodology used for determining the capacity value of resources.

As of February 2021, SPP has completed its first informational-only studies for both wind and solar resources using the approved ELCC methodology for future use. A comparison between the current approved methodology and the new ELCC methodology for Liberty-Empire's existing renewable resources can be seen in the table below. However, the Load and Capability Balance Report for the 2021 IRP Annual Update and the Company's current SPP resource adequacy submission are still based on the current SPP wind and solar accreditation methodology for all years 2021-2026. The new ELCC method is not yet in effect. Additionally, the ELCC estimates in the table below are provided here for comparison purposes only and are subject to change.

Resource	Current Summer Accredited Value (MW)	ELCC Summer Accredited Value (MW)	Current Winter Accredited Value (MW)	ELCC Winter Accredited Value (MW)
Elk River Wind Farm PPA (150 MW)	33	25.71	26	21.94
Meridian Way Windfarm PPA (105 MW)	17	13.14	18	14.59
Neosho Ridge Wind Project (301 MW)	15.1	66.89	15.1	57.80
North Fork Ridge Wind Farm (149 MW)	7.5	37.32	7.5	38.14
Kings Point Wind Farm (149 MW)	7.5	37.57	7.5	38.39

HC* HIGHLY CONFIDENTIAL in its entirety *HC

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HC* HIGHLY CONFIDENTIAL in its entirety *HC

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7. Liberty-Empire Special Contemporary Issues

According to the Rule, special contemporary issues ("SCI") 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 SCIs (issues A through I) that were established by Commission Order in File No. EO-2021-0066. It should be noted that some SCIs for this IRP Annual Update reference sections of the IRP Rule that are specific to the triennial compliance requirements. In those cases, the Company has attempted to address the SCI as completely as possible within the scope of the IRP Annual Update process.

A) Impact of Falling Energy Market Prices in SPP Market

i. Model the current preferred plan both with stable (flat) and with declining market prices. The resulting modeled bill impacts should be compared to the currently forecasted bill impacts to give a more likely range of bill impacts of the utility's preferred resource plan.

In compliance with this SCI, Liberty-Empire developed two sets of natural gas and market prices: one with a stable (flat) trajectory and one with a declining trajectory. Liberty-Empire used these prices as inputs to model portfolio dispatch of the 2019 IRP preferred plan in the Aurora production cost model. Liberty-Empire also modeled the preferred plan against the 2019 IRP Base Case natural gas and power price trajectory for comparison. Finally, Liberty-Empire evaluated the bill impacts of both alternative price scenarios relative to the 2019 IRP Base Case. Although Liberty-Empire completed the exercise as required by this SCI, Liberty-Empire does not necessarily believe that market and natural gas prices will always be flat or declining as modeled here.

To develop the two market price trajectories, Liberty-Empire accessed the market and natural gas price forwards as of January 20, 2021, as published on S&P Global Market Intelligence, and used those forwards as the basis for the two sets of price inputs. For Liberty-Empire, the relevant power price hub for the Aurora inputs is SPP North. For the "declining" market price trajectory, Liberty-Empire used the forward prices for 2020-2030 as published by SNL for that time period, then held the 2030 power price forwards constant on a real dollar basis through the rest of the modeling period (2021-2040). For the "flat" market price trajectory, Liberty-Empire held the 2021 monthly power price forwards constant in real dollars through the entire modeling period. An identical approach was applied to Southern Star hub natural gas forwards to develop corresponding natural gas price trajectories for each scenario.

The resulting market and natural gas price trajectories for each scenario are shown below on an annual basis.

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[5] The portfolio also sees very limited dispatch from Empire Energy Center #3 and #4 in 2030 onwards.

[redacted]

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B) Virtual Power Plant

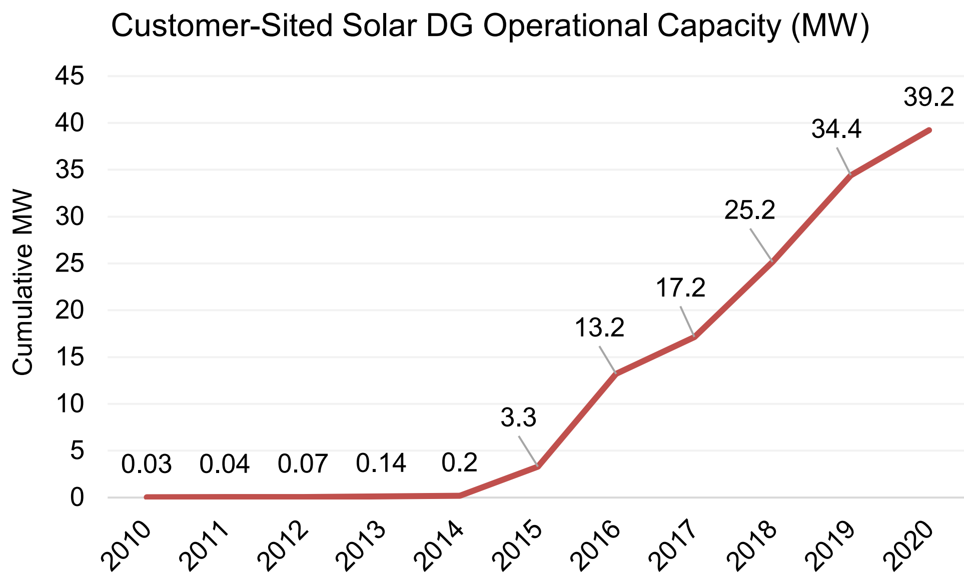
i. ***Determine the necessary customer-owned solar penetration and the steps it would need to take to achieve the penetration within its service territory to justify a virtual power plant option as a resource candidate in future supply-side generation planning and modeling scenarios.***

