

Memorandum

To: Water & Light Advisory Board

From: Water & Light Staff

Date: September 21, 2022

Subject: Update on 100% Renewable Energy by 2030

Executive Summary

Staff has prepared a report evaluating the City of Columbia's renewable energy supply and the feasibility of achieving a 100% renewable energy portfolio by 2030. This report includes information provided in the recently completed Integrated Electric Resource and Master Plan (IERMP), considerations for fossil fuel resources, and recommendations for next steps for expanding renewables on the grid.

Background

Since 2004, the City of Columbia has had a renewable portfolio standard that sets the current threshold of renewable energy at 15%. In 2021, Water & Light received 14.63% of its energy supply from renewable sources. CWL has agreements in place to meet and exceed the City's current renewable portfolio standard.

In 2018, the City of Columbia started an IERMP process that, among other things, evaluated future energy supply, including increasing renewable energy to 100%. Through a sensitivity study, Siemens evaluated numerous factors such as capital costs, fuel costs, interest rates and utility load across a wide range of potential scenarios. These scenarios are not designed as a choice of potential energy future, but rather, are intended to evaluate the portfolio relative to potential future inputs to assess utility risk. Two of these scenarios from the Integrated Resource Plan, the Reference Case and Early Renewable Scenario, are summarized below.

Reference Case

The Reference Case assumes not only compliance with the City of Columbia Ordinance for the Renewable Energy Standard but also a long-term target of 100% renewable energy generation by 2050. It also assumes the carbon resource reduction targets as stated in the City of Columbia Climate Action and Adaptation Plan from May 2019. This path places CWL at 73% renewables by 2040 (Siemens, page 71).

In terms of system costs, the Reference Case has a Net Present Value of costs of \$726 million with 80% of the costs coming from the payments to the coal and renewable power purchase agreements (PPAs). The rest of the costs come from the operation and maintenance of CWL assets (including future generation assets) and market capacity and energy purchases (Siemens, page 3). Because of the timing of the Integrated Resource and Master Planning process, all costs are expressed in 2019 dollars.

In terms of annual costs, the Reference Case has forecast costs of \$67 million in 2021 declining to \$48 million by 2030, mostly driven by a reduction in PPA costs with the expiration of the Sikeston, Ameresco and Blue Grass contracts. System costs increase after 2030 with the new renewable and capacity market purchases ranging from \$52 million to \$55 million in the 2030s, still below current costs (Siemens, page 3).

- Reference Case cost per MWh: \$43.37/MWh
- Reference Case NPV: \$726 Million (2019)

Figure 29 from the Integrated Resource Plan shows the Net Present Value (NPV) of the system costs across all scenarios simulated for the IRP expressed in 2019 dollars. The system costs include all variable and fixed operating costs for CWL generation and the PPAs signed including capital payments, as applicable. The system costs also include the costs of future generation as simulated for each scenario. The NPV of system costs also include the costs of capacity and energy market purchases, and the revenues from energy sales to the MISO market. (Siemens, page 66)

Figure 29: NPV of Total System Cost (Net of Market Sales) (Millions 2019\$)



All capacity purchases and new renewable generation is selected after 2030 in the Reference Case driven by load growth, rising renewable targets, and in particular the planned retirement of the Sikeston coal plant in 2030 and the end of the Bluegrass and Ameresco PPAs in the late 2020s. The Reference Case shows 159 MW of new capacity additions, mostly solar, coming online after 2030 (Siemens, page 76).

Early Renewable Scenario - 100% by 2030

The Early Renewable Scenario is characterized by accelerated renewable and net-zero carbon targets along with higher penetration of solar distributed generation, energy efficiency savings and electric vehicle demand (Siemens, page 86). The Early Renewable Scenario has a NPV of \$777 million, \$50 million higher than the Reference Case. The Early Renewable Scenario has forecast annual costs of \$69.8 million in 2021 rising to \$81 million by 2030 driven by the new PPAs and the renewable capacity

additions. Total costs decline after 2030 with the end of the Sikeston PPA in 2030 to \$66.5 million in 2031. Overall, costs would stay around \$65 million in the 2030s without a significant change in the generation mix (Siemens, page 90). To achieve net zero carbon emissions under this scenario, the utility will need to fully sell the energy from the coal PPAs back to the market by 2030 (Siemens, Page 74).

- Early Renewable cost per MWh: \$46.46/MWh
- Early Renewable NPV: \$777 Million (2019)
- NPV of costs excluding revenues from market sales is \$926 million (2019)

In 2021, the cost for non-renewable energy was \$23.75/MWh and the cost for renewable energy was \$35.79/MWh.

