Minneapolis
City of Lakes

Blueprint for Powering Minneapolis Municipal Operations with 100% Renewable Electricity by 2022

October 23, 2017

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Executive Summary:

City Council Action 2017A-0491 requested Property Services staff to produce two reports:

1. A preliminary report analyzing past and current electricity usage and recommendations on steps necessary for the City of Minneapolis enterprise to obtain 100% of its electricity usage from renewable sources within five years.
2. A secondary report focusing on three areas:
    a. Further, directing City Coordinator's Office and Finance & Property Services staff to undertake a second phase of the renewable energy analysis by utilizing the data and options listed above to solicit input from Xcel Energy through the City's Clean Energy Partnership. Such input should include forecasts of the ability of Xcel Energy to provide the City with the renewable resources assuming that the City retains the renewable energy credits. Such input should also include the projected electrical rates to accomplish the City's goals.
    b. Further, the recommendations should also include elements of a financial plan for the relative financing costs of each option, how capital costs associated with City-owned improvements could be funded, and how the costs or benefits would be allocated among the City's general fund, enterprise funds, and special revenue funds.
    c. Finally, the second phase of the renewable energy analysis should include the impact on greenhouse gas emissions of the changes in electricity use and renewable electricity options. The second phase of the report should be presented to the Health, Environment & Community Engagement and Ways and Means Committees no later than Oct. 30, 2017.

The first report - "Moving Towards 100% Renewable Electricity Powering Minneapolis Operations by 2022" was submitted to the Health, Environment, and Community Engagement Committee on August 18th, 2017. The report concluded that the annual electrical usage in municipal operations will drop from 101 million kWh today to 85 million kWh in 2022. The report noted that with the recent enrollment in the Xcel Energy Renewable*Connect program, the City can claim that 18.2% of its 2018 electricity usage is directly tied to renewable energy sources.

This second report details a method and timeline for the City to claim that 100% of its electricity usage is directly tied to renewable energy sources. The recommended strategy is to pursue three options simultaneously:

1. Continue to increase the purchase of Renewable*Connect Electricity or Renewable Energy Credits (RECs) from new wind and solar projects in the Upper Midwest, which will entail extra cost.
2. Maximize the amount of solar generation on City-owned facilities such as the Water Treatment reservoirs and large City-owned buildings. There will be an 11 year payback period for each array, but over the 25 year life of an array, the savings will have a net present value of twice the initial cost of the arrays.
3. Continue to increase the number of Community Solar Garden subscriptions which will provide savings to offset the increased cost of Renewable*Connect Electricity or RECs. The City, under PUC rulemaking, cannot claim the RECs (which accrue to Xcel Energy) for its Community Solar Garden subscriptions.

With these three paths, the City can raise its renewably sourced electricity to 57% by the end of 2018, to 73% by the end of 2019, and 90% by the end of 2022. The year 2023 will be the first complete year utilizing 100% renewably sourced electricity. The table below shows the progression to 100% renewable electricity:

YEAR	Renewable*Connect kWh	Purchased RECs	City Solar Array kWh	Total Renewable kWh	% of Total Electricity Usage
2017	4,450,000	0	110,000	4,560,000	4.5%
2018	54,600,000	1,000,000	110,000	55,710,000	56.8%
2019	68,100,000	1,000,000	500,000	69,600,000	73.3%
2020	68,100,000	1,000,000	3,000,000	72,100,000	78.3%
2021	68,100,000	1,000,000	6,000,000	75,100,000	84.4%
2022	68,100,000	1,000,000	8,000,000	77,100,000	89.7%
2023	17,800,000	59,200,000	8,000,000	85,000,000	100.0%

Basic Goals of Moving to 100% Renewable Electricity:

The City has three basic goals that it wants to achieve as it moves to 100% renewable electricity for its municipal operations:

1. Create "additionality" of any renewable resources used by the City. This goal is to add new generation assets that did not exist in 2017 to the grid or on City-owned properties.
2. Reduce greenhouse gas emissions generated by its municipal operations.
3. Reduce overall electricity expenditures.