Over time, significant growth in renewable generation will challenge the stability of the grid and require the implementation of grid-balancing mechanisms. A virtual power plant ("VPP") may represent an efficient way to facilitate the integration of such mechanisms. A VPP is an aggregation or network of distributed energy resources ("DERs") that can be dispatched through a central control room while the individual resources remain independent in operation and ownership. A VPP can efficiently manage system load and grid-related issues that increase with DER implementation by monitoring, optimizing, dispatching, and distributing the aggregated power generated by individual DERs during periods of peak load.

The recent passing of FERC Order No. 2222 in September 2020 further facilitates VPPs by requiring Regional Transmission Organizations ("RTOs") to develop rules that allow DER aggregations to participate in wholesale power markets. In a wholesale market setting, a VPP would behave like a traditional power plant, participating in markets to sell electricity or ancillary services and receiving compensation for their ability to shift demand from peak to off-peak periods.

To be eligible for wholesale market participation, FERC Order No. 2222 states that the aggregated VPP must meet a minimum size of 100 kW. Small utilities, defined as those whose annual electricity sales are below 4 million MWh, also have the option to opt out of compliance to avoid being overburdened with the costs of complying.

Given Liberty-Empire's size and current penetration level of distributed solar generation, the Company would be eligible to aggregate its customer-owned DERs. As described further in Section 3, Liberty-Empire recently completed the development of its first utility-owned, distributed 2.2-MW solar farm in January 2021 as part of its Community Solar Pilot Program. In addition to utility-owned solar DERs, Liberty-Empire also has a growing number of customer-owned solar DERs in its service territory. Liberty-Empire maintains a database of these resources for purposes of evaluating current and future increases in penetration. As seen below, Liberty-Empire has continued to see growth in its customer-owned solar penetration in recent years. As of the end of 2020, 39.2 MW of customer-owned solar was online in Liberty-Empire's service territory, representing an increase of 4.82 MW since the end of 2019.



Literature has not identified an optimal amount of DER penetration to implement a VPP, as the conditions are variable and should be considered on a case-by-case basis. However, when considering implementation of a VPP to aggregate customer-owned solar, it is important to account for not only the level of DER penetration, but also to weigh other factors such as economic and resiliency benefits against the required infrastructure investment. To determine an estimated level of appropriate DER penetration and to understand the important considerations behind VPP justification, Liberty-Empire reviewed examples of existing VPPs developed by utilities in other service territories. Some prominent examples are described below.

Southern California Edison and SunRun

SCE partnered with SunRun and AutoGrid to create a 5-MW solar plus storage VPP that alleviates grid stability concerns during high-demand events, such as during extreme heat waves. SunRun provides the solar and storage infrastructure, and AutoGrid, a DER management platform, manages the solar and storage aggregation for SCE. The VPP lowers peak demand, which in turn lowers the overall cost of power and reduces strain on the energy system. This project followed a pilot project with 300 homes in the SCE service territory.

Green Mountain Power (GMP)

GMP in Vermont has a 13-MW battery storage VPP in which GMP leases Tesla Powerwall batteries to residential customers in return for control of their batteries during high-demand events. GMP currently has about 2,567 utility-controlled Powerwall batteries in customer homes. GMP discharges the batteries during hours when the ISO-NE grid faces peak demand, reducing the payments owed to the grid operator. The savings for GMP were $3 million in the first three quarters of 2020, which were passed on to the utility customers. GMP collaborated with Virtual Peaker, a software startup company, to manage the batteries in a VPP on behalf of GMP.

Liberty – New Hampshire

Liberty-Empire's sister utility in New Hampshire recently launched a battery storage pilot program to reduce overall peak electric usage and shift demand to lower usage times. The residential distributed batteries are programmed by Liberty to charge during off-peak hours when rates are low and discharge during peak hours when rates are high. In "critical peak periods," when Liberty experiences the highest demand for electricity for the month, Liberty activates the installed batteries that have excess power available and sends the power to the grid. Customers are compensated for the energy sent to the grid at net metering rates. Additionally, the program reduced the coincident peak load for the purpose of transmission billing.[6] Phase One of the pilot program was limited to 200 Tesla Powerwall batteries, with a potential Phase Two involving an additional 300 batteries.

Portland General Electric

Portland General Electric created a battery VPP fleet of about 4 MW by aggregating 525 residential behind-the-meter ("BTM") storage units. The utility takes complete control of customer batteries and uses them for a range of roles, including frequency response, volt/VAR control, generation capacity, energy arbitrage, and distribution grid upgrade deferral. PGE contracted with Virtual Peaker to facilitate the aggregation.

