Council Report

penticton.ca

Date: February 3, 2026
To: Anthony Haddad, City Manager
From: Draydan Power, Manager of Energy & Environment

Subject: **Electrical Microgrid**

Staff Recommendation

THAT, subject to securing 60% external funding, Council amend the 2026-2030 Financial Plan for the Electrical Microgrid project (SREPS-USS-390) to include a total multi-year cost of $9.3 million, with a maximum of 40% funding from the Electric Capital Reserve ($3.7 million) and the remaining from grant revenues or external sources ($5.6 million);

AND THAT Council authorizes the GM of Infrastructure and the GM of Corporate Services to execute the contribution agreements for the grants, should the City be successful.

Executive Summary

The City of Penticton is proposing a $9.3 million electrical microgrid project which will:

- Reduce peak demand and energy costs by roughly $300k (net) annually- roughly $11/year for the average residential household or $55/commercial customer
- Enhance community resiliency and energy security
- Enable integration of renewable energy, battery storage, and advanced grid controls
- Support climate action and greenhouse gas reduction goals

The project is proposed to be funded by a maximum of 40% from the Electric Capital Reserve and 60% from external sources. The City has received conditional approval for a grant valued at $4.6M (or approximately 50% of the total cost), and there are additional opportunities to secure the remaining external funding. If the external funding can be fully secured, the financial model forecasts a payback period for the City's investment of 11 years, and a net present value (NPV) of $4.1 million. The estimated savings to customers is also expected to increase each year, as the bulk cost of power is expected to increase annually more than the expected increase in operating costs.

Key risks for the project include the operational reliability of the BESS, potential cost overruns of construction, and the accuracy of peak demand management. These are mitigated through grant

funding, strategic budgeting, and the addition of the electrical engineering position in the department to optimize system performance.

Strategic priority objective

Mission: Penticton will serve its residents, businesses and visitors through organizational excellence, partnership, and the provision of effective and community focused services. By implementing peak shaving and energy generation, the City will reduce upstream supply charges from FortisBC, which currently make up 88% of our electric utility's operating costs.

Safe & Resilient: A microgrid ensures continued operation if FortisBC's upstream supply is interrupted. The microgrid would serve the industrial area, providing power to key facilities such as Fire Hall 2, Penticton Regional Hospital, and City Yards, which contains the electric utility operations centre.

Background

Penticton Generation Feasibility Study (2020)

The concept for this project has been in the works for some time. Starting in 2020, the Electric Utility completed a Generation Feasibility Study Report, which reviewed a wide range of potential electricity generation options for the City of Penticton. The findings were presented to both the Sustainability Committee and Council, highlighting which alternatives best aligned with the City's technical, economic, environmental, and policy goals.

Key points presented:

- The study evaluated 15 alternatives, including hydro, solar, battery storage, and others.
- Most options were not economically viable without significant grant or reserve funding.
- City-owned rooftop solar (new build and retrofit) and battery storage were identified as the most promising, especially when combined and supported by grants or the Electrical Reserve Fund.

The study recommended focusing on solar and battery projects, seeking external funding, and monitoring emerging opportunities. To incorporate the generation study into other aspects of utility operation, an Electric Utility Master Plan was determined to be next step.

Electric Utility Master Plan (2020–2045)

In 2020, the electric utility completed a comprehensive 25-year Electric Utility Master Plan. This plan was developed to ensure the long-term reliability, capacity, and sustainability of the City's electrical system in the face of changing demand, emerging technologies, and evolving community needs. The Electric Master Plan analyzed system capacity, forecasted future loads (including the impacts of electric vehicles and distributed energy resources), and identified key infrastructure upgrades required to maintain high reliability and operational flexibility. One of the plan's key recommendations was to

undertake a dedicated resiliency study to address the increasing risks posed by climate change, extreme weather, and other high-impact, low-probability events.

Utility Scale Battery Storage Project (2022)


PROJECT ID: ELEC-NE-08

Utility Scale Battery Storage

CAPITAL TYPE: NEW

Type	2024	2025
Project Budget	$1,700,000	$2,500,000
Electric Fund	($1,700,000)	($2,500,000)

PROJECT SUMMARY:

Utility Scale Battery Storage, or Battery Energy Storage System (BESS) is essentially what it sounds like: a giant battery.

