

Council Report

Date: February 6, 2024
To: Anthony Haddad, City Manager
From: Draydan Power, Manager of Energy & Environment

File No: 5500-01

Subject: Electric Utility Overview

Staff Recommendation

THAT Council receive into the record the report dated February 6, 2024 titled "Electric Utility Overview".

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.

Organizational Excellence: The City of Penticton will support a culture of service excellence built on good governance, leadership and sound financial decisions.

Background

The City of Penticton owns and operates a local distribution electric network that services approximately 20,000 homes and businesses. Power is purchased at a wholesale rate from FortisBC at four substations (Westminster, Carmi, Huth, and Waterford), where it is converted from transmission voltage to distribution voltage through FortisBC owned substation scale transformers. The City distributes electricity at 12.47 kV to homes and businesses through 19 distribution feeder circuits. The Energy & Environment division includes 19 full-time employees: 17 in the electric utility and two in the sustainability group.

This report is intended to clarify some of the questions that were raised during the Utility Rate Review and subsequent discussions, and highlight the future challenges and opportunities for the City's electric utility.

Financial Implication

None, this report is for information only.

Climate Impact

In order to meet the goals of the Community Climate Action Plan and Corporate Energy and Emissions Plan, the City will need to move away from greenhouse gas emitting fuel sources for heating and transportation and transition to electric-based solutions. This is aligned with the provincial CleanBC Roadmap to 2030, including programs like the Zero Carbon Step Code where new developments are built

to escalating requirements limiting the use of greenhouse gas emitting sources for heating and cooking, and the Zero Emission Vehicles Act from 2019, which was updated in 2021 mandating new vehicle sales in BC to be 26% zero emissions in 2026, 90% in 2030, and 100% by 2035. Innovative technology and solutions will be required to meet the accompanying electric demand of these goals, which BC Hydro expect will increase demand by 15% or more by 2030.

Analysis

Power Supply

The electricity consumed in Penticton is generated by hydroelectric generating stations along the Columbia River between Castlegar and Nelson in the Kootenays. These stations are operated by FortisBC and owned by FortisBC, Columbia Power, Columbia Basin Trust, and BC Hydro. Electricity is stepped up to higher voltages for transmission across the Boundary area through BC Hydro and FortisBC transmission lines.

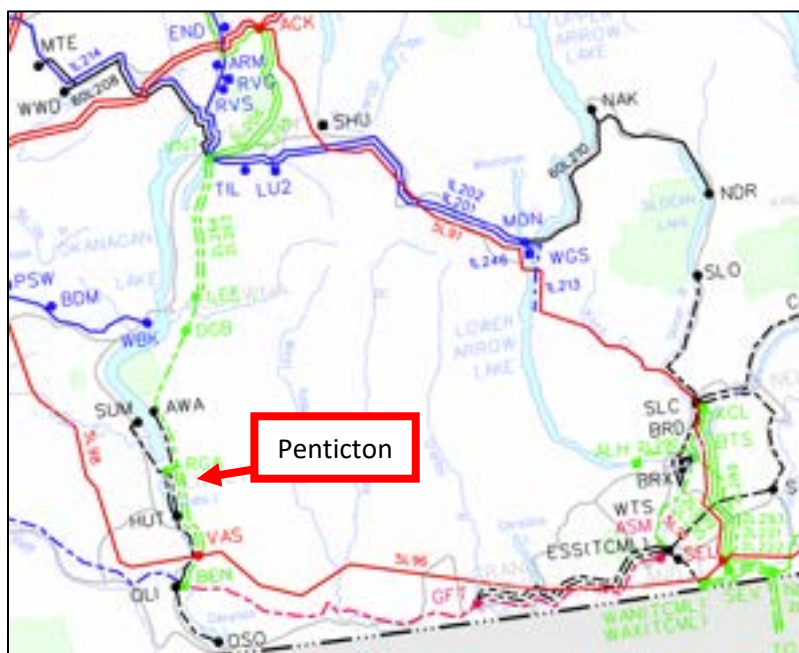


Figure 1 – Bulk Provincial Transmission System

The provincial bulk electric system can be seen above in Figure 1. The colours indicate the voltage of each transmission line: red lines are 500 kV, green lines are 230 kV, pink lines are 161 kV, blue lines are 138 kV, and black lines are 69 kV. Electricity is primarily transmitted across the interior using BC Hydro owned 500 kV lines to Vaseux Lake (VAS) and Ashton Creek (ACK) for efficiency, then stepped down to FortisBC transmission voltages (69 kV – 230 kV) before reaching Penticton. The nearest BC Hydro serviced municipalities are West Kelowna and Peachland, with the nearest transmission substation for connection in West Kelowna and Vaseux Lake (Osoyoos).

FortisBC can supply the City from its bulk electric system through the northeast of Okanagan Lake, southeast of Skaha Lake, or southwest of Skaha Lake as shown in Figures 1 and 2. Figure 2 is an excerpt from the “Power Grid Resiliency Study” that was completed by the City in 2022. The 69 kV line that can be seen to the northwest of Okanagan Lake also services Summerland.



