City of Columbia

701 East Broadway, Columbia, Missouri 65201

Department Source: City Utilities - Water and Light
To: City Council
From: City Manager & Staff
Council Meeting Date: November 4, 2019
Re: Boone Stephens Solar Energy Contract

Executive Summary

A Department objective is to regularly evaluate the opportunity for additional renewable energy resources. In 2018 staff believed the market was at a good point for the development of solar energy resources and the Water & Light Department should look at the options available for a contract for solar generated energy. RFP 48/2019 was issued for the Purchase of Solar Energy Power that closed on 1/30/2019. As a result of this process staff is bringing forward a contract with Boone Stephens Solar for consideration.

Discussion

Chapter 27-106 of the City Ordinance details the required purchase of electricity generated from eligible renewable energy sources at the following levels:

- 2% by 2008
- 5% by 2013
- 15% by 2018
- 25% by 2023
- 30% by 2029

The Climate Action and Adaption Plan has set specific greenhouse gas emission reduction targets for municipal operations. The targets for reduction of municipal operations greenhouse gas emissions below the 2015 baseline are 50% by 2035 and 100% by 2050. One of the strategies to achieve these ambitious emission reduction goals is to maximize Columbia Water & Light's renewable energy purchasing and production.

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As a result of this process, staff is bringing forward a contract with Boone Stephens Solar for consideration. Included with this memo is a copy of the Power Purchase Agreement between City of Columbia and Boone Stephens Solar. As the City develops plans that moves it toward its renewable energy goals, these types of projects and/or contracts are needed to meet the goals. An important aspect of this planning process is to understand the possible impacts of these increased levels of renewable electric generation and how we plan for the risks they incur.

The term of this contract is 20 years. Contract price is $31.65 per MWh with no escalation in price for the life of the contract. The total size of the solar field "Expected Facility Capacity" is 64 MW's at the "Point of Delivery". The field is planned to have an annual capacity factor of about 25%. Initial annual energy production is estimated around 142,000 MWh's for the first few years for an initial cost of just over $4.5 million per year. An annual degradation rate of approximately 0.5% is anticipated. The contract will be paid out of the annual power supply budget which is $78,000,000 for the current fiscal year. The field will have an "Expected Commercial Operation Date" of no later than December 31, 2023. The solar field is planned to be tied directly into Columbia 69KV system at the existing Bolstad substation, "Point of Delivery". The expectation for this resource is to be an in-front-of-the-meter MISO market resource. The project will be required to construct the "Interconnection Facilities" to the "Point of Delivery".

Based on the 2019 Renewable Energy Report the below table shows the amount of renewable energy expected from this proposed solar energy contract the first few years. Also shown is the existing renewable resources and other existing contracts for future wind resources projected to become operational by the end of 2023:

