

City of Independence

MEMORANDUM

Power & Light

DATE: November 25, 2014
TO: Robert E. Heacock, City Manager
FROM: E. Leon Daggett, Power & Light Director *ELD*
SUBJECT: Resolution 5933 – Preliminary Report



This memorandum is provided as the Preliminary Report as provided for in Section 4 of Resolution 5933 which was passed on July 21, 2014 by the City Council.

Section 4 of Resolution 5933 states:

"That the City Manager is hereby authorized and directed to submit status reports regarding the projects identified in Section 1, Section 2 and Section 3 as soon as practical, with a preliminary report by November 30, 2014, and further report the status of the projects on a regular basis to the City Council."

Section 1 of Resolution 5933 addresses the Independence Power & Light Department ("IPL") office renovation project for the recently purchased Doctor's building located on the former MCI Hospital property located at the corner of 78 Highway and R.D. Mize Road. Burns & McDonnell Engineering Company ("BMcD") was hired as the architect on the renovation project and their scope of work includes addressing the directive of Section 1.

Section 2 of Resolution 5933 addresses the potential use of renewable energy options at City-owned facilities.

Section 3 of Resolution 5933 addresses the potential incentives and sustainable programs which can be provided to customers for the use of renewable energy options.

BMcD was hired to provide the required studies of both Sections 2 and 3. A discussion on each of the three sections follows.

Section 1 - IPL's Office Building Renovation Project

Section 1 of Resolution 5933 states:

"That the City Manager is hereby authorized and directed to assure the design of the remodeled electric utility office building incorporates features and designs to minimize energy use and utilize renewable energy options to supplement the power needs of the building."

On October 20, 2014, the City Council approved Ordinance No. 18379 which authorized a contract with BMcD for architectural and engineering services related to the Independence Power & Light Department ("IPL") office building renovation project. Included in the scope of services are specific items related to obtaining Leadership in Energy and Environmental Design ("LEED") certification with a goal of obtaining the highest LEED certification feasibly possible. In addition, the scope includes identification and analysis on potential renewable power options including solar and wind that can be incorporated in the building renovation project.

This project is just underway with the kick off meeting between BMcD and City staff conducted on October 28, 2014. During the 1st half of November, BMcD held interviews with key City staff as part of the space needs assessment and to help with the conceptual design of the building. On November 24 and 25, the Conceptual Design workshops took place.

Based on early discussions with BMcD, it appears that a Gold LEED certification will be possible. It's too early in the project to know if a Platinum LEED certification is obtainable. BMcD will be evaluating the use of ground source heat pump systems, LEED approved interior design concepts, solar PV generation (roof top, ground mounted as well as potentially as part of a new entry canopy) and wind generation as part of the design work.

More detail updates will be provided as the project progresses.

Section 2 – City-Owned Facilities

Section 2 of Resolution 5933 states:

"That the City Manager is hereby authorized and directed to develop and present to the City Council a feasibility study to determine the practicality and economics of the use of renewable energy options such as solar, wind and geo-thermal at City-owned facilities to help achieve the stated renewable energy goal."

As was mentioned above, BMcD was hired to perform the feasibility study as provided in Section 2 as well as the study provided for in Section 3 (discussed later in this memo report). The BMcD report is contained in Attachment 1.

BMcD included the 29 City buildings in their review and narrowed the list down to the top 11 candidate buildings based on a detailed matrix analysis. They considered three different solar configurations (rooftop, ground mounted and car ports), wind turbines and geothermal. Below is a summary of the conclusions and recommendations contained in the BMcD report.

Wind Turbine Technology

BMcD concluded that wind turbines should not be considered a viable renewable generation for any of the City-owned buildings at this time due to the high upfront capital, inefficiency of small turbines, low wind speeds (i.e., low energy production), and lack of locations with the required amount of area. Their analysis on wind turbines resulted in costs nearly double of the current electricity rate.

Geothermal Technology

BMcD concluded that geothermal technology should not be pursued at this time. Up front installation costs prove to be too great due to the high costs associated with the drilling and installation of the underground heat transfer systems (i.e., wells). BMcD did conclude that geothermal should be re-evaluated when existing systems need to be replaced and the building site has sufficient land area to accommodate the heat transfer wells.