Figure 2 – FortisBC System Supply

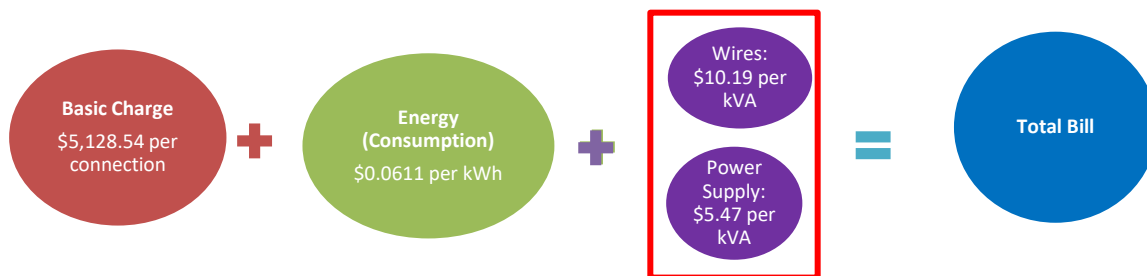


Figure 3 – Penticton Substation Locations

The City interconnects with FortisBC at four substations throughout Penticton. Electricity is stepped down at these FortisBC owned substations to distribution voltage, 12.47 kV, then distributed through City-owned equipment. The location of these substations can be seen in Figure 3. This level of redundancy contributes to Penticton’s high reliability ratings.

FortisBC Bulk Billing

The City of Penticton purchases power through FortisBC Rate Schedule 40. The total cost of supply includes a basic charge of \$5,128.54 per connection, energy charges of \$0.0611 per kWh, and demand charges which are further broken into a wires charge of \$10.19 per kVA and power supply charge of \$5.47 per kVA. The wires charges are determined by the **greater** of the current month’s maximum demand *or* 80% of the maximum demand from the previous 11 months, whereas the power supply charges are determined by the **current** month’s maximum demand. It is this “**or**” portion of the calculation that allows our peak day to impact the City’s billing for an entire year.



Annually, the City of Penticton’s total charges are approximately 64% energy costs and 36% demand costs, with the remaining being made up by basic charges. The 34% demand charges are driven by our current month’s peak or the worst day in the previous rolling year. Penticton typically peaks twice annually, both during the winter and the summer, and this peak is anticipated to become more prevalent as weather events change and become more extreme relative to our average consumption. A breakdown of the total Fortis charges over the last three years is shown below in Table 1, and shows that 21 of the City’s monthly bills over this timeframe included demand charges based on the previous rolling year peak.

Table 1 – 2021 to 2023 FortisBC Power Supply Charges

Year	Total Charges	Energy	Wires Demand	Power Supply Demand	Demand Premium
2021	\$32,871,379	\$19,872,393 (63%)	\$7,584,460 (24%)	\$3,698,606 (12%)	6 Months
2022	\$34,661,516	\$21,031,022 (64%)	\$7,987,937 (24%)	\$3,840,031 (12%)	6 Months
2023	\$35,012,535	\$21,417,183 (64%)	\$7,962,443 (24%)	\$3,802,574 (11%)	9 Months

An example of how a monthly bill can be impacted can be easily demonstrated by using a lower month of consumption, such as April. In 2023, the total charges were \$2,477,441. Basic charges accounted for \$20,514, or roughly 0.8% of the total charges. Energy charges were \$1,550,307, or 62.6%. Power supply demand charges were based on the monthly demand peak of 47,246 kVA and amounted to \$258,435.62, or 10.3%. Wires demand charges were based on 80% of the **December 2022** demand peak (80,329 kVA), which was 64,263 kVA and amounted to \$654,842.01, or 26.3%. If the wires charge was based on the peak demand of that month, it would have been only \$481,436.74, or about \$170,000 less.

This demand premium billing methodology is also used for commercial and industrial customers in the City of Penticton. Similar to the City’s water system, the bulk power suppliers have sized their infrastructure to meet peak demands regardless of how much the City, or its downstream customers, consume. This calculation is intended to smooth their recovery of those costs.

Demand-Side Management and Distributed Energy Resources

Reducing the costs of supply (i.e. the FortisBC bill) can be broken into two categories: **energy reduction** (to reduce energy costs) and **demand mitigation** (to reduce the demand charges, and in particular the peak demand that influences the wire charges).

Energy reduction can be done by upgrading to more energy efficient equipment in homes and businesses and changing the behaviour of residents and business owners. This is known as Demand-Side Management (DSM). The City has some DSM tools in place such as billing for demand for commercial class customers, partnering with residents and business owners on loans for equipment upgrades (as done in the Home Energy Loan Program), and through educational efforts to reduce consumption. However it became clear through our engagement discussions as part of the rate review that more can be done, and additional DSM solutions are being explored.