The addition of a large scale battery will enable more cost effective off-peak power purchase that can be stored and distributed later during periods of high demand for our electric customers. Furthermore, a BESS becomes more valuable to the grid as we add other distributed resources (solar, EVs, wind, etc.). Solar only generates power when the sun is shining, not necessarily when the City needs it. Battery storage allows us to integrate these resources effectively into our system. Lastly, the project was also identified through the resilience study as a method to support critical infrastructure for a section of the City during outages.

This project is subject to further review and the availability of grant applications.

In 2022, City council approved an initial $1.7 million budget for installing a utility-scale battery as part of the capital plan, with additional funding allocated for subsequent years. With the approved budget, staff applied for a federal grant; however, the application at that time was unsuccessful. As a result, the project was deferred and the funds carried forward while staff continued to proactively seek additional grant funding opportunities and closely monitored rising upstream demand charges to ensure the initiative could proceed at the most advantageous time.

Power Grid Resiliency Study (2023)

Following the Electric Master Plan's direction, the City commissioned a Power Grid Resiliency Study in 2022–2023. This study systematically assessed the City's vulnerability to a range of disruptive scenarios, including wildfires, floods, cyber-attacks, and total loss of supply. The study concluded that while the electric utility is highly reliable, the increasing frequency and severity of extreme events required proactive measures to ensure the City could withstand and recover from major disruptions.

The top recommendations included:

- Preparing a detailed microgrid study focused on critical infrastructure (e.g., hospital, fire hall, city operations, wastewater treatment)
- Implementing local generation and battery energy storage within a microgrid framework
- Enhancing emergency response and coordination capabilities

These recommendations set the stage for the next phase: a focused examination of microgrid solutions.

Microgrid Scoping Study (2023)

Building on the resiliency study, the City undertook a Microgrid Scoping Study to define the goals, architecture, and implementation roadmap for a municipal microgrid. The study identified the microgrid as a key strategy to:

- Enhance community resiliency and energy security
- Reduce peak demand and energy costs
- Support climate action and greenhouse gas reduction goals
- Enable integration of renewable energy, battery storage, and advanced grid controls

The scoping study outlined the technical requirements, funding opportunities, and recommended the City Yards as the initial site for implementation due to its suitability for hosting solar, battery storage, and control infrastructure.

Proposed Project (2026-2030)

The proposed project includes a BESS, solar PV generation, and switching devices (reclosers) strategically located in the industrial area, as shown below in Figure 2, to create a microgrid. This area includes the electric utility operations centre at City Yards, where the BESS, solar PV generation, and microgrid control systems will be implemented.

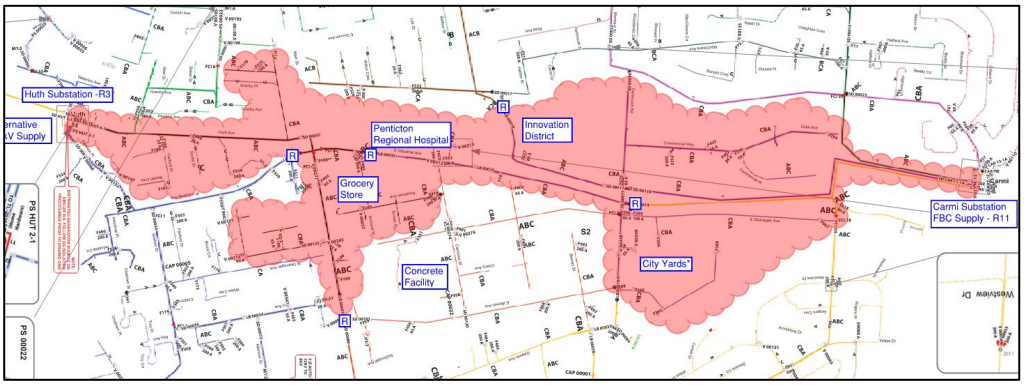

Figure 1 – Microgrid Location

The microgrid architecture enhances resilience by allowing the entire area to operate independently during major service disruptions by isolating from the rest of the grid through automated switching equipment. When isolated, power is sourced from local solar photovoltaic (PV) generation or stored energy in the Battery Energy Storage System (BESS). If necessary, critical loads such as the hospital and City Yards also utilize emergency generators. This strategy improves both cost efficiency and energy security, and also prepares the system for adding more distributed energy resources (DERs) in the future. A microgrid conceptual diagram is included as Attachment C with this report as well.