	Columbia System MWH's	Bluegrass Ridge Wind MWH's	Crystal Lake Wind#1 MWH's	Crystal Lake Three Wind #2 Phase 1 MWH's	Columbia Landfill MWH's	Jeff City Landfill MWH's	Free Power Solar MWH's	Net Metered Solar MWH's	Columbia Solar Production MWH's	Crystal Lake Wind#2 Phase 2 MWH's	MJMEUC Wind MWH's	Proposed Boone Stephens Solar MWH's	Total Renewable MWH's	Monthly Renewable Percentage of System	Calendar YTD Renewable Percentage of System
Janurary	113,783	1,442	3,931	9,684	1,463	1,852	16.67	111.55	25.57	16,140	14,011	9,280	57,956	50.94%	50.94%
February	94,959	1,050	2,743	6,899	1,470	1,782	14.82	102.85	21.74	11,498	9,981	7,890	43,451	45.76%	48.58%
March	93,030	1,525	3,419	9,083	1,868	2,052	18.81	134.59	27.75	15,138	13,141	10,071	56,477	60.71%	52.32%
April	87,303	1,252	3,209	8,422	1,779	1,858	27.69	200.88	40.27	14,037	12,185	14,614	57,626	66.01%	55.39%
May	106,787	646	2,184	5,778	1,534	1,907	34.49	224.35	43.73	9,630	8,359	15,870	46,211	43.27%	52.78%
June	120,263	933	2,853	7,268	1,190	1,821	34.66	229.46	44.39	12,114	10,515	16,110	53,112	44.16%	51.10%
July	126,035	335	1,852	4,806	940	1,824	36.78	245.09	46.42	8,011	6,954	16,846	41,897	33.24%	48.07%
August	123,712	796	1,390	3,598	966	1,886	31.30	237.63	40.08	5,996	5,205	14,546	34,692	28.04%	45.21%
September	105,292	724	2,546	6,536	845	2,200	28.30	235.03	38.50	10,893	9,456	13,972	47,474	45.09%	45.19%
October	89,827	966	2,140	5,621	1,309	2,059	22.08	194.60	32.13	9,368	8,132	11,660	41,504	46.20%	45.28%
November	93,526	1,072	3,321	8,386	1,537	2,173	12.28	99.10	15.69	13,976	12,132	5,694	48,418	51.77%	45.80%
December	98,758	1,186	3,280	8,687	643	1,881	12.22	98.96	15.01	14,478	12,568	5,447	48,296	48.90%	46.05%
Total	1,253,275	11,927	32,867	84,767	15,544	23,295	290	2,114	391	141,279	122,640	142,000	577,114		
% System		0.95%	2.62%	6.76%	1.24%	1.86%	0.02%	0.17%	0.03%	11.27%	9.79%	11.33%	46.05%		

Based on the 2019 Renewable Energy Report the below table uses the current renewable rate impact methodology to show the impact on rates projected from this proposed solar energy contract. Also shown is the existing renewable resources and other existing contracts for future wind resources projected to become operational by the end of 2023:

Existing Renewable Resources	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 ($/MWH)	Production (MWH)	Renwable Cost Impact ($)
Bluegrass Ridge Wind	$69.35	$3.10	$66.25	$43.74	NA	NA	$43.74	11,927	$521,686.98
Crystal Lake C1 Wind	$45.08	$3.10	$41.98	$19.47	$19.20	$5.90	$25.37	32,867	$833,835.79
Crystal Lake C2 Wind	$20.12	$3.10	$17.02	($5.49)	$19.20	$5.90	$0.41	84,767	$34,754.47
Columbia Landfill Gas	$54.87	$9.16	$45.71	$23.20	NA	NA	$23.20	15,544	$360,620.80
Jefferson City Landfill Gas	$53.01	$6.07	$46.94	$24.43	NA	NA	$24.43	23,295	$569,096.85
Free Power PV	$54.95	$15.82	$39.13	$16.62	NA	NA	$16.62	290	$4,819.80
Customer Generated PV (Net Meter)	NA	$15.82	NA	NA	NA	NA	NA	2,114	NA
CWL Generated PV	$62.30	$15.82	$46.48	$23.97	NA	NA	$23.97	391	$9,372.27
Future Renewable Resources								**171,195**	**$2,334,186.96**
Crystal Lake C2 P2 Wind	$20.12	$3.10	$17.02	($5.49)	$19.20	$5.90	$0.41	141,278	$57,924.12
MJMEUC Wind	$20.12	$3.10	$17.02	($5.49)	$20.10	$2.41	($3.08)	122,640	($377,731.20)
Proposed Boone Stephens Solar	**$31.65**	**$15.82**	**$15.83**	**($6.68)**	**NA**	**NA**	**($6.68)**	**142,000**	**($948,560.00)**
								405,918	**($1,268,367.08)**
								577,113	**$1,065,819.88**

Our current renewable rate impact methodology is an incremental cost impact model which works with the assumption that renewable generation provides needed capacity, does not exceed current load and can be absorbed by the existing dispatchable resources. When the level of renewable resources has the potential to operate outside of these assumptions, addition impact assessments should be considered. It is important to know that at some point we would be producing more energy relative to our load, depending upon the reconciliation interval considered (i.e. hourly, daily or monthly). As renewable resources are added we will reach a point where the energy produced from our resources exceeds Columbia's load. This excess generated energy will be settled directly in the MISO energy market. To account for this staff has worked to assess the energy market risk of these contracts for Columbia.