The examples described above suggest a few key strategic considerations. First, traditional utilities often do not have the necessary aggregation technology to enable VPPs. Thus, utilities may require a suitable partner company with the ability to manage the aggregation. Second, the grid system will require substantial upgrades in infrastructure and Information Technology / Operational Technology ("IT/OT") to enable efficient aggregation. These investments may include AMI, Advanced Distribution Management Systems, EV charging infrastructure, and transmission and distribution system upgrades to enable two-way flow. This observation serves to reiterate that when considering VPP implementation. Liberty-Empire must not only consider the level of customer-owned solar penetration, but also consider an array of additional factors for successful aggregation.

It is also important to note that most examples of aggregated VPPs include at least some level of DER storage to be most effective. At this point in time, Liberty-Empire does not have distributed storage data to analyze but intends to develop a database of these resources as they become available.

ii. Examine the possibility of using other DER resource candidates in addition to customer-owned solar as the basis for development and operation of a virtual power plant.

VPPs are most effective when they aggregate multiple resource types due to increased flexibility and ability to meet diverse energy needs. Other resources that have been virtually aggregated include small-scale wind power plants, small hydro, energy storage systems, and IoT and smart devices that together reduce load. Among these, battery storage VPPs have been the most

[6] This is not yet allowable in SPP, but was a significant component of the Liberty – New Hampshire's battery storage pilot business case.

prominent due to their dispatchability, peak shaving capabilities, and ability to enable two-way flow to support grid infrastructure. Battery VPPs have also been successfully implemented by utility companies as an additional service offering to their customers, as described in the examples above.

As mentioned, Liberty-Empire does not currently have storage DERs in their service territory. The Company will monitor the circumstances as they develop.

C) Small Modular Reactors

i. Investigate the option of a small nuclear reactor as a resource candidate in future supply-side generation planning and modeling scenarios.

The International Atomic Energy Agency defines small modular reactors ("SMRs") as small nuclear reactors of up to 300 MW in capacity. While SMRs cannot take advantage of the economies of scale gained by large, traditional nuclear plants, the factory-based manufacturing available to SMRs can potentially help cut costs and allow nuclear to remain competitive with other resource alternatives under certain market scenarios. However, the technology has not been fully approved or commercially tested today, and it is currently difficult to evaluate SMR development risk. In November 2020, several utilities withdrew from a deal with NuScale Power in Utah to help build a plant containing 12 SMRs. The project was also delayed by 3 years to 2030 and project cost estimates have risen to $6.1 billion.

Liberty-Empire screened out SMRs as a supply-side resource option in its 2019 IRP, primarily due to a lack of commercial testing. Details of this screening analysis can be found in Volume 4 of the IRP.

D) Combustion Turbine Conversion to Combined Cycle Units

i. Identify existing combustion turbines and consider (to the extent applicable) the conversion of combustion turbine units to combined cycle units as a resource candidate in supply-side generation planning and modeling scenarios.

Liberty-Empire has used CT to CC conversions for capacity expansions in the past. Both the State Line Combined Cycle ("SLCC") and Riverton 12 Combined Cycle resources were constructed in this manner. Including these units, Liberty-Empire currently has about 554 MW of combined cycle summer capacity in its generation portfolio. The remaining existing combustion turbine units in Liberty-Empire's portfolio are not well suited for conversion to combined cycle units.

Liberty-Empire owns natural gas-fired resources at three locations: the Riverton, Energy Center and State Line generation facilities. The potential of these resources for combined cycle conversion is described below.

Riverton

The Riverton facility consists of a combined cycle unit and two small simple cycle natural gas-fired units. Riverton 12 Combined Cycle is the newest unit at this location. Riverton 12 is a natural gas-fired combined cycle unit that is currently rated at 247 MW for the summer season. The original simple cycle combustion turbine was installed in 2007 and the unit was converted to a combined cycle in 2016. The Riverton site also has two relatively small simple cycle natural gas units (Riverton Units 10 and 11) that are rated at a combined 28 MW. These units were manufactured in 1967 and were installed at the Riverton facility in 1988. Given the age and size of these units, combined cycle conversion is not a feasible option.

<u>*Energy Center*</u>

Liberty-Empire has four natural gas-fired turbines at the Energy Center generation facility. Two of these units, Energy Center Units 1 and 2 (EC 1-2), have combined summer capacity rating of approximately 153 MW. These units went into service in 1978 and 1981. While they tend to operate during the summer on-peak hours, due to their ability to burn fuel oil as a back-up fuel, they can also operate during extreme winter conditions for economic or natural gas transportation curtailment reasons. Similar to Riverton Units 10 and 11, the age and efficiency of these units make them unlikely candidates for combined cycle conversion. Additionally, EC 1-2 were the first existing CTs highlighted for retirement for IRP purposes.