The BESS reduces peak demand by capturing energy gathered midday from solar or overnight from the grid during times of low demand, then releasing that power during the typical daily peak (3:30 p.m. to 7:30 p.m.), helping to reduce FortisBC supply charges. Details on how the City is charged for power supply from FortisBC are outlined in the February 6th, 2024 council report: Electric Utility Overview, which is included as Attachment B with this report. The BESS also offers substantial advantages when integrating future DERs by storing surplus energy from sources with intermittent output, such as solar PV and wind. Based on a financial optimization study, the size of the BESS was selected as 2.5 MW/10 MWh.

The solar PV generation is estimated as 691 kW with an estimated annual production of 700 MWh. For reference, the City of Penticton's electric grid has a peak demand of approximately 80 MW in extreme weather conditions and consumed 346,452 MWh in 2024. The solar panels will be installed on the recently constructed electric utility vehicle bay building, the Yards office, a future fleet building, and Fire Hall 2.

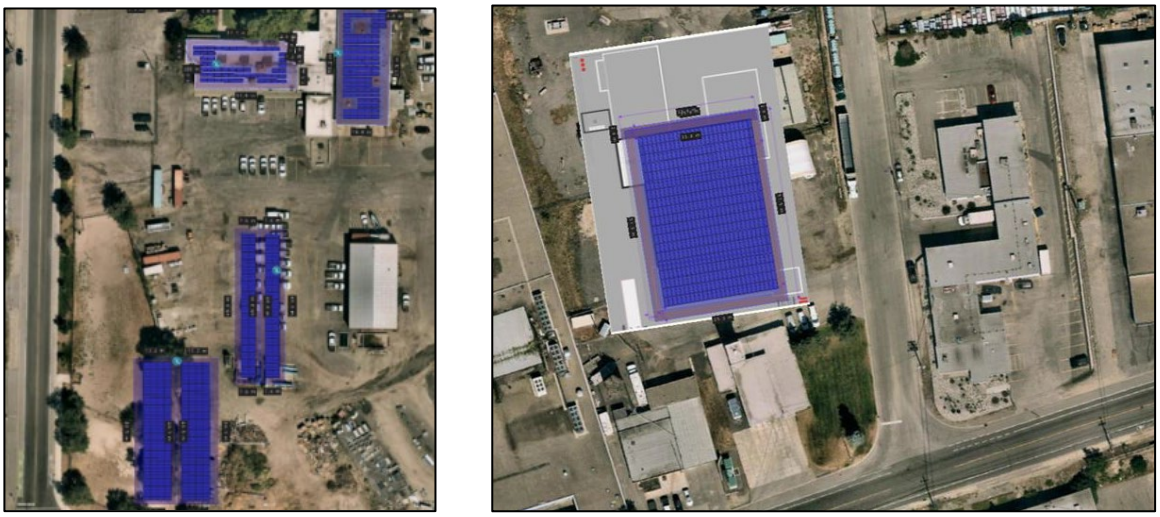

Figure 2 – Solar PV Generation Layout at Yards and Firehall 2

By integrating local generation and battery energy storage, the microgrid will reduce upstream electric supply costs, lessening reliance on external utilities and insulating the community from future rate increases and supply constraints.

Similar Projects in other Electric Utilities

The District of Summerland installed the Okanagan's first utility-scale solar and battery storage facility, which officially opened in November 2023. The Energy Centre features a 412 kW solar array and a 1 MW BESS with 3.56 MWh of capacity. The roughly $7 million project was completed with $6 million in funding from the Canada Community-Building Fund, and the remainder from the District's electrical utility capital reserve. Summerland recently took over operations of the system and has already shared key insights during the development of the City's grant applications, including recommendations on BESS equipment and resourcing requirements to ensure ongoing optimization of the system.