Section 1: Additionality

Xcel Energy is mandated by Minnesota's Renewable Portfolio Standard (RPS) legislation to increase the amount of renewably sourced electricity delivered each year to hit certain percentage targets. The RPS calls for 25% of Xcel's delivered electricity in 2020 to be from renewable sources, and this increases to 30% of the total by 2030. In addition, Xcel Energy is required to have 1.5% of its delivered electricity be from solar resources by the end of 2020. Xcel has been adding significant amounts of wind generation capacity to its system, and by the end of 2016, Xcel met the RPS 2020 goal with 15% Wind, 7% Hydro, and 3% Biomass derived electricity. As the City of Minneapolis increases its renewable electricity usage, some City Councilmembers have indicated that they prefer options that will either enhance Xcel's usage of renewable sources beyond the RPS or options that produce new renewable energy where the RECs stay with the City and do not assist Xcel in meeting its RPS obligations. Three options have been identified that meet these criteria:

1. Xcel Energy Renewable*Connect Program:
   The generation resource for this program is a 1,550 MW wind farm in Minnesota owned by Xcel that was brought on line in 2017. A portion of this wind farm's output is not being counted towards Xcel's RPS requirement. This portion is being sold to customers along with the RECs so that the customers can claim they are using renewable electricity at their accounts. In July of 2017, the City signed a 10 year Renewable*Connect contract for 17.8 million kWh each year. The City began receiving this electricity in August for an extra cost of $0.008/kWh over the regular electricity rates. This amounts to a premium of $140,000 - $250,000 each year of the contract depending on fuel prices at Xcel's fossil fueled generation plants. The convention center and the water utility have already absorbed this premium in their budgets for future years.

   The Renewable*Connect program has a limit on how much electricity a single customer can obtain, which is the 17.8 million kWh that the City is currently receiving each year. Xcel Energy has formally requested that the Public Utilities Commission allow the City to obtain another 50 million kWh each year from this program. This report proposes entering into a 5-year contract for this additional 50 million kWh each year. If the PUC allows the expansion, the City should begin receiving the additional electricity in April of 2018. By 2019, the City would be receiving a total of 67.8 million kWh from this program at an annual premium of $550,000 in 2019 and then increasing annually by 1.1% depending on fuel prices at Xcel's fossil fueled generation plants. As described in the chart on page six of this report, some of these increased costs will be offset by savings on solar gardens. In the future, the City will also see more savings from reduced electricity usage associated with the LED replacement of streetlights. These savings could be redirected in the future to renewable energy programs.

2. Solar Photovoltaic Systems on City-Owned Properties:
   Large solar arrays sited on City-owned properties that feed their generated electricity "behind the meter" do not get counted towards Xcel energy's RPS requirements. The RECs from these arrays stay with the customer. The City currently has a single 101kW array sited on the roof of the Royalston Maintenance Facility that is generating 110,000 kWh annually in RECs for the City. Every new building built by the City is now designed to handle the extra roof load of a solar array, and it is estimated that the East Side Storage and Maintenance Facility could generate 480,000 kWh each year with a solar array on its roof. Another possible site is open roof space at the Currie Maintenance Facility capable of generating 500,000 kWh annually. The capital cost of these two arrays would total $1.6 million, with an 11 year payback.

Much larger systems are possible at the Water Treatment Facilities in Fridley. It is estimated that if all five underground reservoirs are capable of handling the extra weight of solar arrays, the City could generate 7 million kWh at these sites each year. The capital cost of these arrays would total $11 to $12 million with an 11 year payback.

3. Investing in New Wind Projects by Purchasing Their RECs
   Xcel Energy has been granted a regulated monopoly by the Minnesota Public Utilities Commission on the delivery of electricity to the section of Minnesota that contains Minneapolis. As a part of this monopoly, the City cannot purchase electricity from anyone other than Xcel Energy. For example, the City cannot build a wind farm at its own expense to provide renewable electricity to its facilities. The electricity would have to be sold to Xcel Energy and cannot be assigned to a particular facility or account. However, staff is exploring an option that may encourage a third party to build a new wind farm and have the RECs assigned to the City. The City has been approached on such a venture by one of the renewable energy developers in the Twin Cities. The City would sign a 25-year contract with the developer for the rights to the RECs for a portion or all of the wind farm's yearly output. The signed contract with a public entity provides enough of an extra profit stream for the developer that they can obtain financing to build the new wind farm. No other public entity in Minnesota has entered into such a contract at this time. Staff with the City Attorney's Office would need to explore the legal and financial complexities of this option before it could move into the feasibility stage. After that, it would take several years after signing the contract before any of the RECs would start transferring to the City, as it take 2 -3 years to site and build a wind farm.