Liberty-Empire also has two FT8 Twin Pac aero-derivative units known as Energy Center Units 3 and 4 at the Energy Center facility, with a combined summer rating of about 82 MW. These units have quick start capability and are typically on-line at full load in less than 10 minutes. These units are used primarily for two purposes, peaking and load balancing and are not suitable engines for combined cycle conversion.

<u>State Line</u>

The State Line facility consists of State Line Unit 1 and the jointly owned SLCC. State Line Unit 1 is a 93 MW 1995 vintage combustion turbine. Its age, dated technology, and configuration limitations make it an unlikely candidate for combined cycle conversion. 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 555 MW (333 MW Liberty-Empire's share) for the winter peak season and 500 MW (300 MW Liberty-Empire's share) for the summer peak season.

ii. As an alternative to the conversion to combined cycle units, evaluate the redevelopment of fossil-fueled generations sites that are either set for retirement or requiring environmental mitigation for opportunities to integrate lower or zero-emitting energy production including storage as resource candidates in supply-side generation planning and modeling scenarios.

As mentioned in Section 3, after nearly fifty years of service, the Asbury coal-fired generation plant was de-designated in the SPP market as of March 1, 2020. The site and facilities of the former Asbury plant will host the Asbury Renewable Operations Center ("AROC") that will be used to operate and maintain the new North Fork Ridge Wind Farm, Neosho Ridge Wind Project, and Kings Point Wind Farm. The Asbury plant 161 kV substation is also the point of interconnection for the North Fork Ridge Wind Farm providing 150 MW of wind energy onto the SPP grid.

The Company is continuously looking for opportunities to further repurpose the site for new green technologies and generation and will provide updates through the IRP process.

E) Grain Belt Express Energy

i. Include Grain Belt Express Energy as a Power Purchase Agreement resource candidate in supply-side generation planning and modeling scenarios.

Grain Belt Express is a 600-kV, 780-mile HVDC transmission line currently under development. The line is expected to deliver about 4 GW of wind energy from western Kansas through Indiana, Missouri, Illinois, and the eastern grid.

Liberty-Empire believes that including a new supply-side option in modeling scenarios is more appropriate for a full IRP.

F) Long Duration Storage

i. Consider the potential feasibility of long-duration electricity storage applications within a 20-year planning horizon. That is, at least a cursory review of best available technology and promising options of new long-duration electricity storage systems (as opposed to old technology such as pumped hydro). This does not require specific modeling of long-duration electricity storage technology that has not been proved commercially. (The Commission is interested in the stacking concrete blocks for purposes of energy storage as one possible option.)

Within a 20-year planning horizon, long-duration storage technologies have the potential to provide multiple benefits, including peak shaving capabilities, ancillary services, and the ability to balance load during extended adverse weather events. However, new storage technologies currently face obstacles such as uncertainty around cost and technological feasibility. As these technologies mature, Liberty-Empire will continue to monitor their costs and benefits. A review of some of the most promising available technologies is described below.

<u>*Hydrogen Storage*</u>

Hydrogen storage is one potential long-duration storage solution that has recently gained significant interest. When burned for fuel or consumed in a fuel cell, pure hydrogen emits only water vapor and emits no NOx, SOx, or CO2 particulates. While hydrogen can store and deliver usable energy, it does not typically exist in an isolated form in nature and must be produced from compounds containing it. Today, hydrogen is most commonly produced from thermal processes such as steam reforming of natural gas or coal gasification, but may be increasingly produced through the process of water electrolysis using "greener" sources of electricity such as solar or wind, particularly as electrolyzer and renewable prices become more competitive and as environmental regulations and targets continue to decrease the use of fossil fuels.

Regardless of the electricity source used to produce hydrogen, hydrogen storage capabilities will be a key to advancing hydrogen technologies. Once produced, hydrogen can be physically stored in tanks as either a pressurized gas or a liquid and converted back to power (either as a fuel for hydrogen-enabled natural gas plants or in a fuel cell) when needed for energy. The ability to store hydrogen in tanks enables long duration times (up to two weeks with current storage capabilities). While the most successful hydrogen storage methods today have been based on compression, cooling, or liquefication, several materials-based hydrogen storage technologies are also being studied and pursued today.

The cost-effectiveness of hydrogen production and storage will depend on many factors, including the availability of incentives or subsidies for producing hydrogen; carbon regulations; capital cost improvements for the electrolyzer, renewable, and storage components; and the availability of and ability to repurpose existing natural gas storage and production infrastructure for hydrogen, among others. Today, hydrogen electrolysis and storage remain expensive and will require significant research and development before becoming feasible on a commercial scale.

Gravity Storage

Gravity storage involves storing energy by lifting heavy loads and dispatching energy by releasing them. In theory, the concept is similar to that of pumped hydro storage, which involves pumping water to a higher elevation (incurring some electricity cost) and then releasing it back through a turbine to generate electricity.

One gravity storage concept today involves a six-armed crane that stacks 35-metric-ton concrete blocks around itself in concentric rings to store energy, then releases the bricks to discharge, generating power from the gravity-based descent. Operations are designed to be fully automated and to account for inertia and wind interference. The startup pioneering this concept, Energy Vault, received a $110 million investment in 2019. Energy Vault expects to be able to deliver lower system prices per kWh than lithium ion batteries, but like other gravity storage technologies, Energy Vault towers have not been proven commercially at scale.