Nelson Hydro, the electric utility subsidiary of the City of Nelson, was also intending to complete a major BESS project, planned for the North Shore of Nelson. The BESS would have had a capacity of 5 MW with a four-hour duration (20 MWh capacity) and was focused on mitigating peak demand charges during winter cold snaps when electricity costs spike and improving grid reliability and resilience for customers during outages. The City of Nelson informed the City of Penticton that the project was cancelled in 2024, citing uncertainty in construction cost overruns and payback timelines. What remains unclear are the specific factors that contributed to these uncertainties, such as difficult site conditions, fluctuations in material costs, or maintaining a high level of grant funding. Additionally, there is limited information on the detailed financial modelling or risk assessments Nelson used to determine the project's viability.

Despite the cancellation, Penticton will continue to collaborate with the City of Nelson as part of the BC Municipal Electric Utility working group. This ongoing partnership is vital for sharing insights into Nelson's decision-making process and understanding the key drivers behind their project outcomes. By actively engaging with Nelson and learning from their experiences, Penticton will ensure that any gaps in the current analysis are addressed prior to moving forward.

BC Hydro is actively incorporating battery storage into its long-term energy strategy. In its 2025 Integrated Resource Plan, the utility commits to deploying large-scale batteries to provide short-term grid flexibility and support variable renewable resources, while also evaluating pumped-storage hydro for future capacity needs. On the customer side, BC Hydro has launched a multi-year solar and battery storage rebate program, aiming to enable residential customers to install solar panels paired with batteries, with a target of delivering approximately 800 GWh per year of distributed solar-plus-storage by 2034.

Financial implication

As part of the grant process, City staff have been working through a due diligence period, which impacted cost estimates and financial analysis. This process was not completed prior to the preparation and consideration of the 2026-2030 Financial Plan, and staff opted not to include estimated values in the 2026–2030 Financial Plan in order to provide Council with the most accurate information possible for budget-setting purposes when more information was available. The work has now been sufficiently scoped that inclusion in the Financial Plan is appropriate.

As noted above, $1.7 million was previously approved for a Utility Scale Battery Storage project. To date, the City has spent approximately $67,000 completing studies, business cases, and preliminary designs needed for grant applications, and the remaining funds are proposed to be carried forward to 2026.

The total estimated capital cost for the Penticton Microgrid project is $9.3 million. The approximate breakdown of the major project components are as follows:

Table 1 – Component Cost Breakdown

Project Component	Estimated Cost*	Percentage of Total Cost
BESS	$4.3 million	47%
Solar PV	$1.9 million	20%
Line Equipment	$1.9 million	20%
Balance of Plant and Software	$1.2 million	13%
Total	**$9.3 million**	**100%**

**Note that the project components above include weighted estimates for Engineering, Procurement, and Construction Management (EPCM), as well as installation.*

The project will take several years to complete, and the following cashflow will be incorporated to the Financial Plan if approved, as follows:

Table 2 – Estimated Cash Flow

Year	Estimated Cost	Major Tasks
2026	$4.4 million	BESS Procurement Solar PV Procurement Recloser Procurement
2027	$3.6 million	Civil Works Line Work
2028	$1.1 million	BESS Installation

		Solar PV Installation Commissioning/Testing
2029	~$100 thousand	System Optimization
2030	~$50 thousand	Project Closeout
Total	**$9.3 million**	

The City has received preliminary approval for a grant that could cover up to 50% of eligible project costs (approximately $4.6 million). Other funding sources will be sought (one of which has been announced, but not adopted through formal legislation yet) to secure an extra 10%, to lower the City's share of costs to a maximum of 40%. The City's consultant completed a financial model to assess the value of the project to Penticton rate payers, assuming the maximum City contribution. The analysis was completed based on the following 2025 FortisBC rates:

- Energy Purchase Rate: $0.0689 per kWh
- Demand Charge: $17.66 per kVA
    - Ratcheting Wires Charge: $11.49 per kVA
    - Power Supply Charge: $6.17 per kVA

The project is designed to reduce both energy consumption and peak demand charges from FortisBC. Annual savings are primarily realized through lower demand charges due to peak shaving with the BESS, and reduced energy purchases through local solar, as shown below.

