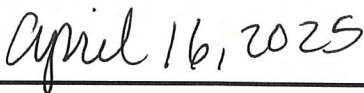


city of
Columbia
Utilities

2025 Renewable Energy Plan

 city of Columbia <i>Utilities</i>		
City of Columbia, MO 701 E Broadway P.O. Box 6015 Columbia, MO 65205 573.874.CITY (2489)	Erin Keys Registered Professional Engineer E-29106	
Approved By: 		 Date
Interim Director of Utilities		

Introduction

City of Columbia Utilities

City of Columbia Utilities' renewable energy portfolio is a diverse combination of wind, distributed and utility solar, and landfill gas resources. This resource mix aims to meet City Ordinances while maintaining reliable, cost-effective service and reducing reliance on non-renewable energy sources.

In November 2004, residents of Columbia approved a renewable energy ordinance for the City's power supply portfolio, directing City of Columbia Utilities to generate or purchase increasing levels of energy from renewable resources through 2029. The Columbia City Council revised the renewable energy ordinance in January 2014 to increase the renewable energy goals. The standard for 2024 was set at 25%.

In 2024, City of Columbia Utilities purchased or generated 280,872 MWH of its total electric usage through renewable energy sources, which was 22.82% of Columbia's adjusted system load. In 2023, Columbia's renewable energy usage was 265,866 MWH, which was 21.84% of the adjusted system load.

The cost of renewable energy was approximately \$1.3 million more in 2024 than in 2023. This increase in cost was predominantly due to higher transmission costs from the Crystal Lake Wind Farm.

The rate impact for renewable energy compared to non-renewables was \$3,003,959, which was 66.2% of the rate impact limit of \$4,536,104.

City of Columbia Utilities continued to make progress in 2024 toward expanding the City's renewable portfolio, strengthening City of Columbia Utilities' efforts to meet the Renewable Energy Standard, and making progress toward climate goals supported by the 2019 Climate Action and Adaptation Plan. City of Columbia Utilities has been instructed to proceed with obtaining a renewable energy Request for Proposal (RFP) that will be released to the public in 2025.

In 2024, the Columbia City Council instructed staff and the Water & Light Advisory Board to assess the Renewable Energy Standard and recommend changes to the ordinance that would build the framework for the future of renewable energy in the City. Those recommendations were discussed with the Council in 2024, and an ordinance based on those recommendations will be proposed in 2025.

City of Columbia Ordinance Section 27-106: Renewable Energy Standard

(a) The city shall generate or purchase electricity generated from eligible renewable energy sources at the following levels:

- Two (2) percent of electric retail usage (kWhs) by December 31, 2007;
- Five (5) percent of electric retail usage (kWhs) by December 31, 2012;
- Fifteen (15) percent of electric retail usage (kWhs) by December 31, 2017;
- Twenty-five (25) percent of electric retail usage (kWhs) by December 31, 2022; and
- Thirty (30) percent of electric retail usage (kWhs) by December 31, 2028.

(b) This renewable energy shall be added up to these kilowatt hour levels only to the extent that it is possible without increasing electric rates more than three (3) percent higher than the electric rates that would otherwise be attributable to the cost of continuing to generate or purchase electricity generated from one hundred (100) percent non-renewable sources (including coal, natural gas, nuclear energy and other non-renewable sources).

(c) Eligible renewable energy generation may be provided by wind power, solar energy, bio-energy sources or other renewable sources that meet the environmental criteria approved by the City Council after review by the energy and environment commission and the Water and Light Advisory Board. Electricity produced from on-site renewable energy systems owned by Columbia Water & Light customers ("net-metering") may be included within the calculation of the levels required in subsection (a).

(d) Renewable energy generation sources located within Missouri may receive preferential consideration in the selection process.

(e) Each year prior to February 1, the water and light department shall publicly release a renewable energy plan detailing a proposal for how the city would comply with this section during the following year. The plan will explain the City's due diligence in pursuing renewable energy opportunities and detail all cost assumptions and related utility rate calculations, except with regard to confidential information that may be withheld pursuant to state law. The plan will then be reviewed by the energy and environment commission and the water and light advisory board and submitted to the city council for approval following a public hearing.

(Ord. No. 18196, § 1, 8-16-04; Ord. No. 21935, § 1, 1-6-14)

Note: Ord. No. 18196, passed by city council on August 16, 2004, called for election; said ordinance was passed by the voters on Nov. 2, 2004.

Note: Ord. No. 024044, passed by city council on October 7, 2019, dissolved the energy and environment commission and replaced it with the Climate and Environment Commission. It is recommended to consider revising all references to the energy and environment commission.

2024 Renewable Energy Supply

Columbia Adjusted System Load: 1,230,621 MWH

Renewable Energy Total: 280,872 MWH or 22.82%

In 2024, 22.82% of Columbia's electric portfolio came from renewable sources: wind (17.62%), landfill gas (2.71%), and solar (2.49%). The total amount did not meet the 25% standard for 2024 by 2.18%.

However, 2024's renewable energy supply increased by 5.6% (15,006 MWH) when compared to 2023.

Adjusted System Load is determined by adding the amount of electricity produced inside Columbia's distribution system to the metered load provided by outside sources. Basing the renewable percentage on Adjusted System Load more accurately describes the actual electric load in the City's service territory.