Another gravity-based concept is advanced rail energy storage (“ARES”), in which an electric train transports heavy loads uphill, storing electric power as mechanical potential energy, and releases energy by traveling downhill. One 5.5 MW ARES demonstration project exists in Nevada and provides ancillary services to the grid, though ARES projects can achieve capacities of up to 1,000 MW. Since a steep grade is required, ARES has limited options for siting and requires high land usage. The Nevada project spans 43 acres.

Gravity storage boasts a higher round-trip efficiency and lower operations and maintenance costs than a pumped hydro storage project. However, gravity storage, like pumped hydro storage, requires high initial capital costs on a per-kW and per-kWh basis. Long-term stranded costs could arise if another storage technology matures more quickly. For example, most of the capital costs for a gravity storage tower lies in the material for the bricks. Stranded costs could occur under a carbon-priced future if the environmental impact of concrete is taxed, so a potential adopter must also consider inexpensive and local material with a low carbon footprint.

Compressed Air Energy Storage ("CAES")

CAES uses electricity to compress and store ambient air in a pressurized underground cavern or container. To extract the stored energy, compressed air is drawn from the storage cavern, heated, and expanded in a high-pressure turbine. The compressed air is then mixed with fuel and combusted, and the exhaust is expanded through a low-pressure gas turbine. The turbines are connected to an electrical generator for power production.

CAES is considered a proven and mature technology, second only to pumped hydro. Thus, the capital costs of a CAES system are not expected to decline significantly in the future, although capital cost is largely dependent on siting.

Siting is the greatest barrier for CAES. Only one CAES system exists in the United States, a 110-MW plant in Alabama. Another 317 MW CAES system in Texas is projected to begin operations in 2022. A $400 million, 270 MW CAES plant near Des Moines, IA was terminated after 8 years of development due to geological limitations.

Liquid Air Energy Storage ("LAES")

A variation of CAES, LAES uses electricity to cool air until it liquefies. Liquid air is stored in a tank. When electricity is needed, liquid air is converted back to a gaseous state, and the gaseous air turns a turbine to generate electricity.

LAES has more geographic potential than CAES, given that its cryogenic tanks can be connected to infrastructure along existing supply chains for the oil and natural gas industry. Highview Power, a LAES startup, has successfully demonstrated a 5 MW/15 MWh LAES system in the United Kingdom. However, the technology is not commercially proven in the United States. LAES may be a viable alternative to CAES if the latter is geologically infeasible or infrastructure exists to support LAES, but at a high cost (the liquefaction plant accounts for 60% of capital expenditures).

Thermal Energy Retrofit Storage

Thermal energy storage can be achieved with several widely different technologies, but generally involves storing energy as heat, then converting the stored heat energy to electricity for consumption. One example of thermal energy storage involves converting or retrofitting existing thermal (e.g. existing coal) assets into storage units that can store intermittent renewable energy. Instead of burning coal for heat, tanks of molten salts are heated electrically by surplus solar and wind to charge the battery, then discharged back to the grid using the plant's existing generation and transmission assets. Aalborg CSP, a renewable and energy storage firm in Denmark, recently began offering thermal plant retrofitting for this purpose on a commercial basis. While the cost and feasibility of implementing thermal energy storage is dependent on the ability to repurpose existing sites, the economics would be further improved with storage tax incentives or an increase in carbon prices in the power sector.

Heat Pump Water Heaters (HPWH)

HPWHs function as a form of thermal storage on a residential scale. HPWHs consume electricity to heat water during non-peak hours of high renewable generation. Because water has a high thermal capacity, hot water produced by a 40-gallon HPWH can last up to 12 hours, reducing the need for electricity consumption during peak hours. Paired with a smart thermostat, HPWHs can help individual customers arbitrage around peak pricing hours. At scale, HPWHs paired with smart thermostats may reduce the grid's overall peak.

G) Integrated Distribution Planning

i. Analyze the benefits of integrated distribution planning as a way to manage distribution grid investments 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) for electric vehicles and inclining block rate (IBR).

"Integrated distribution planning" refers to the consideration and application of emerging techniques that improve the efficiency and operation of the future electric distribution system. In most resource planning applications, traditional utilities have tended to look broadly at supply and demand to identify system needs, mostly due to the historical lack of more advanced data, modeling tools, and mechanisms needed to evaluate existing grid challenges and opportunities on a more granular scale. As the adoption of advanced technologies and systems continues to grow, however, utilities will need to identify and apply more nuanced planning approaches that optimize operations at the edge of the grid. Using the advanced planning tools and models, utilities will be able to forecast locational price and load impacts on a daily, hourly, and sub-hourly basis and apply advanced resources and systems (such as DG, storage, EVs, demand response, and advanced metering) and tools and mechanisms (such as TOU pricing, distribution automation, grid intelligence, and advanced analytics) as appropriate to optimize the operation of the grid to manage load, improve operational efficiency, and more accurately assess capital investment and technology needs over time.