ACTIONS TO TAKE:

1. In early 2108, if the Public Utility Commission amends the Renewable*Connect pilot program to enable the City to subscribe to more than 10% of this program's capacity, the City would enter into a second contract with Xcel Energy for 50 million kWh annually for a period of 5 years. This will bring the City to 70% of its electricity directly tied to renewable energy sources. The premium associated with this program and the savings from future Community Solar Gardens will need to be allocated to the various enterprise funds and general fund.

2. In 2018, perform structural analysis of the City's Water Treatment reservoirs to identify the total amount of solar array capacity able to be sited on the reservoirs. The lowest cost long term option for renewably sourced electricity is for the City to own its own large arrays supplying power directly to the Water Treatment Facilities. At today's prices, the City may be able to install up to 6 MW_{AC} of solar arrays which would produce 10.5 million kWh annually, at a total installed cost of approximately $11 million to $12 million. This investment would pay for itself in 11 years, generating a 25 year net present value of $25.5 million in savings. This is approximately three times the cost savings offered by a Community Solar Garden, and would raise the level of renewably sourced electricity from 70% to 82.5%. The City would need to decide upon the best option for financing the capital cost. Options include issuance of debt or utilizing cash and paying back the fund with interest over time.

3. Examine the feasibility of a third party wind farm development with the RECs assigned to the City. Ideally, the electricity production would start no later than January of 2023 when the Renewable*Connect contract for the 50 million kWh expires.

4. Pursue other options with the Clean Energy Partnership and other local, regional and state governmental entities to increase the choices for public agencies to meet their resident's goals for renewable electricity. The market and pricing for renewable energy has changed dramatically in the past five years and will continue to change. In three to five years, there may be several other options for the City to consider.

Section 2: Reducing Greenhouse Gas Emissions

The action steps listed above will all reduce greenhouse gas emissions from City municipal operations, as will the ongoing efforts to conserve electricity and reduce the City's total usage from 101 million kWh in 2017 to 85 million kWh in 2022. But if the only goal for the City was to reduce the greenhouse gas emission inventory from its municipal operations, the fastest and least expensive way would be to buy the RECs on the open market that are being generated from existing renewable energy sources at a price of only $0.001/kWh - $0.002/kWh for the foreseeable future. These RECs would come from generating assets located anywhere in the United States and purchasing such RECs would not add to the amount of renewable electricity currently being generated. Because of this lack of "additionality", this is not a recommended strategy. However, there is one very specific reason to purchase generic RECSs from existing generating assets - to allow the Minneapolis Convention Center to assert that it is powered by 100% renewable electricity.

Since the end of 2010, the Convention Center has been purchasing electricity from a 601kW solar array on its roof. The array is owned by a third party and the Convention Center pays them for the electricity generated by this array. Such an arrangement does not violate Xcel Energy's monopoly since the generating asset is on the property of the Convention Center and the electricity goes directly to their electrical switchgear and not onto the Xcel Grid. However, this array was built with the help of $2,000,000 from an Xcel Renewable Development Fund Grant in 2009. To receive the grant money, the City had to sign over the RECs generated by this array to Xcel for the life of the array, so even though the resource is sitting on top of the building and all the electricity it generates is used directly by the Convention Center, it does not count this electricity as renewable energy.

