Review of best practices to enable advanced electricity metering infrastructure in New Westminster

EXECUTIVE SUMMARY

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Disclaimer

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I. Introduction

The City of New Westminster declared a climate emergency in 2019 and is committed to a 100% reduction in GHG emissions across the community by 2050. This commitment, stated in the Community Energy and Emissions Plan (CEEP 2050), outlines key actions to be taken across five sectors: transportation, buildings, energy, waste and circular economy, and natural systems. A total of 63 actions have been identified, including prioritizing energy demand reduction, energy efficiency improvements, and fuel switching to help meet its ambitious climate commitments (City of New Westminster, 2022). One key action outlined in the CEEP is the deployment of an Advanced Metering Infrastructure (AMI) network to replace existing meters that are aging, and expensive to maintain.

AMI refers to a comprehensive system that includes three core components such as, advanced meters, secure communication network, and Meter Data Management System (MDMS) that measures and transmits electricity consumption data across a wireless network at frequent intervals (What Is Advanced Metering Infrastructure? | IBM, 2023). This integrated infrastructure enables real-time or near real-time monitoring of electricity usage, remote meter readings that streamline backend bill processing, outage detection, creates the opportunity to design more targeted energy savings programs for users, and improves grid diagnostics. As a foundational technology for grid modernization, AMI is essential for supporting distributed energy resources, decarbonization goals, and the digital transformation of utility services.

With the City of New Westminster's deployment program currently underway, the primary objective of this report is to assess how the city can maximize both customer and utility benefits from AMI deployment, using a forward-looking and evidence-based approach.

II. Methodology

To develop a list of suitable recommendations, a combination of primary and secondary research was conducted to assess best practices by peer utilities and the City of New Westminster's approach to AMI deployment. The scope of the research work conducted can be categorized into three steps of desktop research, current assessment, and report design.

The desktop research reviewed AMI deployment across 16 North American utilities, filtered through a two-stage screening based on five criteria:

- Completion Status: The completion status was assessed to determine whether the utility's AMI deployment was fully implemented, partially underway, or still in the planning phase.

- Proximity: The geographic proximity prioritized utilities located in British Columbia or in Canada, due to their regulatory, geographic, and market alignment, and relevance to New Westminster's jurisdictional context.
- Similarity: The operational similarity was evaluated to understand whether the utility was municipally owned or operated under a model similar to the City of New Westminster's structure.
- Information Availability: The availability of information refers to the quality and prevalence of public-facing documentation on the utility's AMI program. Utilities were scored on a scale of 1 to 3, with 1 indicating low availability, 2 for moderate availability, and 3 for high availability of available information.
- Customer Base: The customer base was profiled to understand if each utility primarily serves residential and small commercial users, similar to New Westminster's core service population.

This process resulted in a final selection of four peer utilities of BC Hydro, FortisBC, London Hydro, and Seattle City Light. Their strategies, tools, and governance structures served as benchmarks for developing the recommendations given in the report.

In parallel, a current state assessment was carried out to evaluate the City of New Westminster's AMI deployment approach. The assessment comprised of internal document review and interviews with the city staff and interest groups, which helped identify alignment gaps and areas for improvement.

The findings from both streams were then synthesized into a final report, which offers targeted recommendations to support customer engagement, operational readiness, and long-term alignment with the City's climate and energy goals.

Summary

Peer Review: The 4 shortlisted utilities were reviewed to highlight key strategies that have enabled their respective AMI deployment programs and customer engagement. The consolidated information were categorized into the following:

Rate design and Incentives: The introduction of flexible rate structures was made possible by the availability of advanced metering data. BC Hydro and London Hydro offer options like Time-of-Use (ToU), tiered, and ultra-low overnight pricing, which incentivize load shifting and support energy efficiency. The development of flexible rate structure is made possible by the granular consumption data provided by the AMI, supporting the introduction of new incentive programs and energy conservation initiatives.