Solar Technology

BMcD considered three solar installation configurations: rooftop, ground mounted and car port canopy mounted. BMcD performed 25 year analysis on the top 11 buildings and the following table contains the results:

	Installed Capacity (kW DC)	Annual production (kWh)	Capacity Factor	Installed Cost	Cost Per kw (\$/kW)	25 Year NPV	Payback period (yrs)
1 WPC Rock Creek Plant	464.0	694,800	17.1%	1,241,280	2,675	39,000	14.6
2 City Hall	369.0	543,400	16.8%	1,370,430	3,714	-792,700	>25
3 Truman Memorial Building	110.0	163,300	16.9%	397,920	3,617	-216,700	>25
4 Health Department	135.0	198,700	16.8%	494,160	3,660	-168,500	20.7
5 Fire Station 1	72.0	104,500	16.6%	252,000	3,500	-90,600	21.3
6 Events Center	4,688.0	6,949,700	16.9%	17,438,100	3,720	-7,122,400	22.4
7 IPL Service Center	1,241.0	1,838,000	16.9%	3,648,768	2,940	-446,800	16.6
8 Public Works Maintenance	162.0	239,300	16.9%	567,000	3,500	-135,700	18.6
9 WPC Maintenance Building	275.0	405,900	16.8%	1,007,040	3,662	-379,000	21.0
10 Adventure Oasis	228.0	336,900	16.9%	866,400	3,800	-345,700	22.1
11 Fire Station 7	107.0	155,500	16.6%	378,386	3,536	-121,100	20.2

The Water Pollution Control Department's Rock Creek plant provides a positive net present value ("NPV" which is a method to determine the profitability of an investment) and a 14.6 year payback. BMcD estimated that 367 kilowatts of solar panels could be ground mounted. Ground mounted solar is the least expensive and provides the best economics. All other buildings have a negative NPV and longer paybacks.

The analysis above assumed City ownership of the solar systems. Since the City is a non-taxable entity, the federal tax incentives associated with solar system cannot be realized. BMcD did state that if the City could find a 3rd party to be the owner of the systems and a purchase power arrangement could be negotiated, then the economics above would improve somewhat. This analysis resulted in the IPL Service Center building also seeing a positive NPV. The other buildings still had negative NPV even under the 3rd party ownership arrangement.

Brightergy Analysis

In addition to the BMcD study, IPL staff enlisted Brightergy to provide an analysis on solar roof-top options on the City-owned buildings. Brightergy is one of the more experienced roof-top solar installation companies in the U.S., and has offices in St. Louis and Kansas City. They also have experience with wind turbines and energy efficiency measures including geothermal systems. Brightergy offered to do the analysis at no cost to the City.

Brightergy reviewed each of the City-owned buildings and narrowed the list of 29 buildings down to what they considered the top 12 candidate buildings for rooftop solar. The following table provides a summary of Brightergy's analysis of the top 12 buildings:

	Installed Capacity (kW DC)	Annual production (kWh)	Capacity Factor	Installed Cost	Cost Per kw (\$/kW)	25 Year NPV	Payback period (yrs)
1 City Hall	38.7	49,000	14.4%	\$114,268	2,950	-\$25,598	19.0
2 Events Center	434.9	548,000	14.4%	\$1,043,832	2,400	\$149,185	13.0
3 Fire Station 2	24.7	30,000	13.9%	\$74,115	3,000	-\$8,024	17.0
4 Fire Station 3	69.5	78,000	12.8%	\$208,620	3,000	-\$36,197	18.0
5 Fire Station 4	47.6	55,000	13.2%	\$147,498	3,100	-\$25,851	18.0
6 Fire Station 7	99.7	116,000	13.3%	\$274,271	2,750	-\$19,442	16.0
7 Health Department	42.1	52,000	14.1%	\$122,061	2,900	-\$7,786	16.0
8 National Frontier Trails Museum	49.1	53,000	12.3%	\$147,315	3,000	-\$29,950	19.0
9 Police Building	52.8	68,000	14.7%	\$153,019	2,900	-\$3,822	16.0
10 WPC Rock Creek Plant	64.7	80,000	14.1%	\$187,514	2,900	-\$11,715	16.0
11 IPL Service Center	149.5	190,000	14.5%	\$396,043	2,650	\$19,262	15.0
12 WPC Maintenance Building	81.4	102,000	14.3%	\$232,090	2,850	-\$8,248	16.0