Summary of Significant Events for 2024

- From May through August, Bluegrass Ridge wind farm was repowered with updated equipment. This led to a decrease in renewable energy from 2023, but will lead to an increase in generation and capacity going forward. Columbia's contract calls for an 11.1% allocation that is anticipated to be an average of 20,088 MWH annually — an increase of approximately 79%. Energy costs will increase, but transmission costs are fixed.
- At a work session with the Columbia City Council, Utilities and the Water & Light Advisory Board recommended potential changes to the renewable energy ordinance. Proposed recommendations include clarifying the definition of eligible renewable energy, setting an incremental goal of 40% renewable energy by 2035, and requiring risk analyses for power purchase agreements (PPAs). The Council instructed staff to return with a revised ordinance in 2025.
- The City of Columbia entered into an agreement for a utility-scale battery energy storage system study in 2024. The report is expected to be completed in early 2025.
- City of Columbia Utilities has been instructed to proceed with obtaining a renewable energy Request for Proposal. The RFP is expected to be released to the public in 2025.
- In October, Grain Belt Express won two appeals decisions in Missouri, which could pave the way for construction of the transmission lines that will connect Columbia to the Ironstar Wind project. Construction is expected to begin in 2025, and the anticipated delivery date for electricity in Missouri is 2029. City of Columbia Utilities has a contract in place for the purchase of 35 MW and has requested 18 MW of additional wind energy through this existing arrangement with the Missouri Electric Commission (MEC). According to the Missouri Public Utility Alliance (MPUA), it is anticipated that Grain Belt will want to renegotiate the supply side costs for the energy. MPUA expects to put out a bid in early 2025 after construction has begun.
- Columbia received a full year of production from Unit No. 4 of the Columbia Landfill Gas Energy Plant expansion. The expansion increased the Landfill Gas Energy Plant's generator capacity to 4.2 MW.

2024 Renewable Energy Production Amounts

Month	Columbia Adjusted Load	Bluegrass Wind	Crystal Lake Contract 1	Crystal Lake Contract 2	Columbia Landfill	Jeff City Landfill	Truman Solar	Net-Metered Solar	Columbia Solar	Total Renewable	YTD% of System
1-24	119,006	704	3,022	13,582	456	1,425	835	270	14	20,308	17.06%
2-24	89,238	937	3,623	16,031	458	1,219	1,762	588	31	24,649	21.59%
3-24	89,478	1,191	4,588	19,982	798	1,900	2,059	708	35	31,261	25.60%
4-24	86,515	1,208	4,714	20,543	1,373	2,046	2,185	755	36	32,859	28.39%
5-24	98,880	393	3,025	13,406	1,400	1,732	2,507	823	38	23,324	27.41%
6-24	119,270	149	2,915	12,850	1,326	1,686	2,778	891	40	22,632	25.74%
7-24	121,793	0	1,662	7,221	1,394	1,628	2,282	775	34	14,995	23.48%
8-24	123,369	0	1,914	8,384	1,052	1,636	2,390	766	34	16,175	21.97%
9-24	102,730	2	2,458	10,614	1,220	1,684	1,967	625	27	18,598	21.55%
10-24	92,018	624	3,748	16,423	1,407	1,602	2,095	694	32	26,625	22.20%
11-24	87,028	1,552	3,654	15,831	1,313	1,560	1,021	382	18	25,332	22.74%
12-24	101,297	1,878	3,326	14,695	1,324	1,751	817	307	15	24,112	23.80%
TOTAL	1,230,621	8,638	38,649	169,560	13,521	19,869	22,698	7,584	354	280,872	22.82%
% of System		0.70%	3.14%	13.78%	1.10%	1.61%	1.84%	0.62%	0.03%	22.82%	

The amount of energy is measured in megawatt-hours (MWH)

2024 Renewable Energy Portfolio

Bluegrass Ridge Wind Energy

Columbia started receiving wind power from turbines near King City, Missouri, in September 2007. The Columbia contract is for one-ninth of the electric output of the Bluegrass Ridge Wind Farm from Associated Electric Cooperative.

At the maximum output, City of Columbia Utilities receives up to 6.3 MW. Bluegrass Ridge was repowered with updated equipment between May and August 2024. This outage led to a decrease in the amount of energy received in 2024. Columbia received 8,638 MWH of power from this contract or 0.70% of the energy system total.

The amount of wind energy Columbia receives is variable. There is a fixed transmission cost for this energy, so it is more expensive when less energy is received. The average cost for 2024 for wind power from the Bluegrass Ridge Wind Farm was \$77.33 per MWH.

Crystal Lake III Wind

City of Columbia Utilities has two PPAs with NextEra for wind energy produced at the Crystal Lake III wind farm in Northern Iowa. The first PPA, effective February 2012, is for 21 MW. The second PPA, effective December 2016, involves the purchase of energy in two phases. The first is for the production of 27 MW beginning in January 2017 with an additional 18 MW in January 2023.

Both contracts were amended in 2020 and include updated pricing as a result of a turbine repower of the entire site NextEra completed in 2021, with estimates of an additional 40,000 MWHs per year from the repower. Table 1.1, detailing updated pricing for the contracts from 2023 through 2040, can be found in the appendix.

Energy from the first contract provided 38,649 MWH in 2024 representing 3.14% of City of Columbia Utilities' energy system total at a cost of \$27.89 per MWH.

Energy from the second contract provided 169,560 MWH in 2024 representing 13.78% of City of Columbia Utilities' energy system total at a cost of \$18.80 per MWH.

Congestion on the electrical system resulted in additional cost increases for transmission on these two contracts. Analysis from The Prime Group through the Electric Cost of Service Study noted in their Renewable Target Evaluation that:

Future congestion costs from Crystal Lake will likely grow with the Expansion and Repower taking effect in 2022/2023. These costs could persist for the foreseeable future until MISO Long Range Transmission Plan projects are in service in the late 2020s/early 2030s.

Columbia Landfill Gas

The Columbia Landfill Gas Energy Plant was constructed in 2008 and uses the gas created from decomposing waste at the Landfill. The amount of energy received from the Columbia Landfill Gas Energy Plant is fairly consistent, aside from times when there is routine maintenance work. In 2024, the

Landfill Gas Energy Plant produced 13,521 MWH of energy, which was 1.10% of Columbia's energy system total, at a cost of \$58.32 per MWH.

Jefferson City Landfill Gas

City of Columbia Utilities has a 20-year power purchase agreement with Ameresco for 3.2 MW of energy from the landfill gas plant at the Jefferson City Landfill. Columbia started receiving energy from the plant in April 2009. The total amount of energy received in 2024 was 19,869 MWH, which is 1.61% of the energy system total. The utility paid \$53.10 per MWH for the electricity.