If properly architected, a combination of DG, DR, EVs, storage, advanced metering, and pricing strategies could represent foundational investments that enable a variety of applications that then expand the capabilities of the system overall. For example, the use of DER-provided grid services will drive enhanced distribution operational functions, such as schedule coordination, DER portfolio dispatch, aggregation, and settlements. These functions can then be used to reduce overall system costs and balance hourly load profiles or manage grid congestion in a more cost-effective manner than building and implementing new centralized power plants. Without high levels of DER on a distribution system, however, these functions would not be necessary or beneficial, illustrating that the timing, pace, and locational dispersion of DER on a distribution system matter with respect to decisions about the evolution of a distribution system platform structure. Irrespective of DER adoption, however, foundational modern grid capabilities, including robust sensing and measurement, information management, and communications networking capabilities, will be required for reliability and grid resiliency.

Today, Liberty-Empire is testing some of the distribution grid benefits of DER through the implementation of its Community Solar Pilot Program, the first phase of which completed development in January 2021. The pilot program aims to place small (approximately 2 to 10 MW) solar facilities directly on the distribution grid in specific areas that have historically experienced congestion or have neared their peak capacity. By placing these solar facilities around the grid, Liberty-Empire is able to alleviate some pockets of system demand while potentially avoiding the need for larger construction projects, such as expanding power lines or building new central generators.

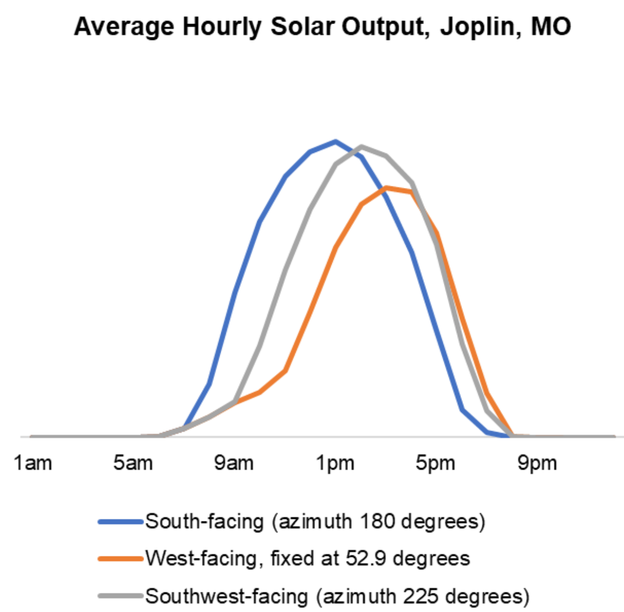
Liberty-Empire is also currently in the process of deploying AMI across its service territory, which is expected to be completed mid-2021. Once fully implemented, the AMI system will effectively enable Liberty-Empire to access more granular data about its customers, and in turn, further allow more advanced integrated distribution planning with an informed application of storage, DERs, DSM, EVs, and rate design mechanisms such as time varying rates. In the interim, Liberty-Empire is developing and proposing a TOU pilot in its upcoming Missouri Rate Case to aid in the analysis and development of more robust rate mechanisms in the future. Additional information on Liberty-Empire's TOU pilot can be found in Section 4 of this report.

H) Solar

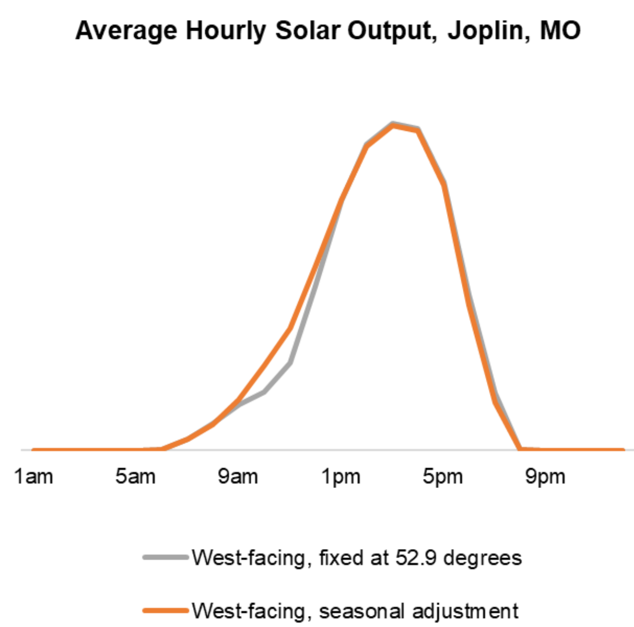
i. Assess the value of a solar tariff that encourages distributed solar installers to optimize the direction that solar panels face to provide more kWh during the utility's peak and provide maximum benefits for all utility customers.