Table 3 – Savings Breakdown

Savings Mechanism	Annual Reduction	Annual Savings (2025 Rates)	% of Savings
Demand Reduction – BESS	18,652 kW	$330k	82.5%
Demand Reduction – Solar PV	1,266 kW	$22k	5.5%
Energy Reduction – Solar PV	700,067 kWh	$48k	12%

These annual savings are offset by roughly $100k in operations and maintenance costs, however, these savings are projected to increase over time, as both energy and demand rates are assumed to escalate at 4.84% per year.

Payback and Return

A detailed financial analysis (including the anticipated external sources of funding) is included in Attachment A. The life of the battery is roughly 30 years, with major equipment replacement required in roughly year 14. All life cycle costs have been incorporated into the financial analysis. Overall, for the City of Penticton's maximum investment, the project is forecasted to result in a:

- Payback Period of **11 years**
- Net Present Value (NPV, 3.8% discount rate) of **$4,118,206**

- Annual savings to the average residential customer of **roughly $11/year for the average residential household or $55/commercial customer**

In order to recommend proceeding with the project, the project needed to have a positive net present value (which confirms the investment will generate more value that its cost), and a payback (when the City recovers its investment) that is in the 10-15 year range. The project as proposed has a payback of 11 years when including the external sources of funds. Financially overall, the project represents a good investment for Penticton rate payers, even without being able to quantify the added benefits from the resiliency and ability to integrate future Distributed Energy Resources (DERs). However, the project would not be viable without the anticipated external funding, which is why staff are recommending proceeding with a maximum contribution by the City of 40% or $3.7M.

It's important to recognize that using $3.7 million from the City's Electric Capital reserve over the next five years will significantly reduce its balance, which was $9.3 million as of Dec 31, 2024. The City has been consistently relying on the Electrical Surplus to fund the operating budget, and neither the Surplus nor Capital reserves currently meets the recommended levels outlined in the Utility Rate Review. A change in methodology to include asset management funding into the rate structure was made during the last rate review process; however, for the Electric utility, the impact for this is being phased in to smooth rates for the ratepayers.

There are also two other major capital projects in the near future that will require significant capital funding for the electric utility: modernizing the metering system to Advanced Metering Infrastructure and completing another voltage conversion to boost overall system capacity. Depending on reserve levels, funding options for these projects will be evaluated when they are being proposed through the Financial Planning process. Prioritizing this project at this time is recommended due to available grant opportunities, the advantages a BESS offers for integrating future Distributed Energy Resources (DERs) such as solar, and the fact that current system capacity, further supported by the BESS, is sufficient.

Climate Impact

If provincial hydroelectric resources reach their capacity limits and upstream utilities are compelled to obtain electricity from higher-emission suppliers in Alberta or the United States, the microgrid becomes an essential tool for maintaining Penticton's commitment to clean energy. This proactive approach not only aligns with Community Climate Action Plan by adding capacity for electrified heating and transportation but also mitigates the need for higher-emission electricity imports at the provincial level.

Analysis

Electrification, Growth, and Upstream Supply Constraints

The City of Penticton is experiencing steady development growth and increasing electrification across residential, commercial, and industrial sectors. This trend is driven by the adoption of electric vehicles, heat pumps, and new construction standards, all of which place additional demands on the municipal

electric grid. At the same time, upstream supply constraints are emerging: both FortisBC and BC Hydro have issued calls for new power resources, signaling that provincial hydroelectric capacity is nearing its limits. As the province's clean energy surplus diminishes, Penticton must proactively plan for future electrical needs to avoid exposure to supply shortages and volatile market rates. This diversification is further supported by the long-term planning strategies the utility has developed (i.e. Electric Utility Master Plan, Generation Feasibility Study, Resiliency Study, etc.).

Resilience for the Industrial Area and Utility Operations

The proposed microgrid at City Yards will deliver up to 2.5 MW of power for approximately 4 hours at full load (i.e. running business as usual), with flexibility to extend the duration through demand management. Under typical conditions, the Yards office and Fire Hall 2 each draw less than 300 kW at peak, meaning the system could sustain either facility in isolation for 1–2 days during a prolonged outage, or both at a reduced load. Solar generation will provide supplemental charging, though not sufficient to maintain full industrial operations indefinitely.

For industrial customers, continuous supply would require load curtailment to maximise battery duration, and the City-owned BESS would not typically be relied upon for their critical operations. For example, Penticton Regional Hospital currently utilizes two diesel generators, which offer continuous operation if fuel is available. The microgrid would complement these systems by covering short-duration outages and, in specific scenarios, could operate in tandem with diesel backup to enhance resilience.