Truman Solar

Truman Solar is a 10 MW solar facility connected to City of Columbia Utilities' 13.8 kV distribution system at the Rebel Hill substation. The solar installation went into operation May 7, 2021. In 2024, the Truman Solar facility produced 22,698 MWH of energy, which was 1.84% of Columbia's energy system total. The Utility paid \$44.81 per MWH for the electricity.

Net-Metered Customer Production

The Columbia City Council passed an ordinance in 2007 to allow customers to enter into a net-metering agreement with City of Columbia Utilities. A net-metering arrangement is a billing agreement in which customers receive credits for electricity provided to the Columbia system.

During 2024, there were 74 new customer-owned photovoltaic installations or expansions, and the rated capacity grew from 5.67 MW to 6.34 MW. In 2024, the amount of energy sold to the electric utility was 2,899 MWH of 7,584 MWH estimated to have been generated. Net-metered production represented 0.62% of Columbia's energy system total in 2024 at a cost of \$39.99 per MWH.

Analysis from The Prime Group through the Electric Cost of Service Study noted in their Renewable Target Evaluation that:

If Net Metering continues to grow at similar rates as 2020 and 2021, it will become a substantial renewable cost to the City if credits remain at the current retail rates.

Since growth in the distribution of solar energy sold to the utility and behind-the-meter generation are expected to remain steady, the financial risks from net-metering are not likely to affect the overall renewable energy cost, though they could be significant in the future when considering cost of service.

In 2024, the estimated potential reduction of revenue to the utility due to power not being sold to customers because of net metering was \$586,229.

City of Columbia Utilities Solar Installations

City of Columbia Utilities staff expanded the Bernadette site in 2015 to a total of 263 kW. This solar resource produced 354 MWH or 0.03% of the energy system total at a cost of \$65.94 per MWH.

Costs of Renewable Energy

To minimize rate impacts on customers that could result from investments in renewable generation, Section 27-106(b) of the Renewable Energy Standard requires that rates will not increase by more than 3% due to the potentially higher cost of renewable energy compared to non-renewable energy.

City of Columbia Utilities implemented a Power Cost Adjustment in October 2023. The PCA helps City of Columbia Utilities manage fluctuations in power purchase costs by making adjustments that reflect the true cost of power each month, which will help City of Columbia Utilities avoid reactionary rate increases.

Costs for renewable energy increased in 2024, primarily due to an increase in the cost of power transmission from Crystal Lake. Including transmission, power purchase and capacity costs, the average cost per megawatt-hour of renewables in 2024 was \$42.42 per MWH, which is higher than the average cost of non-renewables at \$31.72 per MWH.

From calendar year 2023 to calendar year 2024, the total amount of renewable energy increased by 5.6% or 15,006 MWH. The total rate impact of renewable energy in excess of non-renewable energy was \$3,003,959, which is 66.2% of the rate impact limit of \$4,536,104.

While cost is not the only consideration in evaluating power supply options, this metric is important when considering Columbia's Renewable Energy Standard.

Impact of 2024 Renewable Energy Portfolio

Renewable Resource	Total 2024 MWH	Additional Cost/(Savings) Per MWH	Total Impact on Rates
Bluegrass Ridge Wind (Associated Electric)	8,638	\$42.51	\$367,201
Crystal Lake Wind Contract 1 (NextEra)	38,649	\$17.95	\$693,750
Crystal Lake Wind Contract 2 (NextEra)	169,560	\$8.32	\$1,410,739
Columbia Landfill	13,521	\$22.42	\$303,141
Jefferson City Landfill (Ameresco)	19,869	\$15.31	\$304,194
Truman Solar (Truman Solar LLC)	22,698	\$ (1.54)	\$ (34,955)
Net-Metered Photovoltaic Production	7,584	\$(6.21)	\$ (47,097)
Columbia Water & Light Solar Production	354	\$19.74	\$6,986
Total Renewable Resource Impact on Rates			\$3,003,959

Renewable Portfolio Cost Calculations

The City of Columbia has a fiscal year that does not match the calendar year outlined in the Renewable Energy Standard. Renewable energy costs for this report include information from January through September of the prior fiscal year and October through December of the current fiscal year.

Revenue Source	January – September (FY24)	October – December (FY25)
Residential	\$51,065,807	\$14,432,737
Commercial/Industrial	\$65,117,778	\$20,587,141
Total Revenue During Calendar Year 2024		\$151,203,463
3% Impact Limit on Rates		\$4,536,104

Calculating Renewable Energy Rate Impact

In 2014, City of Columbia Utilities enlisted the services of Utility Financial Solutions LLC (UFS) to provide guidance on the valuation of renewable generation. As outlined by UFS's [Rate Impacts on Renewables](#) report, City of Columbia Utilities uses a combination of market prices of electricity and avoided cost to determine the cost for renewables and the impact on ratepayers.

Below is the approach and details used by the proposed renewable energy impact methodology:

- Start with total cost of renewable resource
- Subtract the capacity value
- Determine the difference between the renewable resource cost and City of Columbia Utilities' cost of avoided production from the non-renewable resource
- Add the cost of any congestion and losses for each renewable resource relative to City of Columbia Utilities' load
- Multiply by the production from the renewable resource

For 2024, the following factors have been established:

- Columbia's Non-Renewable Avoided Cost — \$31.72/MWH
- The production weighted price of Columbia's Midcontinent Independent System Operator (MISO) Load Node for Crystal Lake Contract One — \$27.79/MWH
- The production weighted price of Columbia's Midcontinent Independent System Operator (MISO) Load Node for Crystal Lake Contract Two — \$27.82/MWH