In general, solar photovoltaic (PV) systems typically generate the most output when directly facing the sun at noon. However, in the absence of paired storage capacity, increased midday electricity output from fixed-tilt solar PV arrays may not alleviate a utility's peak electricity demand in the early evening. The optimal module direction to serve peak load is most likely west-facing, toward the setting sun. Rather than maximize daily solar output, west-facing modules shift the highest panel output to peak hours. The graphic below illustrates the average day of hourly output of a hypothetical 4-kW PV array located in Joplin, Missouri, produced using NREL's PVWatts resource simulation tool.[7]

[7] Source: NREL PVWatts (assuming fixed tilt 52.9 degrees, variable azimuth, other parameters NREL default)



The angle of solar irradiance varies seasonally. Customers who adjust the fixed tilt of their PV array every three months can slightly increase annual module output compared to a static year-round tilt, as shown below.[8] Seasonal adjustment is not a common practice, but in jurisdictions with heavy snowfall, adjusting panel tilt to a steeper angle prior to winter months can both increase output and reduce snow accumulation.



Under a time-of-use (TOU) rate structure, customers that generate more electricity during the Company's peak demand hours can optimize earnings from net metering. For example, solar

[8] Source: NREL PVWatts (assuming variable tilt, fixed azimuth 270 degrees, other parameters default)

customers in San Diego Gas & Electric's service territory in California can earn up to $0.04 more per kWh generated during peak hours of 4 p.m. to 9 p.m.[9] West-facing modules can also alleviate strain on utility generation and transmission resources.

Liberty-Empire is currently investigating rate design structures including TOU and will provide further updates on the process as they become available.

ii. ***Conduct a Value of Solar study to inform efforts relating to integrated resource planning. A Value of Solar study is a comprehensive analysis of the cost avoided and benefits created for the grid, electricity customers, and society as result of the generation of solar energy. Because solar energy is often interconnected at the distribution level of the grid, such a study, done correctly, will capture distribution level benefits and costs that cannot be captured by wholesale level avoided cost estimates. The immediate benefit of such a study is to understand the contributions and costs related to distributed solar generation beyond simplistic and subjective allegations of cross subsidies. The utility's Value of Solar study should consider the National Association of Regulatory Utility Commission's Distributed Energy Resources Rate Design and Compensation manual, National Renewable Energy Laboratory's Value of Solar: Program Design and Implementation Considerations, and the National Energy Screening Project's National Standard Practice Manual for Distributed Energy Resources among any other industry guidance on value of solar study development and implementation.***

Based on the language in the Commission Order in File No. EO-2021-0066 establishing the SCIs, Liberty-Empire believes that conducting a full locational value of solar or DG study that includes distribution-level benefits and costs, or even a more general value of solar study would be outside the scope of the Annual Update Report. File No. EO-2021-0066 states that, "The Commission does not intend that a utility spend an unreasonable amount to address any special contemporary issue. If Liberty finds that the cost to address a special contemporary issue is excessive, it may explain its concerns in its next IRP filing, while addressing the issue to the extent reasonably possible." A full value of solar study is highly locally-specific and would require in-depth analysis involving net metering proceedings and considering non-wires alternatives.

For these reasons, Liberty-Empire did not conduct a full value of solar study for purposes of this report. However, the Company has addressed this SCI as it believes is appropriate by laying out a proposed bottom-up approach for performing such a study in the future, in addition to some key modeling uncertainties to consider.

Proposed Approach to a Value of Solar Study in Liberty-Empire's Service Territory

Step 1: Identify and calculate the key components of the value of distributed solar for Liberty-Empire customers. At a high level, these components would likely include an (a) avoided environmental cost, (b) avoided energy cost, (c) avoided capacity cost, (d) avoided transmission capacity cost, and (e) avoided distribution capacity cost. A proposed approach for estimating

[9] https://www.sdge.com/sites/default/files/regulatory/6-1-19%20Schedule%20DR-TOU%20Total%20Rates%20Table.pdf

each of these components is below.

Step 2: Summarize the range of estimates of each component described above, ultimately arriving at a range for the "value of solar" to Liberty-Empire customers in $/MWh, with commentary on the uncertainties and individual drivers of the range of solar value.

Bottom-Up Estimation Approach to Identified Value Components

Avoided Environmental Cost

Proposed Approach: Determine the amount and value of avoided emissions due to the addition of a new solar project. The calculation would be based on the hourly emissions of the marginal unit in the SPP market, weighted by the hours when the solar plant is producing. Three emissions costs (CO_2, SO_2, NOx) would likely be evaluated, with CO_2 having the greatest impact. For SO_2 and NOx, the Company would rely on existing market structures and fundamental forecasts. A range of potential prices would likely be developed for CO_2, for example based on IRP planning assumptions and/or the "social cost of carbon" prices used by the federal government in recent years.

Avoided Energy Cost

Proposed Approach: Determine the amount and cost of energy offset by a new solar project over the lifetime of the resource. The value would be based on a solar generation-weighted SPP market price outlook. A range of potential prices would likely be developed for SPP market prices, for example based on IRP planning assumptions.

Avoided Capacity Cost

Proposed Approach: Determine the value of avoiding the fixed costs (including capital and FOM) associated with new or existing power plants. As Liberty-Empire has done in past IRP and DSM analyses, the avoided capacity cost over time would be a blend of the going-forward costs of the marginal existing unit in the portfolio when reserve margins are above minimum requirements, trending to a net Cost of New Entry ("CONE") value (based on a natural gas peaking unit or a new storage unit) over time when capacity is needed. The value would be de-rated by a solar facility's expected ELCC credit over time, informed by SPP (or other market) studies on the potential range of ELCC credit trajectories, as more and more solar enters the market. Note that the ELCC assumption would be different if considering a solar plus storage resource, allowing for a fuller range of avoided capacity value.