Customer Tools and Education: Utilities such as BC Hydro and London Hydro have invested in customer portals (e.g., HydroHome, LondonHydro App) that offer near real-time usage insights, helping customers better understand and manage their energy consumption. These platforms are complemented by educational resources such as instructional videos and targeted communications, which further enhance awareness of AMI benefits and functionalities. The adoption of the Green Button standard represents best practice in data transparency, allowing customers to securely access and share their energy data with authorized third-party applications. Additionally, Seattle City Light's tiered pre-deployment notification system which includes multiple points of contact before meter replacements has also proven effective in building awareness, fostering transparency, and increasing customer acceptance.

Technical Integration and Smart Devices: Utilities have partnered with vendors like Itron and Cisco to ensure reliable data transmission and support for smart devices. The networks enable hourly or more frequent data collection, support remote meter readings, generate customer bills, and facilitate other utility operations. Advanced data-sharing capabilities, such as integration with ENERGY STAR and Building Benchmark BC, allows utilities to contribute to Citywide energy performance tracking, and emissions reduction strategies.

Post-Deployment Programs and Customer Support: Utilities have supported ongoing engagement through initiatives like BC Hydro's net metering program and opt-out policies for customers concerned with health and safety risks. Over 70% of initially resistant customers of BC Hydro eventually accepted smart meters after escalation protocol was established.

Privacy, Security, and Health:
Transparent data handling practices, encryption, and compliance with health standards have built public trust. For instance, BC Hydro encrypts all customer data using protocols comparable to online banking standards. The utility has emphasized that advanced meters cannot identify specific appliance usage or the timing of such use, which addresses concerns about behavioural surveillance. London Hydro has also developed a test bench to validate smart meter performance and ensure interoperability.

Feedback Mechanisms and Continuous Improvement:
BC Hydro and FortisBC use customer research panels like "Power Poll" and "MyVoice" to collect feedback and inform service design, demonstrating a commitment to transparency and responsiveness.

Current State Assessment: The assessment of the City of New Westminster's AMI program was carried on a review of documents such as reports, strategic utility plan, as well as other internal

documents, and interviews with key departments including Utility, Information Technology, Finance, Communications, and Climate Action and external interest groups. The outcomes of the assessment highlighted several opportunities for consideration. One key area is the formalization of a customer portal, which could be enriched with additional features such as historical usage data, consumption goal setting, and mobile app accessibility, that have proven highly effective in supporting customer engagement, energy literacy, and conservation for peer utilities. Expanding the scope of these tools over time would help New Westminster residents make more informed choices about their energy use and deepen interaction with the AMI system.

There is also potential to introduce flexible rate structures, such as time-of-use or tiered pricing, to take advantage of the full extent of AMI's capabilities. This would encourage conservation, better grid management and help shift demand from peak periods. Finally, there is an opportunity to pilot new digital tools, invite customer inputs, and proactively share information on various related utility programs and actions through channels such as surveys. Additionally, these measures could help ensure the ongoing alignment between the City of New Westminster's AMI offerings and community needs, while strengthening public confidence, and reinforcing its position as a modern, customer-focused utility.

Recommendations

The identified recommendations have been segmented into two categories:

1. Customer Facing: Recommendations that focus on engagement with customers. This includes:

    - Launching a public education campaign
    - Establish a formal post-deployment feedback mechanism and privacy protocols
    - Building a customer engagement pilot
    - Developing and designing customer insight tools.

    These initiatives will improve customer satisfaction, energy literacy, and long-term participation in City of New Westminster's programs. Over time, better-informed customers are more likely to adopt energy-efficient behaviors, reduce consumption, and support broader municipal sustainability initiatives.

2. Utility Facing: Recommendations that facilitate internal planning and operational readiness. This includes:

    - Scoping out cross-departmental resources as post-deployment support team

- Planning for future dynamic rate structure
- Developing operational guidance and asset management plans
- Data validation and quality control
- Ensuring compatibility with third party services
- Enhancing portal functionality
- Improve outage detection and communication systems
- Leveraging the AMI network to support overarching energy programs.

These recommendations will enhance operational efficiency, service reliability, and enable the City of New Westminster to harness AMI data to support progress towards climate targets, including alignment with the goals outlined in the Community Energy and Emissions Plan (CEEP) 2050.