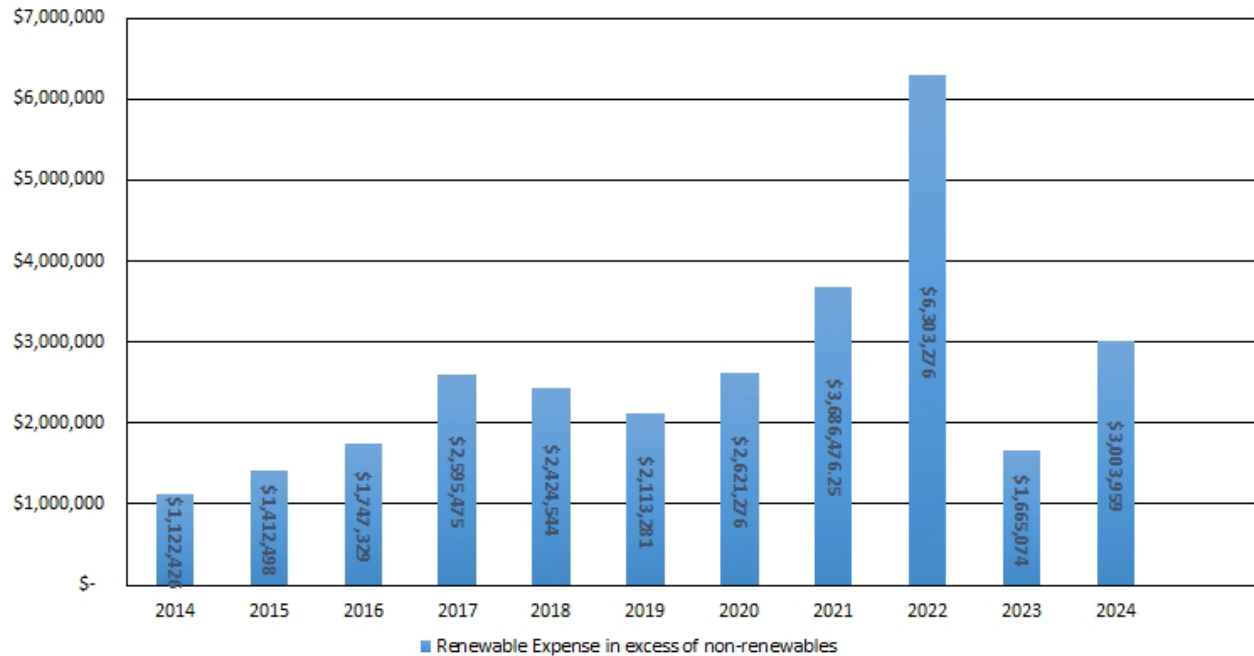
	A	B	C	D	E	F	G	H	
Resource	Resource Cost (\$/MWH)	Capacity Component (\$/MWH)	Energy Component (\$/MWH)	Energy Impact (\$/MWH)	Resource MISO LMP (\$/MWH)	Cong. & Loss Cost (\$/MWH)	Energy Impact w/ C&L (\$/MWH)	Production (MWH)	Renewable Rate Impact (\$)
Bluegrass Ridge Wind	\$ 77.33	\$ 3.10	\$ 74.23	\$ 42.51	-	-	\$ 42.51	8,638	\$ 367,201
Crystal Lake C1 Wind	\$ 27.89	\$ -	\$ 27.89	\$ (3.83)	\$ 6.01	\$ 21.78	\$ 17.95	38,649	\$ 693,750
Crystal Lake C2 Wind	\$ 18.80	\$ -	\$ 18.80	\$ (12.92)	\$ 6.58	\$ 21.24	\$ 8.32	169,560	\$ 1,410,739
Columbia Landfill Gas	\$ 58.32	\$ 4.18	\$ 54.14	\$ 22.42	-	-	\$ 22.42	13,521	\$ 303,141
Jefferson City Landfill Gas	\$ 53.10	\$ 6.07	\$ 47.03	\$ 15.31	-	-	\$ 15.31	19,869	\$ 304,194
Truman Solar	\$ 44.81	\$ 14.63	\$ 30.18	\$ (1.54)	-	-	\$ (1.54)	22,698	\$ (34,955)
Customer Generated PV (Net Meter)	\$ 39.99	\$ 14.48	\$ 25.51	\$ (6.21)	-	-	\$ (6.21)	7,584	\$ (47,097)
CWL Generated PV	\$ 65.94	\$ 14.48	\$ 51.46	\$ 19.74	-	-	\$ 19.74	354	\$ 6,986
								280,873	\$ 3,003,959

- Column A - Total cost of the Renewable resource
- Column B - Amount of total cost that is determined to be providing capacity value, as outlined in the Utility Financial Solutions report
- Column C - Amount of total cost that is determined to be providing energy value (Column A minus Column B)
- Column D - Cost impact of the renewable resource energy above the incremental cost of City of Columbia Utilities' non-renewable resource cost (Column C minus \$31.72)
- Column E - Production weighted MISO LMP at the point of resource connection to the MISO system for the Crystal Lakes wind contracts
- Column F - Resource congestion and losses as compared to City of Columbia Utilities' load Wind Resources (\$27.79 minus Column E for contract 1; \$27.82 minus Column E for contract 2)
- Column G - Energy Impact plus congestions and losses for the resource (Column D plus Column F)
- Column H - Resource Annual Production
- Renewable Rate Impact – Column G times Column H

Renewables Cost Impact by Year

The City Ordinance states that the renewable energy integrated into Columbia's electric portfolio shall not increase electric rates more than 3% higher than the rates for electricity generated from 100% non-renewable resources. For calendar year 2024, the additional expense of renewable energy in excess of non-renewable energy was \$3,003,959.

Additional Cost for Renewables



Planning for the Future of Renewables

City of Columbia Utilities' Renewable Energy Plan is based on the revised 2014 Renewable Energy Standard, and the future of renewable energy planning is informed through the 2021 Integrated Electric Resource and Master Planning process and a 2023 The Energy Authority (TEA) study on meeting 100% renewable energy.

One factor to be taken into consideration is that with the City's current power purchase agreements, once the Ironstar Wind project is generating, the City will be obligated to purchase more energy than the City's load requires. This places the Utility at financial risk because the energy must be sold on the open market. Awarding additional power purchase agreements would increase that risk.

With this information building the framework, Utilities staff worked with the Water & Light Advisory Board to adapt the Renewable Energy Standard with a goal of moving renewable energy acquisition forward in a responsible way.

The board and staff held a work session with the City Council in December, and a revised renewable energy ordinance is scheduled to be brought before Council in 2025.

The proposed recommendations included setting an incremental goal of 40% renewable energy by 2035.