Generation capacity additions in the Early Renewable Scenario are incremental to the new PPAs signed by CWL. The results of the generation expansion plan show 246 MW of new capacity additions — 87 MW higher than the Reference Case — including 175 MW of new solar generating capacity and 68 MW of wind. In the Early Renewable Scenario, all new solar capacity is installed by 2030, which is in sharp contrast to the Reference Case where all new capacity additions come online after 2030 (Siemens, page 87).

Resource Planning

The City of Columbia legal department is currently evaluating coal contracts to identify any flexibility within those contracts that will help determine what Water & Light's next steps could be.

While it is useful to have a general procurement plan looking out several years, it is less risky to procure energy in smaller time intervals, given the volatility and uncertainty in the markets. For example, it is not recommended to solicit an RFP for 2028 or 2029 energy given the current historically high cost energy markets. Likewise, future legislation related to tax credits or other incentives could have significant benefits that would be lost if energy is contracted too soon.

CWL is currently looking to procure a replacement for the Boone Stephens solar project as well as planning for replacement of other resources with near term contract end dates. In CWL's current position, seeking PPAs in excess of necessary resources could result in overbuying energy for several years, as much as 35% more than CWL load. This excess energy would be sold to the market at significant market risk to CWL.

Additional consideration must be given to how best to meet capacity requirements if the City chooses to no longer receive power from coal-fired facilities. The IERMP included the capacity attributes of the coal PPA generation in order to satisfy MISO's planning reserve margin requirement as well as utilizing existing gas peaking systems to meet future capacity requirements.

CWL's capacity position is stable until the expiration of the current capacity contract with Dynege and the retirement of the Sikeston plant. CWL desires to be long on capacity given the potentially costly downside of being short and will need to seek additional capacity agreements, or perhaps construct additional capacity, to plan for the end of those contracts.

Siemens assumed that firm capacity would be readily available for purchase when and where needed. This may be a faulty assumption as indicated by the results of the last MISO capacity auction, which showed a substantial increase in the cost for capacity, the lack of thermal resources in the MISO

interconnection queue, and the continued retirement of legacy thermal resources within the MISO footprint.

In determining how best to move forward with the coal contracts and gas peaking systems, the City will need to clearly define 100% renewable energy. Defining this metric will provide for a better understanding of necessary resources to meet the City's energy goals.

Next Steps

The IERMP provided insight into what a transition to 100% renewable energy could look like at a high level using data from 2019 and assumptions concerning time periods, the state of the economy, energy input pricing, adoption of energy efficiency and electric vehicles, and similar items. The IERMP was not designed to study a particular renewable energy case, but a range of potential scenarios. The energy markets have changed significantly since 2019, with much higher prices and volatility, making the IERMP results less reliable. A detailed study needs to be conducted to properly vet the 100% renewable energy by 2030 case.

Staff has had discussions with The Energy Authority (TEA) about conducting a detailed study that would consider options regarding a potential 100% renewable energy by 2030 goal. A proposed scope of work would include the following:

1. Case #1 (Base Case): 100% renewable energy to serve CWL load on an annual basis by 2030. Capacity to be served by existing resources and/or procured as necessary through market purchases or construction. Use of Renewable Energy Credits (RECs) is not allowed, and excess energy is sold to the market.
2. Case #2: Same as the Base Case, except that the use of RECs is allowed.
3. Case #3: Same as the Base Case, except CWL divests of all coal assets at its earliest convenience, if possible. CWL will have to replace both capacity and energy, and some development of the costs of divestiture will be required.
4. Case #4: Same as Case #3, to include eliminating CWL thermal units used for capacity. All capacity obligations are to be met with renewables. Any capital costs in required transmission upgrades necessary to eliminate existing resources would not be included.
5. Case #5: Same as the Base Case, except Sikeston is assumed to retire early, i.e. 2026 or 2027.
6. Case #6: Same as the Base Case, except a shorter monthly or weekly reconciliation period is used.

The estimated cost of examining Case #1 through Case #5 is \$90,000 to \$100,000. TEA indicated that studying Case #6 would be very complicated and recommended not pursuing that case unit after the previous five cases had been completed and reviewed. TEA indicated that they could begin work in the first quarter of 2023, with an estimated completion of the study in the second quarter of 2023.

Staff believes that TEA is uniquely qualified to conduct the detailed analysis as described, as they have intimate knowledge of the CWL system, CWL assets and purchase power arrangements, and the markets in which CWL operates. TEA has served as CWL's market participant in these markets for many years. This work can be completed through the execution of a new task order to our existing agreement with TEA, which would require Council approval.