By implementing these recommendations, the City of New Westminster is expected to maximize the AMI's technical potential to empower its community, improve its utility's operational performance, and advance its overarching sustainability and climate goals.

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Appendices

Appendix A – An overview of the information gathered on the deployment program carried out by the 16 Utilities

Company	Program Start	Program Overview
BC Hydro	2011	• Track your daily usage using our online electricity tracking tools - Automatic meter reading • Set-up fee: none | Monthly fee: none • Next day consumption data available, automatic outage detection Feedback tools from 2012-2014: • Customers receive information highlighting new options available to support their energy conservation efforts • Customers receive a rebate for a basic in-home display device that can be redeemed at select stores • Customers will have access to information about their electricity use, up to the previous day, through a secure Power Smart website Optional in-home feedback tools: • BC Hydro will provide incentives for customers to adopt market available in-home displays, programmable thermostats, and energy management software products. • Power Smart website: Customers will also have the option of accessing their own secure consumption information through BC Hydro's expanded Power Smart website Rate Options: • Meters capture information that will enable BC Hydro to design new rate structures that encourage conservation during peak periods, such as voluntary ToU. The design of these rates will involve consultation with customers and will be subject to review and approval by the BC Utilities Commission. Partner:

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		• Itron: Itron will provide its OpenWay® smart meters • Cisco: Network • Capgemini: provide the project implementation and technology integration services • Corix Utilities: Corix is based in Vancouver and will be responsible for deploying and installing the meters across the province.
Maritime Electric	2024/2025	• Just got approved by The Island Regulatory and Appeals Commission. It would store data and software locally rather than remotely on the cloud, in order to avoid the risk of losing access to crucial information if the internet went out during extreme weather events.
Hydro One	2007-2008	• First step in the process was to field test the processes, procedures, and tools with a deployment of 15,000 meters to discover lessons learned that could be applied to the mass deployment of meters. • One of the unique aspects of this pilot was the design and implementation of a paperless change meter order process, an application that delivers and processes orders electronically from Hydro One's Smart Meter Control Centre to "handheld" devices and back, eliminating paper entirely from the process. This new application has led to efficiency gains of over 90% in the manual intervention of change meter orders. Upon successful integration testing with the provincial MDMR (expected in 2009), customers will begin the transition from conventional rates to time-of-use pricing. Partners: • Capgemini- new systems integration, field services, legacy systems management, integrated process design and operational services. • GE Energy- GE Energy is supplying smart meters for Hydro One's smart network project. • Motorola- Motorola is a long-term supplier of wireless communication systems and services to Hydro One. • Trilliant- Trilliant Incorporated, Hydro One's AMI vendor partner, is providing the 2.4 GHz RF mesh intelligent communications infrastructure, head-end software applications and 1.3 million smart meters to be installed by Hydro One. • Audit of Ontario Smart Metering Initiative: https://www.auditor.on.ca/en/content/annualreports/arreports/en16/v2_111en16.pdf • Public wireless smart metering technology by SmartSynch

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Toronto Hydro	2007	• First Version: Toronto Hydro Electrical System's (THES) "Smart Meter" tracks consumption on an hourly basis and makes this data available via a THES web-portal- 1 day delayed. Not shown in real-time. It can be difficult to remember the following day what was used that caused higher energy use. • Suggestions: The THES website can be more user-friendly, better ways to communicate, when energy is being used (High-peak time alerts or alarm), provide real-time by in-home displays or share information, Benchmarking and comparisons with similar residences.
New Brunswick Power	2020-2024	• No installation fee • The initial benefits will be a portal where you will be able to see how much energy you're using. You will also be able to set an alert and be notified automatically if your usage exceeds the amount you've set. • You will be able to opt out of the meter upgrade, with the understanding that you would not have access to the benefits. • Customers with a communicating smart meter and an NB Power online account can go online to see exactly how much energy their household is using in 15-minute, hourly, daily, and monthly intervals. They can view their consumption in both kilowatt hours and the dollar amount. • Customers with smart meters will also receive energy usage alerts. Like a cell phone data plan, you can get usage alerts when your power bill is trending 30% higher than the same month in the previous year and set up custom alerts when your usage reaches a threshold you choose. • If you have an online account, you will automatically be enrolled in the usage alert program when you have a smart meter installed and activated and a history of electricity usage at the present address for at least one year. Partner: • Itron: smart meters
Saint John Energy	2006	• Saint John Energy has been using early-generation AMI technology for more than a decade. Today, about 25 per cent of our customers have smart meters. SJE stopped adding more AMI meters about five years ago, but not because didn't see the benefits. • Stopped because at the time technology was rapidly maturing, and we wanted to wait for that process to play out. In the interim, SJE have continued to update our business cases around AMI