This target matches TEA's recommendation for short-term goals:

There is value in setting incremental renewable goals rather than a single goal at a specified year. Renewable PPA prices are changing over time, this presents a risk when investing in a large volume of PPAs in just one year.

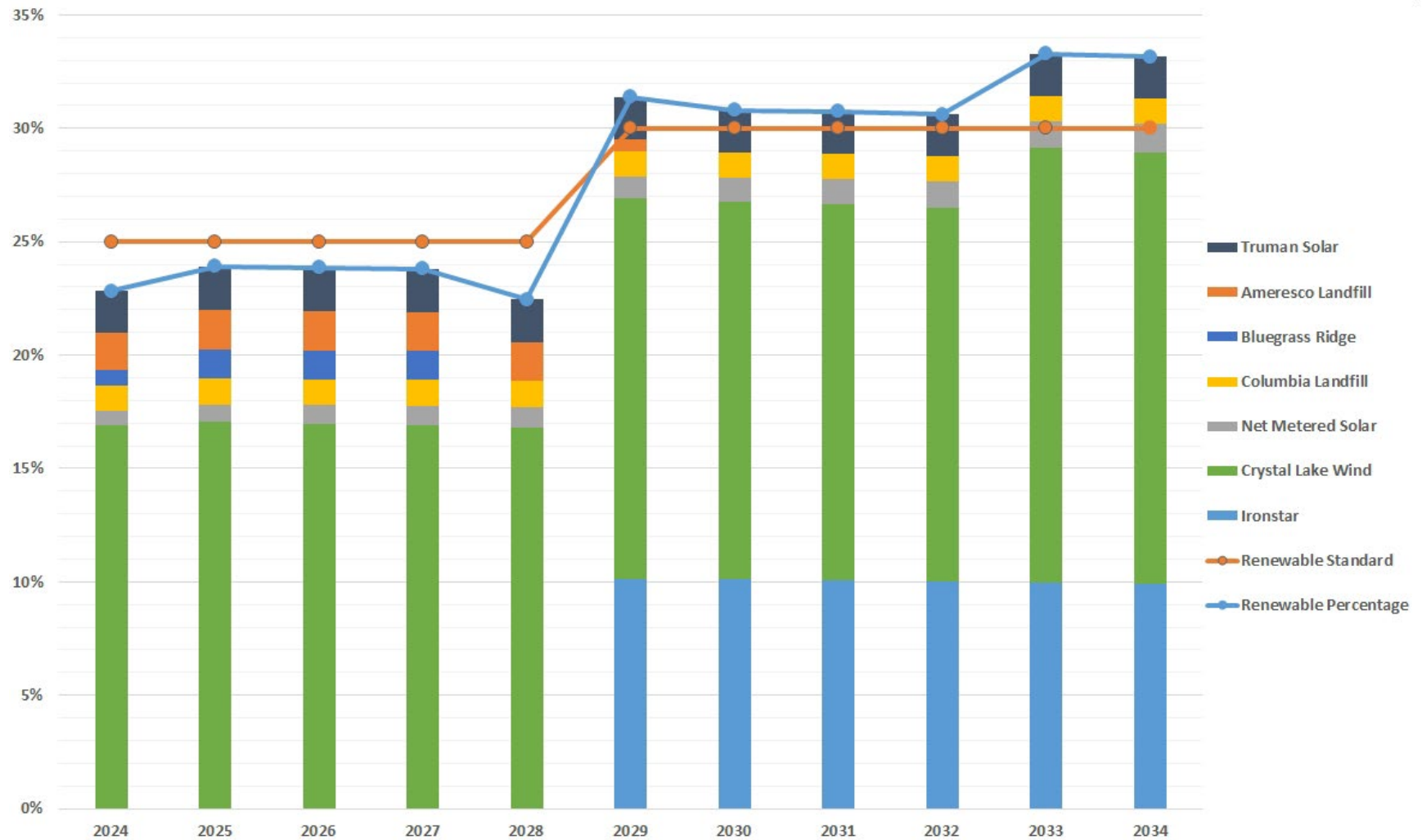
TEA's assessment is that the cost of new renewables is not expected to come down until approximately 2030.

MISO's Long Range Transmission Plan Tranche 2.1 portfolio, approved by the MISO board in December, will add approximately 176 miles of transmission lines in Missouri to come online between 2032 and 2034. The project, which needs Missouri Public Service Commission approval, would help MISO handle load growth, reduce locational marginal pricing and relieve congestion.

According to [Utility Dive](#): "[T]ransmission expansion can improve access to generation resources across the footprint, something especially important given the (Midwest's) abundant energy sources."

The chart on the following page depicts the 10-year outlook for currently contracted renewable energy supply in Columbia. City of Columbia Utilities has renewable energy provided by wind, solar, and landfill gas resources.

Renewable Energy Generation Production by Percentage of Load (2024-2034)



Planned Additions to the Renewable Energy Portfolio

Transitioning the power supply to renewable energy from traditional sources requires long-term planning to ensure all utility and customer needs are met. To address Columbia's future renewable energy needs, City of Columbia Utilities is working on the following projects:

Bluegrass Ridge repower (2025)

From May through August 2024, Bluegrass Ridge wind farm was repowered with updated equipment, which will lead to an increase in generation and capacity. Columbia's contract calls for an 11.1% allocation that is anticipated to be an average of 20,088 MWH annually — an increase of approximately 79%.

There is a fixed transmission cost for this energy, so it is more expensive when less energy is received. The yearly transmission costs do not vary with the energy received since the rate is based on 6.3 MW. Therefore, the cost per MWH becomes lower as Columbia receives more energy.

The contract expires in 2027, therefore the associated increase in costs is short-term. However, this will provide the City an opportunity to evaluate the additional energy production and costs associated with the repower of the generators. Should a future contract renewal become available with this resource, the City will have historical data to evaluate rate impacts.

Future Power Purchase Agreement (ongoing)

Beginning in 2023, City of Columbia Utilities has been seeking additional renewable energy projects to replace the terminated Boone Stephens solar project. A local generation source that connects directly into Columbia's power grid would reduce exposure to electric market volatility. However, the proposed costs for a new solar field proved to be prohibitive, requiring an estimated 12% to 13% increase in rates to cover the costs.

