

Appendix D – Solar Panels

Council Motion MN 18-4 from the April 30, 2018 meeting of City Council stated:

1. The Administration investigate the potential of installing solar panels on various City of Regina facilities and analyze the cost benefit of removing select city facilities from the power grid to be self-sustaining, and determine if there is a financial benefit in selling the power that would be generated.
2. The Administration investigate the possibility of installing a large number of solar panels on city owned land with the expressed desire to generate revenue for the City of Regina.
3. The Administration also determine if there are partnerships available regarding the installation of solar panels resulting in revenue generation for the City of Regina, with, but not limited to, SaskPower.
4. The Administration report back to Regina City Council no later than December 2019.

Power Generation

Details about generation programs offered by SaskPower can be found in *Engagement with SaskPower (Appendix E)*.

Power Generation Partner Program (PGPP): The program allows customers to develop power generation projects to sell electricity to SaskPower. Projects are selected through a competitive procurement process. Generation options under the PGPP include solar, geothermal, hydro, flare gas, biomass/biogas, and waste heat recovery power.

Eligible solar generation projects must be between 100kW and 1MW. A detailed assessment of a solar installation under the PGPP has not been completed. Rough estimates suggest this would be a multi-million-dollar project. Given the private sector's interest in this type of solar installation, it can be assumed such a project would be profitable. However, this would be a new line of business for the City of Regina and the organization may be challenged to run a solar facility as efficiently as a purpose-specific solar power generation company.

Net Metering Program (NMP): This program allows customers to produce electricity for their own consumption and provide excess electricity to the grid for credit on their SaskPower bill.

The cost/benefit analysis for Net Metering projects is currently being addressed on a case-by-case basis. Generally, the larger the solar system, the faster the return on the original capital investment. For example, a 30 kW system would have a capital payback of approximately 29 years. While a 45 kW system would have a payback of about 21 years.

A preliminary assessment for the feasibility of a net meter solar installation on City Hall shows that a 100 kW system could be installed on the first floor roof (a structural assessment to determine that the roof can handle the weight has not yet been completed). The installation would offset about 6 per cent of City Hall electricity usage, based on 2019 consumption data. Using an assumed supply and installation cost of between \$2500 - \$3000/kW of capacity, the system would pay off the capital investment in between 19 and 23 years. It is worth noting that the cost of operating the system is currently unknown as is the cost of dismantling and disposing of the solar panels at the end of their life. These additional costs would extend the payback period for the initial investment.

In 2019, City Hall consumed approximately 3,062,400 kWh of electricity, the same as over 400 homes. Preliminary estimates show that approximately 11,500 m² of solar panels would be required to provide enough power for City Hall. This would require a solar panel surface area of roughly two football fields and would cost several million dollars.

Disposal Implications

Currently, there are no cost-effective recycling opportunities for solar panel waste. While research continues and investment is being made in technologies around the globe, in the near-term most solar panels will end up in landfills. Solar panels often contain lead, cadmium, and other toxic chemicals that cannot be removed without breaking apart the entire panel. About 90 per cent of solar panels are made up of glass. However, this glass often cannot be recycled due to impurities including plastics, lead, cadmium and antimony.

When solar panels end up in landfills, there is risk that these toxic chemicals can leach into the soil. As such, disposal in regular landfill is not recommended.

Some government authorities are implementing legislation that puts the responsibility for disposal on solar panel manufacturers, mandating that they offer a recycling solution or charge a disposal fee.

As solar installations increase in Regina, the City of Regina will need to determine disposal parameters and considerations as part of our Solid Waste Master Plan.

Disconnecting from the SaskPower Grid

Removing facilities from the SaskPower grid means disconnecting from the electricity network and relying on the City's own electricity generation, without the grid as back-up. This option is considered high risk as there would be no ability to count on the reliable baseload power that is supplied by SaskPower.

For any facility that would be removed from the grid, a high capacity storage system or battery would be required to provide electricity in the case of reduced generating capacity. Additional considerations for disconnecting from the grid, include:

- Upfront cost to install solar panels, battery storage, and inverter equipment.
- Whether or not there is generation potential (space) to meet the facility's peak demand.
- Installation of a backup power generation option (such as a diesel or natural gas generator) for when back-up battery power expires.
- Spikes in power use and whether the system can handle them.
- What changes to the facility might be required to operate off the grid (what equipment might need to be turned off to reduce demands).
- Battery safety risks such as explosion, fire, and chemical leakage.
- Ongoing costs to maintain and operate the generation equipment, including replacement at end of life.

There are some facilities and services, such as water and wastewater facilities, or emergency services, that cannot be removed from the SaskPower grid due to healthy, safety, and risk related regulatory requirements. SaskPower has never encountered a situation where a client has completely disconnected from the grid. Even in cases where customers generate their own power, they remain connected to the

grid as back-up. If the City of Regina did disconnect facilities from the grid, there may be a cost-recovery fee charged by SaskPower to recoup the costs of infrastructure that was built to support the City of Regina. This would require further discussion with SaskPower and the intention of any charges would be to not burden other SaskPower customers with higher costs.

A preferable option is to leverage Behind the Meter generation (see Appendix E) to offset our reliance on SaskPower supplied electricity, while still having access to baseload power.

Partnership Opportunities

Many other cities with 100 per cent renewable goals may seem to have an advantage over Regina due to the availability of hydroelectricity as baseload power in their utility grids. For example, the City of Portland, Oregon has set a target to transition 100 per cent of the electricity used in their City operations to renewable sources by 2030 and are reporting achievement of this goal. This is because approximately 70 per cent of the utility-scale electricity generation in Oregon comes from conventional hydroelectric power plants.

SaskPower is on a journey to sustainability and renewability. SaskPower is working to meet the following targets by 2030:

- Increase renewable electricity generation from about 25 per cent today to as much as 50 per cent.
- Increase wind power capacity from 221 megawatts (MW) to approximately 2,100 MW.
- Add 60 MW of solar generation by 2021.

While SaskPower works to achieve these targets, the City is making decisions and acting today to leverage renewable energy as changes to the supply network evolve in Saskatchewan.

In fact, Portland only generates 700 kW of renewable power (solar), whereas through our partnerships with SaskPower, the City of Regina generates 1 MW of energy at our landfill gas-to energy generator. Additionally, we produce the equivalent of 11,000,000 kWh of energy through use of biogas, and offset office heating costs by as much as 50 per cent through geothermal heating at the wastewater treatment plant.

SaskPower offers several programs that enable individuals, business, and communities in Saskatchewan to generate power (see Appendix E). These programs are the City's best approach to transitioning to renewable energy in a reliable way in order to meet our 100 per cent renewable community by 2050 goal. Unlike cities who have a "head start" on their renewable journey due to hydroelectric baseload power, the City of Regina has a greater opportunity to participate and lead in our community's energy transition.

In order to generate power for revenue purposes, the City of Regina must work with SaskPower as the SaskPower grid is the only power delivery infrastructure in the province and they have the exclusive right to supply, transmit, distribute and sell electrical energy in any area.

Other partnership opportunities include incentives for renewable energy producers, such as the Foxtail Grove Solar implementation, that attract renewable investment in our province.