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		and, independent of NB Power's process, SJE continue to investigate technologies that are optimized for service territory. • Partner TUNet- network
Hydro Ottawa	2006	• With smart meters and time-of-use rates, distribution companies can provide detailed information on the customer web portal, MyHydroLink, itemizing how much electricity was consumed and when it was consumed. The bill also displays the three rate periods, and the amount of consumption used within those periods. This is intended to encourage customers to shift consumption, where possible, to lower-cost times of the day and week, and to more actively manage their electricity usage. • By the end of 2011, Hydro Ottawa moved more than 99 percent of eligible customers to time-of-use billing. Power monitors that receive constant data from smart meters are also available to show customers in real time the current electricity rate, current consumption, cumulative consumption and charges, and even to isolate the power demand of appliances or other machines.
ATCO Energy	2021	• If you opt-out of receiving an AMI meter at your premise(s), additional monthly or quarterly fees may be incurred for required manual or technical meter reads.
ENMAX	2018	• If you opt-out of receiving an AMI meter at your premise(s), additional monthly or quarterly fees may be incurred for required manual or technical meter reads. • Advanced meters push data to the router every four hours for one and a half seconds.
Nova Scotia Power	2019-2021	Benefits of smart meter technology include: • View Your Daily Usage- Access your daily energy use information through your online My Account to give you more insight into how and when you use electricity to better manage costs. • Set Notifications- Set-up personal energy use and billing notifications to help you control costs. • Improved response- Smart meters help us understand when and where outages happen, allowing for a faster, more efficient response. • Faster Connection- Connecting and disconnecting electricity can be faster and easier with on-site appointments not always being required. • Remote Meter Reading- In most cases, property visits will not be required to read meters and there will be fewer estimated bills due to meter access issues. • Billing Support- Our Customer Care team can review your daily energy use with you and help resolve billing issues more efficiently.

		• Any future time-of-day rate will be voluntary; it will be the customer's choice. There would be no change for those who do not participate. • Can opt-out but additional monthly or quarterly fees may be incurred for required manual or technical meter reads. Partners: • Tribus Services is Nova Scotia Power's authorized contractor for the smart meter upgrade. • Itron : OpenWay Riva CENTRON meter
Saskatchewan Power	2021	• No charge • Will not be increasing rates for power at peak times during the day. Unlike provinces with high populations • Can opt-out • The smart module inside automatically transmits data every 15 minutes • The detailed data available with MySaskPower account and a smart meter means people can see if the power use spiked last Tuesday at 2 pm, or if using more power through the night than they'd like. Partners: • AIM Electric Ltd • AMISK • Hundseth Power Line Construction • Maxim • STC Industrial Contracting
London Hydro	2009	• The AMI System provided the best value was "Sensun FlexNet AMI System" • Communication system: Bidgley • London Hydro and JOMAR deliver a full-scope, Green Button powered customer engagement platform and LDC enterprise-grade solution that includes: • MyAccount- An online portal that provides customers with 24/7 access to a suite of self-serve options.