Utilities plans to issue a Request for Proposal (RFP) for additional renewable energy projects in 2025. The RFP is being expanded from the one issued in 2023 to be open to a wider variety of responses.

Customer Net-Metered Solar (ongoing)

Customer-owned distributed generation has continued steady growth since approximately 2008. Market analysis predicts ongoing growth in this area. For the purposes of the Renewable Energy Plan, City of Columbia Utilities has projected conservative growth in this area as many factors can impact the customer-owned solar market, including regulation changes, economic growth or recession, component pricing and rates.

Ironstar Wind (2029)

In June 2017, the City Council approved a contract with the Missouri Joint Municipal Electric Utility Commission for the purchase of 35 MW of wind energy from western Kansas. Delivery of this energy depends upon the construction of the Grain Belt Express transmission line and a converter station in northeast Missouri. The proposed production timeline was for 2021; however, litigation has delayed the project. Invenergy was continuing work on eminent domain acquisitions in Missouri and Kansas, with the majority of those easements being in place.

As a result of a need to amend their Certificate of Convenience and Necessity due to the converter station changing locations, this project was returned to the Missouri Public Service Commission in 2023. This change has pushed back the anticipated delivery date to 2029.

Under City of Columbia Utilities' current agreement, Ironstar Wind is expected to have an annual energy production estimated around 122,640 MWH per year, which would be 9.4% of the projected electric system total in 2029.

Utility staff has notified the Missouri Joint Municipal Electric Utility Commission of the City's interest in expanding takeoff from Ironstar Wind based on additional energy being available. City of Columbia Utilities has requested up to an additional 18 MW for delivery, bringing the total purchase potential to 53 MW of wind energy.

2025 Estimated Renewable Energy Percentage

In order to meet the City's Renewable Energy Standard, City of Columbia Utilities utilizes an array of renewable energy sources including wind, solar, and landfill gas. Based on a metered system energy requirement of 1,188,912 MWHs and similar renewable energy production levels, it is estimated that 23.90% of Columbia's electric portfolio will come from existing renewable resources in 2025.

	Location	Amount of Energy	% of System Load	Cost
Bluegrass Ridge	King City, MO	15,205 MWH	1.30%	\$77.33/MWH
Crystal Lake Contract #1	Hancock County, IA	38,622 MWH	3.20%	\$27.89/MWH
Crystal Lake Contract #2	Hancock County, IA	164,066 MWH	13.80%	\$18.80/MWH
Jefferson City Landfill gas	Jefferson City, MO	20,612 MWH	1.70%	\$53.10/MWH
Columbia Landfill gas	Columbia, MO	13,561 MWH	1.10%	\$58.32/MWH
Net-Metered Customer Production	Columbia, MO	8,950 MWH	0.75%	\$39.99/MWH
West Ash Solar	Columbia, MO	337 MWH	0.03%	\$67.27/MWH
Truman Solar	Columbia, MO	22,908 MWH	1.90%	\$44.81/MWH
TOTAL	—	284,261 MWH	23.90%	—

Summary

City of Columbia Utilities strives to provide reliable, cost-effective service while achieving City of Columbia environmental and renewable energy goals. In 2024, City of Columbia Utilities did not meet the goal of providing 25% renewable energy. However, 2024's renewable energy supply increased by 5.6% when compared to 2023. If the Ironstar project was generating now, the City would be exceeding the current Renewable Energy Standard.

While Utilities believes it is important for the City to seek affordable and viable options to increase renewable energy generation sources, it is important that the City move forward in a responsible way.

With the City's current purchase power agreements, once the Ironstar Wind project is generating, the City will be obligated to purchase more energy than the City's load requires. This places the Utility at financial risk because the energy must be sold on the open market. Awarding additional power purchase agreements would increase that risk.

It will be important that the utility remains adaptable as the City navigates unforeseen challenges presented by an energy future that includes more renewable energy sources. Additionally, the City continues to encourage customer-owned distributed generation to help reduce demand on the system.

City of Columbia Utilities anticipates the City will not reach renewable energy percentage goals within the next few years because of project delays. In addition, Columbia's total system load continues to grow, which may have a negative impact on the City's renewable energy percentage even if the City achieves an increase in actual MWHs of renewable energy purchased or generated.

The City is planning to release an RFP for more renewable energy sources in 2025 as Utilities continues the trend of increasing renewables in an ever-changing environment.

Renewable energy prices increased in 2024 from 2023; however, the cost of renewable energy remained below the 3% impact limit on rates. This increase in price was primarily due to higher transmission prices.

As the City of Columbia looks to the future of energy supply, long-term goals laid out in the Renewable Portfolio Standard, Climate Action and Adaptation Plan and TEA assessment of the 100% renewable energy goal will guide the utility in future planning and resource selection.

In a rapidly changing market and environment, City of Columbia Utilities will continue to provide customer-focused, reliable and cost-effective service that meets today's needs while planning for the future of the community.

Appendix

Glossary

Climate Action and Adaptation Plan is Columbia's strategy to address risks posed by climate change and to contribute to international efforts to reduce greenhouse gas emissions.

Climate and Environment Commission is a public board that reports to City Council on the implementation of CAAP strategies.

IERMP stands for Integrated Electric Resource & Master Plan.

kV means kilovolt, and is a standard unit for electromotive force. It is used to describe the infrastructure of the transmission and distribution systems.

kW means kilowatt, and is a unit of measurement for the rate of power an electrical device or load uses.

kWh means kilowatt-hour(s), and is common unit for electric energy. Note that 1,000 kWh equals 1 MWH.

LMP stands for Locational Marginal Price. This is the hourly price that City of Columbia Utilities buys or sells energy into the MISO marketplace.

MISO stands for Midcontinent Independent System Operator and is the regional transmission organization that Columbia Water & Light is a member.

Missouri Public Service Commission is a utility regulating body that oversees investor-owned utilities.

Missouri Public Utility Alliance is a service organization that represents municipality-owned utilities.

