

Solar PV Pre-Design Study

ISSUE

In March 2022, the City of Saskatoon (City) submitted two Expressions of Interest under the Government of Canada's Low Carbon Economy Fund (LCEF) – Champions Stream, for the Wastewater Treatment Plant Ground-mount Photovoltaics (PV) and the Municipal Rooftop Solar PV projects.

The City has been invited to advance to the Proposal stage and is preparing the required documentation for the funding applications. As part of the background research for the Renewable and Low-emissions Energy Strategy (RE Strategy), the City hired a consultant to prepare a preliminary Solar PV Feasibility Study on eight municipal buildings which was completed between June 2021 and May 2022. Should the federal funding be offered to the City under the LCEF, further design and PV analysis is required prior to proceeding with the projects. While existing funding is available to undertake pre-design work for the Wastewater Treatment Plant Ground-mount PV project, this report identifies civic funding required to carry out the pre-design work for Municipal Rooftop systems with funding redirected from other projects.

RECOMMENDATION

That the Standing Policy Committee on Environment, Utilities and Corporate Services recommend to City Council:

1. That \$77,000 remaining from Phase 1 project development of P1956: PACE Financing Program, be directed to P2650 Renewable Energy Strategy;
2. That \$100,000 from P10033 Industrial, Commercial, and Institutional (ICI) Energy Efficiency and Energy Generation - Program Design and Pilot, be directed to P2650 Renewable Energy Strategy; and
3. That the following recommendation is brought to the 2023 budget deliberations for consideration: That \$100,000 from P10035 Residential Energy Efficiency and Generation be directed to P10033 Industrial, Commercial, and Institutional (ICI) Energy Efficiency and Energy Generation - Program Design and Pilot, and the work scope for P10035 be adjusted as outlined in this report.

BACKGROUND

History

Actions related to municipal PV are included in *the Low Emission Community Plan*, which was received by City Council in August 2019. Action 29: Install solar PV systems on municipal buildings, includes a milestone target to install 24 MW of solar PV capacity by 2026.

At its Preliminary Business Plan and Budget meeting in November 2019, City Council approved \$180,000 in capital funding for the Integrated Solar/Renewable Energy Strategy project (P2650). At the same meeting, City Council allocated \$80,000 for the

development of a Property Assessed Clean Energy (PACE) Financing Program for the City from Multi-Material Stewardship Western funding. The approved funding was leveraged to successfully apply for a Federation of Canadian Municipalities (FCM) grant, which will provide up to an additional \$102,750 for program research and design, or 50% of eligible costs. Because of the additional funding, the full project budget was not required, leaving a \$77,000 surplus.

At the 2022-2023 Preliminary Business Plan and Budget meeting, the 2022 and 2023 Environmental Health Business Line Capital Budgets and Budget Plans were approved. This included 2022 funding for P.10033: ICI Energy Efficiency and Energy Generation, and 2023 planned funding for P.10035: Residential Energy Efficiency and Energy Generation.

In February 2021, funding for the Home Energy Loan Program (HELP) was approved and included \$250,000 capital to operate the program and \$2,500,000 to loan to program participants. The program launched in September 2021.

The 2022-2025 City of Saskatoon Strategic Plan includes a Council Strategic Priority for Environmental Sustainability. To achieve the outcome that “Greenhouse gases are reduced in a way that maximizes co-benefits and doesn’t leave anyone behind”, key actions are:

- Implement climate actions in the *Low Emissions Community Plan* and the *Corporate Adaptation Strategy* within proposed timeframes; and
- Develop initiatives to increase the use of renewable energy or low emissions energy sources and promote opportunities to property owners to generate electricity from renewable sources.

In February 2022, City Council approved, that ‘Capital Project P1956 – Property Assessed Clean Energy Financing Program be increased by \$3,666,600 for the grant portion and \$7,333,200 for the loan portion (subject to an intent to borrow report and public notice) of FCM’s Community Efficiency Financing Program Funding’ for the expansion of HELP. As of May 2022, the intent to borrow and all associated bylaw amendments had been approved. Expansion will include 247 additional loans, rebates, and program enhancements such as energy mapping, coaching, communication and education materials, training, and more.

Current Status

Low Carbon Economy Fund – Champions Stream

The LCEF is part of the Pan-Canadian Framework on Clean Growth and Climate Change and Canada’s climate plan, *A Healthy Environment and a Healthy Economy*. It supports the implementation of the Framework by leveraging investments in projects that will generate clean growth and reduce greenhouse gas (GHG) emissions. The LCEF is meant to help Canada meet or exceed its commitments under the Paris Agreement, and supports innovation, reduction of energy bills, and the creation of jobs. Champions stream projects are intended to result in GHG emissions reductions and demonstrate the other key guiding principles of the LCEF, including materiality, incrementality, cost-effectiveness and other merit-based criteria.