Brightergy assumptions differed from BMcD mainly with somewhat lower material and installation cost of the solar systems. For instance, BMcD assumes the cost of rooftop solar to be \$3.50 per watt where Brightergy assumed between \$2.40-\$3.00 per watt depending on the building and size of the solar system. As can be seen in the above table, the Events Center and the IPL Service Center have a positive NPV with paybacks of 13 years and 15 years respectively. All the other buildings have a negative NPV and longer paybacks. Brightergy's analysis of each of the 12 buildings is included in Attachment 2.

Section 3 – Customer Programs

Section 3 of Resolution 5933 states:

“That the City Manager is hereby authorized and directed to develop and present to the City Council a study to evaluate potential incentives and sustainable programs which can be provided to customers for the use of renewable energy options.”

As mentioned earlier, BMcD was hired to perform the study pursuant to Section 3. BMcD was also asked to include energy efficiency customer program options in their scope of work in addition to renewable generation options.

BMcD surveyed 10 different utilities customer program offerings (of which seven were interviewed) to determine the most appropriate programs for the City to consider. The utilities surveyed were both local (Missouri and Kansas) as well as from states where these type of customer programs have more significant presence (California and Texas).

BMcD Recommendations

BMcD concluded that the following programs may be of the most interest to the City:

1. Utility Purchased Efficiency Program such the LED Buy-Down Program offered by a utility in Texas. Under this program, the utility buys equipment (i.e., LED light bulbs) in bulk at a reduced price and directly sells the equipment to the customer at the reduced rate.
2. Community Solar Program similar to the program offered by City Utilities of Springfield, Missouri. Under this program, the utility has a purchase power agreement with a developer who installs, owns and operates a large scale solar farm. Customers have the option to purchase a portion of their energy needs from the solar facility by paying a 20 year fixed price on the energy. Under Springfield's program, that rate is higher than the current electric rate, but is expected to be lower in the future.
3. BMcD recommended some improvements in IPL's current Home Energy Loan Program ("HELP"). IPL's HELP program provides up to \$15,000 loans to residential customers who undertake energy efficiency measures on their home. BMcD recommended further review and potentially refining the program to provide additional protection to the utility in case customers do not pay the loan.
4. BMcD recommended that IPL look at ways to increase program marketing efforts related to their existing programs as well as any new programs to increase participation.
5. BMcD recommended that IPL review their current rate structure to eliminate or reduce any rate subsidization issues.

As mentioned in Item 2 above, a community solar program requires a utility-scale solar farm to be present. In that regard, on November 10, 2014, the IPL issued a Request-for-Proposal for a Solar PV Installation whereby a company would install a large scale solar farm (3-10 Megawatts) on property owned by IPL. The RFP asks companies to submit pricing for the installation, to supply ownership and operation of the solar farm and pricing for the City to buy all the energy produced by the farm through a purchase power agreement ("PPA"). The PPA structure allows for the taxable company to own the solar farm which allows the company to take advantage of all the tax incentives associated with solar. The company then can pass through the benefits of these tax incentives by offering a lower price under the PPA. The responses to the RFP are due on December 10, 2014.

In addition to the Solar PV Installation RFP, IPL issued an RFP for Wind Energy. Under this RFP, companies were requested to provide pricing for energy produced by a wind farm. We received three proposals and staff is evaluating the proposals to determine with one is the most favorable to the City. If the City were to move forward with both the wind and solar purchase power agreements, the percentage of renewable energy to serve the City load would increase from the current 5% to over 10%.

Recommendation #5 relates to the sustainability of the customer programs and in particular to have the appropriate rate structure in place. The consultant performing the rate study as provided for in Section 8 of Resolution 5933 will be considering the recommended customer programs as part of their work and will make recommendations on any rate structure changes.