MWH means megawatt-hour(s), and is a common unit for utility-scale electrical energy.

MW means megawatt(s), and is a common unit for utility scale electrical power.

Power Purchase Agreement is a contract between an electricity generator and the utility, during which time the utility buys energy at a pre-negotiated price.

Request for Proposal is an open request for bids from a potential contractor to complete a project.

TEA stands for The Energy Authority, an energy trading and risk management firm, whose services include advanced analytics, renewable solutions, and advisory services.

Table 1.1: Crystal Lake III Amended Price Chart

Period	Fixed Rate (\$/MWH)
Repower Completion Date through Dec. 31, 2022	26.21
January 1, 2023 through December 31, 2023	25.11
January 1, 2024 through December 31, 2024	25.37
January 1, 2025 through December 31, 2025	25.63
January 1, 2026 through December 31, 2026	25.89
January 1, 2027 through December 31, 2027	26.16
January 1, 2028 through December 31, 2028	26.43
January 1, 2029 through December 31, 2029	26.71
January 1, 2030 through December 31, 2030	27.01
January 1, 2031 through December 31, 2031	27.30
January 1, 2032 through December 31, 2032	22.61
January 1, 2033 through December 31, 2033	22.00
January 1, 2034 through December 31, 2034	22.44
January 1, 2035 through December 31, 2035	22.89
January 1, 2036 through December 31, 2036	23.35
January 1, 2037 through December 31, 2037	23.81
January 1, 2038 through December 31, 2038	24.29
January 1, 2039 through December 31, 2039	24.78
January 1, 2040 through December 31, 2040	25.27

Historical Renewable Energy Data

For reference, Renewable Energy Data from the previous five years are included here. For all the data charts dating to 2005, visit CoMo.gov/wp-content/uploads/2021/12/2022-Renewable-Report-Yearly-Production-Charts-1.pdf.

2023 Renewable Energy Production Amounts

Month	Columbia Adj. Load	Bluegrass Wind	Crystal Lake Contract 1	Crystal Lake Contract 2	Columbia Landfill	Jeff City Landfill	Truman Solar	Net-Metered Solar	Columbia Solar	Total Renewable	YTD % of System
1-23	104,703	1,048	3,035	13,631	1,303	1,361	879	245	15	21,517	20.55%
2-23	90,670	1,144	3,774	16,976	1,224	1,944	1,537	419	24	27,043	24.85%
3-23	96,751	1,193	3,563	15,595	1,397	2,143	1,551	441	24	25,906	25.49%
4-23	85,150	1,534	4,574	19,557	1,293	1,275	2,494	678	35	31,441	28.07%
5-23	98,468	543	3,481	14,537	1,351	1,932	2,659	703	35	25,241	27.57%
6-23	112,162	425	1,526	6,965	1,177	1,358	2,775	725	34	14,986	24.86%
7-23	125,294	302	1,308	6,105	733	1,849	2,457	678	31	13,462	22.38%
8-23	126,252	434	1,963	8,765	653	1,555	2,308	654	29	16,360	20.96%
9-23	103,040	613	2,463	10,750	574	1,924	2,195	478	28	19,026	20.69%
10-23	91,568	1,001	3,211	14,613	642	1,727	1,658	482	21	23,355	21.11%
11-23	88,277	1,007	3,652	16,092	646	1,615	1,380	467	25	24,883	21.67%
12-23	94,900	893	3,405	14,986	651	1,556	840	299	16	22,647	21.84%
TOTAL	1,217,234	10,137	35,955	158,572	11,644	20,239	22,733	6,269	317	265,866	21.84%
% of System		0.83%	2.95%	13.03%	0.96%	1.66%	1.87%	0.52%	0.03%	21.84%	

The amount of energy is measured in megawatt-hours (MWH)

2022 Renewable Energy Production Amounts

Month	Columbia Adj. Load	Bluegrass Wind	Crystal Lake Contract 1	Crystal Lake Contract 2	Columbia Landfill	Jeff City Landfill	Truman Solar	Net-Metered Solar	Columbia Solar	Total Renewable	YTD% of System
1-22	114,255	1,180	2,967	7,856	1,137	2,124	1,261	301	24	16,850	14.75%
2-22	99,995	1,283	3,653	10,037	1,160	1,875	1,505	299	23	19,836	17.12%
3-22	94,465	1,452	4,328	11,958	1,376	1,970	1,907	398	29	23,418	19.47%
4-22	86,861	1,472	4,827	12,612	1,421	2,023	2,046	482	33	24,916	21.49%
5-22	100,378	1,039	3,834	9,701	1,311	1,543	2,273	500	33	20,234	21.22%
6-22	117,760	751	2,603	6,963	1,250	1,497	2,817	597	38	16,516	19.84%
7-22	130,699	489	2,060	5,416	1,350	1,767	2,506	539	34	14,161	18.26%
8-22	128,406	309	1,877	4,993	1,328	1,819	2,608	557	35	13,526	17.12%
9-22	102,853	730	2,750	7,238	1,296	2,027	2,303	511	33	16,888	17.05%
10-22	87,400	1,071	3,393	9,049	1,317	1,637	1,964	459	29	18,919	17.43%
11-22	92,478	1,560	4,703	12,322	1,241	2,148	1,362	362	23	23,721	18.09%
12-22	108,065	1,355	4,268	11,158	1,332	1,299	741	221	13	20,387	18.15%
TOTAL	1,263,615	12,691	41,261	109,305	15,519	21,729	23,293	5,226	347	229,371	18.15%
% of System		1.00%	3.27%	8.65%	1.23%	1.72%	1.84%	0.41%	0.03%	18.15%	

The amount of energy is measured in megawatt-hours (MWH)

2021 Renewable Energy Production Amounts

The Truman Solar 10 MW facility began operation in May. The Water & Light Advisory Board and the City Council recommended against the purchase of Renewable Energy Credits.