City of Saskatoon's Current Approach

Renewable and Low-Emissions Energy Pilots for Municipal Buildings

There are 242 buildings with a floor area larger than 100m² in the municipal building portfolio, three of which have piloted renewable energy generation, including:

- Solar hot water heating at Harry Bailey Aquatic Centre and Lawson Civic Centre
 - Emissions reductions are estimated to be 25% of the GHG's associated with pool heating as the panels provide 25% of the pool heat.
- Combined heat and power at Lakewood Civic and Shaw Centres
 - Emission reductions of approximately 1000 tonnes CO_{2e}/year or ~1% of annual corporate emissions.

Utility-Scale Solar – Dundonald Solar Farm

In November 2021, City Council approved implementation of the Dundonald Solar Farm. The City, with Saskatoon Light and Power as lead, intends to build, own, and operate the 2.2 MW Solar Farm for the 30-year life of the project. The project is estimated to cost \$4.25 million with \$2.56 million covered through government funding. Tender preparation for this project is currently underway. The solar farm is expected to be operational in 2023.

DISCUSSION/ANALYSIS

Renewable and Low-Emissions Energy Strategy

The RE Strategy is expected to be completed by Q3 2022. It reviews the opportunities and barriers for Saskatoon to meet its renewable and low-emissions energy actions and targets within the Low Emissions Community Plan. Actions will include those lead by the City (installation of solar PV on municipal buildings and lands), those facilitated by the City (incentivise residential and commercial PV), and regulatory (solar easements or access).

As part of the RE Strategy, the City hired J.L. Richards & Associates Limited (JLR) to complete a Solar PV Feasibility Study on eight municipal buildings. The study reviewed the suitability of the identified City buildings to host rooftop and/or ground-mount solar PV arrays. This included a high-level review of the buildings' structure and electrical systems, roof replacement schedule, utility interconnection programs to provide financial and environmental analysis and a prioritized deployment strategy. The Executive Summary of this study is available as Appendix 1. There are numerous other buildings that may be suitable for solar PV systems in addition to the initial eight buildings assessed; the results and methodology can be used to understand feasibility on additional buildings.

Pre-Design Study and Workplan

Following the submission of the Expression of Interests, the City has been invited to submit a formal proposal for both projects. GHG emission reductions, co-benefits, risk, and feasibility are among the criteria that will be evaluated for merit by a cross-disciplinary review committee.

The City plans to embark on a pre-design study for the Wastewater Treatment Plant Ground-mount PV project that will include environmental, geo-technical, glare, and interconnection review as well as public engagement.

For the Municipal Rooftop Solar project, the pre-design study will build on the feasibility study already completed to provide more detailed information on the eight municipal buildings already assessed. The original feasibility study assessed roof structure based on available information but did not include thorough testing or recommended upgrades to confirm viability. Outcomes from the pre-design will include:

- Completion of interconnection applications and electrical drawings;
- Further assessment of structural and electrical conditions identified in the original feasibility study, recommendations for upgrades, and costing estimates; and
- Updated economic feasibility using forecasted utility rates, interest rates, and capital costs.

A feasibility and pre-design will also be completed on up to seven additional buildings not included in the original study.

Comparison of Recommendation and Current Status

The advantages and disadvantages of proceeding with the pre-design study are outlined in Table 1.

Table 1. Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none">• Provides the information required to leverage 40% matching federal funding;• Better understanding of upgrades and costs to reduce uncertainties, not carry unnecessary contingencies, and reduce risk in achieving economic paybacks;• Identify any red flags that might stop the projects from proceeding;• Optimize project sizes and locations to achieve best value;• Improved information to begin tendering design and construction of the systems.	<ul style="list-style-type: none">• Risk that the project will not continue due to an unsuccessful funding application or other reason.

While there is a risk that the LCEF application will not be approved, the pre-design studies are required to advance the integration of renewable energy into civic facilities. Advancing renewable energy within the City remains a priority and this work adds to the Renewable and Low-emissions Energy Strategy. Planning and pre-design work for renewable energy allows shovel-ready projects for other future funding opportunities along with advanced alignment with asset management.

FINANCIAL IMPLICATIONS

The Water Conservation Capital (P.2197) has sufficient funding for the pre-design study for the Wastewater Treatment Plant Ground-mount PV project at without impacting other near-term priorities.

Solar PV Pre-Design Study

The pre-study for the Municipal Rooftop project is proposed to be funded by reallocating from other capital projects as shown in Table 2. As the study will provide the information required to leverage significant federal funding and reduce uncertainties once the project begins, the following changes are proposed to reprioritize capital projects within the Sustainability portfolio:

- P10033: Industrial, Commercial, and Institutional (ICI) Energy Efficiency and Energy Generation - Program Design and Pilot will still receive total funding of \$375,000. However, only \$275,000 will be available in 2022, as the other \$100,000 will be reallocated to the solar pre-design study. It will receive \$100,000 from P10035 in 2023.
- P10035: Residential Energy Efficiency and Energy Generation Program will receive \$150,000 in 2023, with \$100,000 being reallocated to P10033.
- Excess funds in P1956: Property Assessed Clean Energy (i.e. HELP) will be reallocated to the pre-design study.
- A total of \$177,000 will be added to P2650 in 2022, to fund the pre-design study.