Demand mitigation can be accomplished at both the customer and system levels, and is much more effective with advanced metering technologies. As mentioned above, the City is investigating ways to educate residents and business owners on how to reduce their peak demand as well as total energy consumption. This includes exploring the use of smart meters, as they allow for both customers and the City to better understand when and how energy is being used. In addition, the City is exploring incentive programs to motivate residents to perform some large demand activities during off-peak hours (e.g. charging an electric vehicle). At the electric system scale, the City is assessing the feasibility of energy storage systems such as batteries that can charge overnight during periods of low demand, and discharge during periods of high demand, to reduce the amount of supply from FortisBC particularly during peak demands. The City is also investigating other sources of energy supply, such as solar, micro hydro, vehicle-

to-grid technology, and co-generation. These are Distributed Energy Resources, and are intended to work together to offset electrification of heating, cooling, and transportation.

System Performance

Customer service is a key focus for the City, and the electric utility is no exception. Having a distribution network operated by experienced local Powerline Technicians and Meter/Traffic Technicians, combined with the geography of Penticton, have led to fast response times for connection requests and key outage metrics significantly better than regional and national averages.

- SAIDI: System Average Interruption Duration Index
 - Measurement of how long an outage is for the average customer
 - City of Penticton (2023): 0.146
 - Regional (2022): 7.25
 - National (2022): 12.88
- SAIFI: System Average Interruption Frequency Index
 - Measurement of how frequent outages occur for the average customer
 - City of Penticton: (2023): 0.117
 - Regional (2022): 2.10
 - National (2022): 2.98

Benefits of Utility Ownership

Electric utilities commonly collect an annual return on the equity of their assets. Privately owned utilities use this return as a dividend for shareholders, while publicly owned utilities such as the City of Penticton typically use this return as an annual dividend to the general fund. Following the Utility Rate Review, to improve transparency, a policy formalizing this practice was adopted by Council on December 12th, 2023 as CP#2023-10. In addition, the rate review showed that generally, Penticton rates were competitive relative to other private and municipal comparators, particularly for residential customers, as shown below.

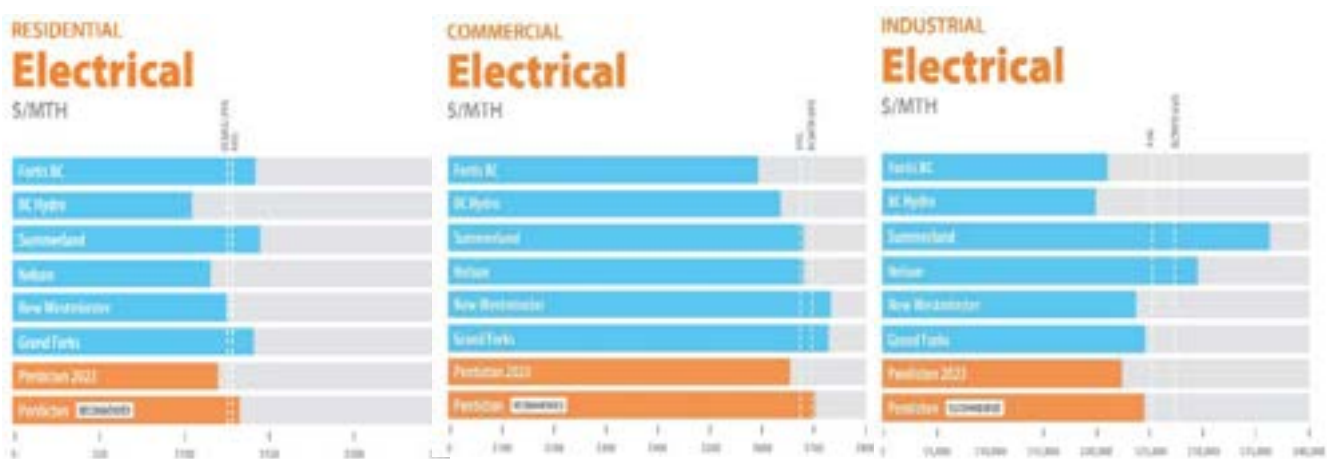


Figure 3 – Utility Rate Review Electricity Rate

Beyond the financial benefit to the City, ownership of an electric utility provides unique integration with other City departments. Collaborating closely with Public Works and Engineering to complete projects together reduces the amount of construction in a given area and improves cost efficiencies and scheduling coordination. For example, the electric utility is able to adjust its capital programs to align with other infrastructure renewal projects, or vice versa. Internal project managers are also able to address conflicts and coordination much more effectively than external third parties. In addition to these benefits, the utility is able to provide cost-effective electric services within short timelines to City facilities and infrastructure.

Finally, owning and operating the utility allows the City, and the officials elected in our community, to control the policies and practices of the utility. This includes setting rates for each of the customer classes, determining asset management investment levels, and determining business improvement initiatives. All of these would otherwise be determined by a private company, regulated by BC Utilities Commission, whose priorities may not align with the City's.

Conclusion

The effects of climate change, and the corresponding mitigation and adaptation efforts, will inevitably increase the demands on our electrical system. The techniques and technologies to manage these increased demands are rapidly evolving, and by owning the electrical utility, the City is well positioned to tackle these challenges in a way that supports the high level of customer service and reliability our customers expect, while maintaining competitive rates.

Draydan Power
Manager of Energy & Environment

Concurrence

Director of Finance and Administration <i>AMC</i>	General Manager of Infrastructure <i>KD</i>	City Manager <i>PH</i>
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