The Convention Center wants to be able to advertise that it is powered by 100% renewable electricity to aid its marketing efforts, so the first Renewable*Connect contract has 14 million kWh annually assigned to the Convention Center. As of August 1, 2017, the Convention Center can claim that 94% of its electricity comes from renewable sources. To allow them to reach 100% immediately, the City can purchase a 5-year annual REC contract for 1,000,000 kWh. The annual cost will be $4,000 and the RECS will come from existing renewable energy sources within the MISO (Midcontinent Independent System Operator, Inc.) geographic area. This contract has been offered through Xcel Energy so that the RECs can appear directly on the monthly invoice from Xcel.

If the action steps outlined in the "Additionality" section are added to this purchase of 1 million kWh of RECs, the City's greenhouse gas emissions from electricity will drop as follows:

	2016	2017	2018	2019	2,020	2021	2022	2023
Total Electricity kWh	100,629,213	101,000,000	98,000,000	95,000,000	92,000,000	89,000,000	86,000,000	85,000,000
Non-Renewable Electricity kWh	100,219,213	96,440,000	42,300,000	25,400,000	19,900,000	13,900,000	7,900,000	0
Renewable Electricity kWh	410,000	4,560,000	55,700,000	69,600,000	72,100,000	75,100,000	77,100,000	85,000,000
Metric Tons of CO_2 from kWh	**40,213**	**38,539**	**16,900**	**10,146**	**7,948**	**5,551**	**3,153**	**0**

If all other energy source usages stay the same (natural gas, steam, chilled water, vehicle fuels), this will reduce the total carbon emissions from 66,436 metric tons in 2016 to just 26,223 metric tons in 2023, a decrease of 60%.

ACTION STEPS:

1. Immediately enter a 5-year contract with Xcel Energy for 1 million kWh of Renewable Energy Credits (RECs) from generation resources sited within the MISO territory. These RECs will be assigned to the Convention Center, allowing it to claim it is powered by 100% renewably sources electricity at an additional cost of $4,000 a year.

Section 3: Reducing Overall Electricity Expenditures

The strategies outlined above all come at an increased cost to the City either in annual expenditures or one-time capital expenditures. The City does have one way to offset these increased costs - its contracts with Community Solar Gardens. Currently the City has signed subscriber agreements with 24 separate gardens from four developers for a total of 7.5 million kWh annually. Each of the four developers has a different pricing structure, but in general, as the retail rate of electricity continues to rise each year, more savings will be realized through the subscription agreements. Over the 25 year life of the agreements, it is estimated the City will realize a savings of $1.0 million to $4.7 million depending on the rate of increase in retail electricity prices in 2017 dollars.

Xcel Energy has ruled that a customer can have an account entered into the Renewable*Connect program and have the same account signed up for Community Solar Garden subscriptions. When the solar garden sends its electricity to the Xcel Energy grid system, the electricity is regarded by Xcel in the same manner as any other generation source. There is no connection between the subscriber and Xcel for this transaction. The "Bill Credit" given to the subscriber by Xcel has no connection to the subscriber's actual electricity usage for the month. The "Bill Credit" is calculated from the amount of electricity generated by the garden. The Renewable*Connect program is charging the customer a premium for the actual electricity used for the month, and is not connected in any way to the solar garden subscription, so an Xcel Energy customer can have the same account signed up for both programs. This allows the City to directly offset the costs of the Renewable*Connect kWh with a solar garden subscription for the same amount of kWh on the account. The City Council has given authorization for a total of 12 million kWh in annual Community Solar Garden purchases, and this report recommends increasing the number of annual subscriptions until all 12 million kWh are subscribed. The savings will more than offset the increased costs from the Renewable*Connect Program, REC purchases, and the capital cost of more solar arrays. The table below shows the increase in subscriptions and savings through 2023:

YEAR	Solar Garden kWh	Solar Garden Savings
2017	50,000	$2,500
2018	7,000,000	$53,000
2019	8,500,000	$83,000
2020	9,500,000	$110,000
2021	10,000,000	$133,000
2022	10,500,000	$155,000
2023	11,000,000	$178,000

ACTION STEPS:

1. Before the end of 2017, release a bid package requesting current Community Solar Garden subscription pricing for up to the remaining 4.5 million kWh of the originally authorized 12 million kWh of Community Solar Garden subscriptions.