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		• Trickl - A mobile app that delivers the best of MyAccount's self-serve functionality for electricity, water and gas services. Trickl integrates smart home devices, personal distributed energy resources and hybrid heat pumps for increased visibility and control. • Commerce- An energy monitoring and tracking tool for large commercial and industrial customers. • MDM- Provides actual, estimated and aggregated consumption, generation and peak demand values for any service location of any rate class. Through notifications, manages budgets, thresholds and consolidated targets for residential, commercial and institutional customers across all service locations. • CIS- Supports customer moves into, within and out of service territory. The system includes historical pricing, projected billings, balances, payments and a host of self-serve transaction APIs. • Settlement – Includes customer historical monthly usage/generation, revenue and energy cost with aggregation across all rate classes and rate types.
Alectra Utilities	2023	• First generation: completed deployment in 2014. • Most residential and small business customers have a smart meter and pay Time-of-Use (TOU) rates for electricity. • Deploying Second generation AMI since 2023 • Since 2021, The Green Button initiative provides solutions that empower customers with easy, secure digital access to their energy data. It provides a standardized format in North America for account holders to authorize downloading or connecting their energy data to help them better understand, manage, and optimize their energy waste to save resources and money. • AMI 2.0 deploying Itron's Gen5 Riva meters, multi-purpose industrial IoT network solution and utility management software suite, Utility IQ, designed to help collect and manage electricity consumption data and enable real-time decision making. • Alectra Utilities has implemented a web-based application that allows it to 'ping' individual meters as well as multiple meters. In the event of a specific field issue, this tool can be used by the Control Room Operators to quickly diagnose whether Alectra Utilities is experiencing a single customer connection issue, or an upstream issue affecting multiple customers. Control Room Operators are therefore able to quickly and remotely diagnose whether a single, or a larger scale outage has occurred and to promptly deploy the appropriate resources or take other measures to resolve the issue.

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		• Smart meter hourly interval data is used by Alectra Utilities to create detailed transformer 18 load profiles, covering 24-hour, monthly, yearly as well as seasonal load curves. This data 19 set allows the company to identify potentially overloaded transformers so that they can be replaced in a planned fashion during normal working hours, instead of in response to 1 emergency or during unplanned outages, thereby providing improved customer service 2 and enhanced cost control. • Partner- Itron, a provider of smart networks, software, and more.
Hydro Quebec	2013	• Arrange for the free installation of a next-generation meter • Opt out of the next-generation meter, which will mean a one-time charge of $85 for the installation of a non-communicating meter, as well as a $5 monthly meter-reading charge Use customer space in HydoQuebec web & app: • See all your consumption data at a glance • Compare your data with those from households similar to yours • Get a detailed analysis of your electricity use • Get personalized recommendations to create your action plan and start saving Partner: The AMI technology is being provided by Landis+Gyr
Seattle City Light	2017	• Customer energy-use information is sent several times a day to City Light using radio frequency waves. This is like the wireless communications used by cell phones and WIFI. The meters transmit data for a maximum of 90 seconds per day. • No fee & No charge Improve customer service: • Faster outage detection and restoration: AMI will eventually automatically report power outages to City Light, allowing us to respond and restore power faster. • More accurate billing: AMI greatly reduces billing estimates that lead to incorrect charges. • Seattle Meter Watch is City Light's free, online energy use and cost information service, allowing you to track consumption in 15-minute, hourly and daily intervals. Benefits include: • Access your facilities' meter data to view and download kWh usage, kWh estimated cost, kVarh and demand

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		• View meter data for all your facilities at once • Track your facilities' energy use patterns and costs to identify issues and act quickly to cut costs • Set daily usage targets and receive alerts if your usage exceeds them Partner: • Landis+Gyr's Gridstream AMI solution that includes a multi-purpose radio frequency network, advanced meters and a meter data management system
Fortis BC	2012	• As the new meter standard in North America, your advanced meter wirelessly transmits information about your total electricity use to us, helping to improve the efficiency of our electricity system while providing you with a variety of benefits: • More choice. You can choose your billing date and get your bill monthly instead of every two months. • Energy conservation. You have the ability to see how much electricity you use and when (weekly, daily and hourly) through Account Online. This can help you make decisions about when to use appliances and save on energy costs. And with access to tools like in-home displays, you can better monitor and manage your use. • Improved power outage response. Advanced meter technology allows us to respond more efficiently to power outages, getting your power turned back on as soon as possible. • Loss prevention. Advanced meters make it less costly for us to deliver electricity by preventing millions of dollars in electricity theft and reducing meter reading costs. Partner: • Itron's smart grid solution, consisting of advanced metering, network communications and software systems, to support the utility's Advanced Metering Infrastructure (AMI) project.

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