Avoided Transmission System Capacity Cost

Proposed Approach: Determine the avoided transmission upgrade costs for new plants due to serving load with solar. The calculation would be based on a review of the SPP interconnection queue, as Liberty-Empire has done in past IRP work. The value would be de-rated by a solar facility's expected ELCC credit over time. Note that the ELCC assumption would be different if considering a solar plus storage resource, allowing for a fuller range of avoided capacity value. Additional benefits may include O&M related to the avoided transmission capacity investments.

Avoided Distribution System Capacity Cost

Proposed Approach: Determine the cost of distribution system investments (e.g. line upgrades or new substations) avoided by using distributed solar to meet peak load. The value would be based on Liberty-Empire's expertise associated with pending distribution upgrade projects and determined by identifying representative distribution projects that could be offset, then approximating an associated $/kW-year value. Additional benefits may include O&M related to the avoided distribution capacity investments.

Given that Liberty-Empire is a winter-peaking system, standalone solar may receive little to no distribution benefit. However, paired solar plus storage may be incorporated in the range assessment to assess a higher range. In addition, it is important to note that the locational value of solar most comes into play for this component of the value of solar. While avoided distribution system capacity investments may be fairly low on a general level, it may be one of the most significant areas of value for a more specific locational value study.

If measurable at a local level, additional benefits or avoided costs may include (f) avoided system losses from avoided transmission and distribution line losses and (g) avoided outage costs due to the potential to reduce the number and duration of outages as a result of having more generation at the edge of the grid.

I) FERC Order 2222

i. Evaluate the options of potential upgrades to the utility's distribution system needed in light of FERC Order 2222.

In September 2020, FERC issued Order No. 2222 ("Order"), which is intended to encourage SPP and other regional transmission operators to update their tariffs to allow virtual aggregations of distributed energy resources ("DERs") to participate in wholesale power markets. FERC broadly defines a DER as a small-scale (10-1,000 kW) generation or storage resource. DERs can be located behind a customer's meter or connected to a utility's distribution system. DER technologies include electric storage, intermittent generation, distributed generation, demand response, energy efficiency, thermal storage, and electric vehicles and their charging equipment.

One specific directive of the Order is to address coordination between SPP, DER aggregators, and utility distributors such as Liberty-Empire. The Order does not require specific cooperation frameworks, nor does it mandate software applications or best technologies for compliance. Rather, FERC encourages participants to consider new IT and communications systems. As DER penetration increases, such systems will likely need to interface to exchange mutually recognizable data. Early consideration of interoperability could potentially prevent redundancy and unnecessary costs later.

SPP established a Task Force to prepare SPP's Order No. 2222 Compliance filing to submit to the FERC by July 19, 2021. The Task Force is scheduled to address SPP-aggregator-utility coordination issues in late February and early March 2021. Liberty-Empire will continue to monitor any updates or revision requests issued by SPP on this matter.

Given FERC's guidance, the following technical upgrades to Liberty-Empire's distribution system could be potential options to facilitate Order No. 2222 compliance. Liberty-Empire is already implementing certain upgrades, including AMI and a transportation electrification program, and will continue to evaluate the need for other upgrades on Liberty-Empire's distribution system.

Advanced Metering Infrastructure (AMI)

The Company is currently implementing advanced metering infrastructure (AMI) as part of Liberty's Customer First program. The Company expects to complete implementation by mid-2021. AMI offers the technical capabilities to comply with Order No. 2222 requirements, for example, assigning resources as wholesale market products or retail products. Additional information on AMI implementation can be found in Section 4.

EV Charging Infrastructure and EV Readiness

EVs are eligible for DER treatment under the Order. EVs are able to serve as both a demand and a supply resource, offering grid flexibility and avoiding costly infrastructure upgrades, among other benefits. Installing bi-directional EV charging stations at key locations on the distribution system could alleviate congestion and provide other grid benefits.

Liberty-Empire currently intends to roll out a five-year program to facilitate transportation electrification. The proposed program includes an on-road component, a non-road component, and an administrative component. Additional information on the proposed Transportation Electrification program can be found in Section 5.

Advanced Distribution Management System ("ADMS") and Distributed Energy Resource Management System ("DERMS")

These systems are used to register DERs, aggregate DERs into VPPs, optimize dispatch, and manage grid response. New IT systems and communications platforms may be needed to support a DERMS. The Company's Customer First platform may be able to serve as a utility-client interface. This will also require communication and coordination between the Company and the system's DER aggregator.

Firm Distribution Circuits

The distribution system must be physically ready for any influx of DERs in order to prevent outages. An effort to firm distribution circuits may be necessary as DER penetration grows.

Centralized Telemetry

Centralized telemetry will communicate market data to load-serving entities and load distribution companies.