Month	Columbia Adj. Load	Bluegrass Wind	Crystal Lake Contract 1	Crystal Lake Contract 2	Columbia Landfill	Jeff City Landfill	Truman Solar	Net-Metered Solar	Columbia Solar	Total Renewable	YTD % of System
1-21	105,250	970	2,291	5,401	1,522	2,208	—	143.7	13.3	12,548	11.92%
2-21	108,774	602	1,808	5,134	1,724	1,675	—	164.8	14	11,121	11.06%
3-21	88,380	1,363	2,610	4,213	2,091	2,198	—	379.9	31.2	12,886	12.09%
4-21	83,807	1,154	3,095	6,805	1,933	2,163	—	469.8	37	15,657	13.52%
5-21	88,215	925	3,154	8,133	1,666	1,733	1,226	414.7	31.6	17,283	14.65%
6-21	113,121	504	2,270	5,989	1,929	2,015	2,560	496.0	37.0	15,799	14.52%
7-21	122,265	351	1,425	3,927	1,855	2,013	2,548	495.1	36.6	12,651	13.80%
8-21	129,083	670	1,855	4,837	1,331	1,385	2,466	508.3	38.4	13,090	13.24%
9-21	107,649	1,016	2,463	6,585	1,119	1,374	2,148	480.7	36.7	15,222	13.34%
10-21	90,711	996	2,967	7,809	1,060	1,287	1,322	295.5	22.7	15,759	13.69%
11-21	87,076	1,206	4,426	11,557	921	2,203	1,265	323.0	25.5	21,927	14.58%
12-21	93,983	1,232	2,301	6,026	1,215	2,168	1,048	267.6	21.6	14,279	14.63%
TOTAL	1,218,313	10,989	30,664	76,414	18,365	22,422	14,583	4,439	346	178,223	
% of System		0.90%	2.52%	6.27%	1.51%	1.84%	1.20%	0.36%	0.03%	14.63%	

The amount of energy is measured in megawatt-hours (MWH)

2020 Renewable Energy Production Amounts

Free Power Company LLC defaulted on its lease agreement with the City.

Month	Columbia Adj. Load	Bluegrass Wind	Crystal Lake Contract 1	Crystal Lake Contract 2	Columbia Landfill	Jeff City Landfill	Free Power Solar	Net Metered Solar	Columbia Solar	Total Wind RECs	Total Renewable	YTD % of System
1-20	103,904	929	3,110	7,848	1,151	2,277	8.11	138.71	7.73	—	15,469	14.89%
2-20	96,923	856	3,213	8,696	1,589	2,131	13.88	149.71	17.14	—	16,666	16.00%
3-20	86,776	881	3,301	8,471	2,135	2,235	20.84	245.34	29.71	—	17,319	17.20%
4-20	76,639	704	3,080	7,810	1,247	2,158	26.40	314.18	36.82	—	15,376	17.80%
5-20	82,741	625	2,672	6,507	1,011	1,859	26.10	319.75	36.32	10,676	23,732	19.81%
6-20	109,963	581	3,025	7,080	1,396	2,094	32.10	397.08	43.66	9,324	23,973	20.21%
7-20	126,435	228	1,222	3,186	748	2,062	28.97	356.77	38.55	—	7,870	17.62%
8-20	115,374	388	2,198	5,594	578	1,993	28.83	369.81	39.09	—	11,189	16.47%
9-20	94,957	634	2,522	5,452	469	1,702	24.20	348.62	34.54	—	11,186	15.98%
10-20	88,430	1,010	1,908	4,196	1,337	1,845	11.73	280.43	27.79	—	10,616	15.62%
11-20	84,537	1,313	3,211	6,340	1,791	1,816	0.00	253.24	24.95	—	14,749	15.76%
12-20	99,725	890	2,006	4,397	1,975	2,118	0.00	226.65	21.93	—	11,635	15.41%
TOTAL	1,166,405	9,039	31,467	75,578	15,427	24,290	221.2	3,400	358.2	20,000	179,780	15.41%
% of System	—	0.77%	2.70%	6.48%	1.32%	2.08%	0.02%	0.29%	0.03%	1.71%		—

The amount of energy is measured in megawatt-hours (MWH)

2019 Renewable Energy Production Amounts

Month	Columbia Load	Bluegrass Wind	Crystal Lake Contract 1	Crystal Lake Contract 2	Columbia Landfill	Jeff City Landfill	Free Power Solar	Net Metered Solar	Columbia Solar	Total Wind RECs	Total Renewable	YTD % of System
1-19	109,535	1,169	3,300	8,648	515	1,745	9.39	96.78	17.35	-	15,499	14.15%
2-19	98,438	957	2,644	6,489	1,131	1,765	10.02	105.09	17.64	-	13,119	13.76%
3-19	94,656	1,332	3,540	9,049	940	2,069	21.69	222.00	33.45	-	17,207	15.14%
4-19	81,014	1,366	2,568	6,514	1,428	1,914	25.90	270.81	39.64	-	14,126	15.63%
5-19	91,789	821	2,971	7,670	1,245	1,609	30.71	284.77	39.47	-	14,671	15.70%
6-19	101,949	745	2,091	5,634	517	1,368	34.84	311.47	42.79	-	10,744	14.79%
7-19	123,326	657	1,808	4,776	1,217	2,112	37.59	337.89	45.92	-	10,992	13.75%
8-19	116,521	487	1,366	3,782	1,463	1,819	30.96	285.17	38.48	-	9,272	12.93%
9-19	112,748	1,015	2,583	6,853	965	1,253	27.45	281.99	34.52	20,000	33,012	14.91%
10-19	87,641	1,129	3,507	9,288	1,451	2,251	18.29	200.31	14.44	-	17,859	15.38%
11-19	90,026	1,238	3,340	8,898	1,481	2,211	14.55	175.52	12.26	-	17,370	15.70%
12-19	96,218	1,517	3,125	8,177	1,878	2,286	10.93	136.29	9.86	-	17,141	15.87%
TOTAL	1,203,862	12,433	32,842	85,780	14,229	22,402	272.32	2,708.09	345.82	20,000	191,012	15.87%
% of System	-	1.03%	2.73%	7.13%	1.18%	1.86%	0.02%	0.22%	0.03%	1.66%	15.87%	-

The amount of energy is measured in megawatt-hours (MWH)