Table 2: Capital Reallocation Plan – (less)

Project	Approved Budget (2022)	Planned Budget (2023)	Revised Budget (2022)	Revised Budget (2023)	Difference Total
P10033: Industrial, Commercial, and Institutional (ICI) Energy Efficiency & Energy Generation - Program Design and Pilot	\$375,000	\$0	\$275,000	\$100,000	\$0
P10035: Residential Energy Efficiency & Energy Generation Program		\$250,000	\$0	\$150,000	(\$100,000)
P1956: HELP - remaining from Program Development previous years			(\$77,000)	\$0	(\$77,000)
P2650: Renewable Energy Strategy – Rooftop PV Pre-design			\$177,000		\$177,000

Impact on P.10035: Residential Energy Efficiency and Energy Generation

The Residential Energy Efficiency and Energy Generation capital project was approved with \$250,000 of funding in 2023, as part of the 2023 Budget Plan approval. The project's approved scope is to research options for an energy education and incentive program for the residential sector, specifically targeting low-income participation in energy efficiency and renewable energy programs, and was expected to include education materials and programming, mapping, audit or coaching programs, and rebates or incentives.

Much of the original scope for education programming overlaps with HELP enhancements planned using grant funding awarded from FCM. This report proposes

to redirect \$100,000 of the capital project, with the remaining \$150,000 being used to research and develop a retrofit incentive and rebate program for residents not participating in HELP, focusing on low- and moderate-income households.

Impact on P.10033: ICI Energy Efficiency and Energy Generation

The total funding for this project remains the same under the proposed reallocation, it will just be distributed over two years. The scope of work planned for 2022 fits within the proposed budget.

OTHER IMPLICATIONS

Triple Bottom Line Impacts

A full Triple Bottom Line (TBL) assessment has not yet been completed for this project; however, TBL benefits and impacts of completing solar PV systems on municipal buildings are expected to include:

- GHG reductions of 7,200 to 11,600 tonnes CO_{2e};
- Economic opportunity and jobs for the community from pre-design studies, installation, and project management;
- Leverages federal money and achieves energy savings resulting in the ability to pay back the costs of the system within its lifetime;
- Resilience benefit of diversifying power supply;
- Shows environmental leadership and helps achieve Low Emissions Community Plan Actions;
- Requires borrowing and poses a risk that costs are higher than anticipated; and
- Lost revenue to Saskatoon Light and Power.

Approaches in Other Jurisdictions

SaskPower's goal is to reduce their GHG emissions from 2005 levels by 50% by 2030. In 2020/2021, SaskPower had 39MW of solar capacity and are planning to construct at least 60 MW of utility-scale solar power in the coming years. Each of these projects will be built, owned, and operated by independent power producers, and in some cases in partnership with Indigenous groups or businesses. In addition, SaskPower is offering key customers the opportunity to invest in its Renewable Partnership Offering (RPO) by purchasing bundled renewable electricity and associated environmental benefits (specifically renewable energy certificates or 'REC's) up to their current maximum monthly load from an additional 100 Megawatt (MW) solar facility being developed. The City submitted an Expression of Interest in March 2022 for 66 MW of power.

Alberta has also seen a steady growth in utility-scale solar projects over the past few years and recently approved the 400 MW Travers Solar Project, which is the largest solar project planned in Canada.

Federal Plans

The Federal Government's *Pan-Canadian Framework on Clean Growth and Climate Change* presents the goal of adopting a net-zero energy ready building code by 2030. In the recently released National Energy Code for Buildings 2020 (NECB), a voluntary tiered code is recommended for provinces to adopt that includes four progressive tiers

for energy efficiency. Future revisions of the NECB are expected to have more stringent energy performance requirements to “step up” to Net Zero when it is mandatory in 2030. The Federal Government has committed to achieving a net-zero emissions electricity sector by 2035, and is developing a [clean electricity standard](#) in support of this.

NEXT STEPS

Next steps include:

- Submit Formal LCEF Application for both the rooftop and ground-mount solar PV projects by July 15, 2022;
- If funding for pre-design of the proposed rooftop solar project is approved by City Council, the Administration will proceed to competitive procurement; and
- Anticipated funding decision from Government of Canada’s LCEF in November 2022.

If the funding application is successful, a report will be brought forward for City Council approval with a request for borrowing (green loan) for the City’s portion of funding and approval to begin projects.

APPENDIX

1. Executive Summary – Solar Photovoltaic Feasibility Study for Municipal Buildings

Report Approval

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