Our first approach for this consideration was to contact The Energy Authority (TEA). TEA is Columbia's Market Participant in the MISO Energy Market. We asked TEA to assess the market position of this solar resource in using our current Risk Model.

The below table shows the results of TEA's efforts to assess the effects of adding the Boone Stephens Solar contract to Columbia's electric portfolio in the MISO Energy Market using data from the 2019 Risk Model:

FY2020	Generation (GWh)	Capacity (GWh)	CapFactor (%)	Starts	VarCosts ($000)	FixedOM ($000)	Total Cost ($000)	Variable Cost/MWh ($/MWh)	Total Cost/MWh ($/MWh)	Revenue ($000)
Sikeston	492.87	579.75	85%	4	11257.21	10565.15	21822.36	22.84	44.28	13386.57
Iatan II	156.31	182.71	86%	6	2782.29	6363.42	9145.71	17.80	58.51	3926.48
Prairie State 1	191.91	219.60	87%	5	2370.14	9528.84	11898.98	12.35	62.00	4777.48
Prairie State 2	179.12	219.60	82%	5	2212.18	9528.84	11741.01	12.35	65.55	4517.98
PlantD6	1.09	105.41	1%	14	76.45	0.00	76.45	69.88	69.88	98.06
PlantD8	25.53	307.44	8%	28	1454.80	0.00	1454.80	56.99	56.99	1227.86
CEC Unit 1	5.90	351.36	1.7%	12	372.37	641.13	1013.50	63.13	171.83	488.53
CEC Unit 2	5.85	351.36	1.7%	12	369.21	641.13	1010.35	63.09	172.64	484.04
CEC Unit 3	6.14	351.36	1.7%	13	384.02	641.13	1025.16	62.52	166.89	503.36
CEC Unit 4	4.14	351.36	1.2%	8	271.31	641.13	912.44	65.53	220.40	365.35
Bluegrass Ridge	13.01	55.19	24%	0	858.86	0.00	858.86	66.00	66.00	289.95
Boone Stephens	143.22	560.64	25.5%	0	4532.97	0.00	4532.97	31.65	31.65	4392.98
Crystal Lake	128.35	328.50	39%	0	4062.29	0.00	4062.29	31.65	31.65	3327.12
Jefferson City LFG	22.66	27.67	82%	8	1189.75	12.00	1201.75	52.50	53.03	602.66
Columbia LFG	15.04	27.67	54%	13	361.23	489.70	850.93	24.02	56.59	400.72
BTM Solar	15.92	87.60	18%	0	713.24	0.00	713.24	0.00	0.00	500.13

Using this approach shows the Boone Stephens Solar contract will have an annual contract cost of $4,532,970 and market revenue of $4,392,980 which results in a net position of ($139,990) of cost for this contract when settled in the MISO Energy Market.

Out next approach was to conduct and in-house evaluation of the market position for Boone Stephens Solar using a simpler approach. In this approach we took the contract cost minus the MISO market price multiplied by the projected generation for each hour. Using the average MISO market data for FY 17-19, the results are show in the table below:

Boone Stephens Total Market Risk Per Hour													
EndHour	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Totals
1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
6	$0	$0	$0	$0	$0	$0	-$366	-$2,710	-$2,939	-$2,017	-$489	$0	-$8,520
7	-$175	$0	$0	$0	$0	-$306	-$323	-$9,458	-$9,833	-$7,489	-$4,673	-$3,454	-$35,711
8	-$2,935	$448	$7	$195	-$722	-$2,255	-$4,870	-$13,421	-$12,634	-$11,325	-$11,557	-$10,845	-$69,913
9	-$6,242	-$877	-$946	-$46	-$4,866	-$2,554	-$6,041	-$12,581	-$13,119	-$10,161	-$11,867	-$13,412	-$82,712
10	-$5,000	-$1,028	-$1,875	-$1,240	-$6,303	-$3,591	-$2,418	-$13,469	-$14,061	-$9,796	-$11,444	-$10,822	-$81,046
11	-$3,728	$652	-$1,852	-$746	-$6,279	-$6,667	-$4,317	-$9,590	-$11,920	-$6,167	-$9,536	-$5,550	-$65,700
12	-$4,423	-$3,009	-$2,667	-$2,368	-$7,973	-$8,472	-$8,480	-$8,463	-$7,960	-$306	-$8,018	-$4,622	-$66,761
13	-$3,015	-$4,100	-$4,353	-$4,898	-$9,451	-$10,250	-$7,172	-$4,770	-$8,211	$2,081	-$4,941	$1,901	-$57,179
14	-$2,456	-$5,065	-$5,253	-$6,360	-$10,052	-$12,045	-$9,988	$3,802	-$3,091	$5,926	-$88	$10,546	-$34,122
15	-$772	-$5,330	-$6,028	-$7,531	-$10,897	-$12,981	-$10,112	-$3,758	$1,960	$14,078	$3,910	$7,876	-$29,584
16	-$2,443	-$3,199	-$4,888	-$6,305	-$9,853	-$11,878	-$8,263	-$1,826	$4,130	$18,982	$12,617	$32,329	$19,404
17	-$805	-$905	-$753	-$2,058	-$5,317	-$9,120	-$5,832	$1,613	-$566	$19,693	$9,317	$17,050	$22,315
18	-$26	$0	$0	$0	-$1,023	-$3,109	-$2,621	-$1,355	-$2,304	$7,707	$764	$621	-$1,348
19	$0	$0	$0	$0	$0	-$76	-$577	-$678	-$1,020	$335	$337	$496	-$1,185
20	$0	$0	$0	$0	$0	$0	$0	$0	-$109	$7	$0	$0	-$103
21	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
22	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
23	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
24	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	-$32,018	-$22,412	-$28,608	-$31,357	-$72,737	-$83,306	-$71,379	-$76,663	-$81,676	$21,548	-$35,668	$22,112	-$492,164
per MWH	-$3.052	-$3.409	-$4.958	-$4.633	-$8.670	-$6.693	-$5.106	-$4.827	-$4.755	$1.276	-$2.335	$1.628	-$3.436

Using this approach shows the Boone Stephens Solar contract will have an annual net cost position of $492,164 for this contract when settled in the MISO Energy Market.

There are a number of system factors that can affect the impact on rates from this contract on an annual basis, such as availability of generation resources, system load, MISO market price and system capacity to name a few. Staff believes the numbers presented here represents a range the impact on rates for this resource will operate in. How this resource actually performs year to year will change and should be evaluated on an annual basis as part the Annual Renewable Energy Report.

While staff believes that this contract represents a good opportunity to secure a utility scale local solar generation resource, this contract will be adding to the environment that the Integrated Electric Resources and Master Planning Task Force will be working in to fully analyze and explore when making recommendations on plans for the future of the electric utility.

Fiscal Impact

Short-Term Impact: NA
Long-Term Impact: NA

City of Columbia
701 East Broadway, Columbia, Missouri 65201

Strategic & Comprehensive Plan Impact

Strategic Plan Impacts:
Primary Impact: Primary, Secondary Impact: Secondary, Tertiary Impact: Tertiary

Comprehensive Plan Impacts:
Primary Impact: Environmental Management, Secondary Impact: Secondary, Tertiary Impact: Tertiary

Legislative History

Date	Action
NA	NA

Suggested Council Action

Staff recommends approval of the Boone Stephens contract for solar energy.