Building a Roster of Distributed Energy Resources (DERs)

The microgrid project marks the beginning of a broader strategy to deploy Distributed Energy Resources (DERs) across the City's electrical system. By adding local generation (solar PV) and storage (BESS), Penticton increases its ability to manage peak demand, reduce reliance on external suppliers, and maintain cost certainty. With the basic microgrid infrastructure in place, integrating future DERs becomes easier, and generation sources work even more effectively when combined with the BESS.

Municipal Leadership and Agility

As one of only five municipalities in BC that owns and operates its own electric utility, Penticton is uniquely positioned to demonstrate leadership and innovation in grid modernization. The City's speed and agility allow it to pilot advanced technologies, such as microgrids and DERs, on a manageable scale, providing valuable lessons for other communities. By leveraging grant programs, Penticton can showcase the effectiveness of clean energy solutions and contribute to provincial and national climate goals.

Potential Risks

The microgrid project faces several risks, specifically with the BESS. BESS technology deployment has increased significantly over recent years, but outages can impact the BESS' ability to effectively shave demand. Because the demand charge is based on the "worst day" or peak, if the battery is down

during that peak, the savings are lost for that month and could impact savings for other months of the year. A sensitivity analysis was conducted to determine the risk to the financial performance if a demand window is missed with the BESS, particularly regarding its ability to shave peak demand during high-need periods. Results indicate that if the BESS captures peak demand with 80% accuracy, that is, if the City misses the peak demand window in one out of five years (a reasonable margin of error), the project still maintains a positive Net Present Value (NPV), demonstrating overall financial resilience.

To mitigate this risk, staff must dedicate time to learn and optimize the system. In the 2026 budget, an additional electrical engineering position was added, and while this was not the primary intention of this position, the additional engineering capacity in the department will help to ensure the Energy & Environment department can optimize the system. Staff will also continue to collaborate with Summerland, the broader BC Municipal Electrical Utility, and technical experts to optimize the performance year over year.

There are also the typical large project risks of cost overruns. Fluctuations in construction expenses and unpredictable material prices, primarily driven by tariffs, shifts in federal policy, and limited availability of certain minerals, make accurate cost estimates challenging. These risks will be mitigated as best as possible through the detail design and strategic procurement, a contingency of 15% has been included in the total project costs.

Despite the risks above, the BESS is a necessary part of this project to gain access to grants available for this new technology. If the grants were not available, the City would not be proceeding with a BESS; rather, the microgrid would be limited to solar PV generation and switching devices to isolate from upstream supply. These technologies have less risks and operational requirements when implemented, but do not warrant innovative grants.

It is also important to note that part of the proposed solar PV generation is designated for installation on two buildings that are yet to be constructed: a future fleet building and Firehall 2. Should the City not proceed with construction of these assets, or if their location shifts outside of the microgrid boundary, alternative rooftop areas would need to be identified to maintain the planned output of 691 kW. Otherwise, there would be a decrease in overall solar generation capacity for the project.

Next Steps

If Council authorizes the project, the City's financial plan will be amended to include the project and the required external funding. With this approval, staff will finalize negotiations to secure the 50% grant and continue seeking additional external funding to ensure the City's contribution does not exceed 40%, which is essential for offsetting the financial risks associated with microgrid implementation. Following successful confirmation of the funding, the project will advance to the next stage, encompassing a detailed design phase that incorporates an additional independent review. Should the findings deviate significantly from the approved project and budget, or if procurement processes result in costs that are not aligned with the quotes used to develop the estimate, staff would report back to Council for further direction.

Alternate recommendations

Should Council not wish to proceed with this project at this time, no action is required and the project would remain unfunded. The City would lose the existing conditional grant, valued at roughly $4.6 million.

Attachments

Attachment A – Financial Memo

Attachment B – February 6th, 2024 Council Report: Electric Utility Overview

Attachment C – Penticton Microgrid Concept

Respectfully submitted,

Draydan Power

Manager of Energy & Environment

Concurrence

GM of Infrastructure	GM of Corporate Services	City Manager
RD	AMC	AH