Chris Sandve
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July 31, 2025

Commission Secretary
British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC V6Z 2N3

Dear Commission Secretary:

RE: British Columbia Utilities Commission (BCUC or Commission)
British Columbia Hydro and Power Authority (BC Hydro)
BC Hydro 2024 Rate Design Application (Application)
Compliance with BCUC Order No. G-42-25
Investigation and Consideration of
Non-socket-based Metering Solutions Report

BC Hydro writes in accordance with BCUC Order No. G-42-25 to provide its Suite Metering Report (**Report**). In its Reasons for Decision to Order No. G-42-25, the BCUC approved BC Hydro's proposal to remove the master-metering option for multi-unit residential properties in Section 4.4 of its Electric Tariff, effective April 1, 2025, but stated:

> "The Panel recognizes that BC Hydro's current socket-based meters could be problematic for some developers and notes BC Hydro's statement that it anticipates the next phase of its work on investigating the feasibility of non-socket-based metering solutions will be completed by the end of March 2025. Therefore, the Panel directs BC Hydro to file a report with the BCUC on its investigation and consideration of non-socket-based metering solutions by July 31, 2025."

BC Hydro engaged JTS Consulting Inc. (**JTS**) to support our investigation of the feasibility of non-socket-based metering solutions. As attachments to this submission, BC Hydro provides:

- **Appendix A – Suite Metering Analysis – Preliminary Assessment Report:** This report was prepared for BC Hydro in June 2024 by JTS to assess suite metering solutions as an alternative to socket-based meters to individually meter units in new Multi-Unit Residential Buildings (**MURBs**).
- **Appendix B – Suite Metering Analysis – Alternative Metering Solutions for Multi-Unit Residential Buildings:** This report was prepared for BC Hydro in July 2025 by JTS to analyze whether BC Hydro should provide an alternative metering solution for new MURBs and whether BC Hydro should offer an alternative metering solution that could be used for retrofitting existing bulk metered MURBs.

BC Hydro is filing certain sections of Appendix A confidentially with the BCUC pursuant to section 42 of the *Administrative Tribunals Act* and Part IV of the BCUC's Rules of Practice and Procedure. The report contains BC Hydro's information technology system architecture diagrams, information on submeter companies and employee names of BC Hydro and organizations (i.e., submetering companies, utilities and developers) that JTS interviewed. The public version of the report has been redacted to protect BC Hydro's critical system information, commercially sensitive information for submetering companies and the names of BC Hydro and other interviewed organizations' employees.

In the attached Suite Metering Analysis – Alternative Metering Solutions for Multi-Unit Residential Buildings report, JTS concluded:

> "The primary benefits of offering an alternative metering solution are for MURB Developers and MURB residents that could become BC Hydro customers should a technical option for retrofitting existing master metered MURBs be introduced. However, the analyses of both questions identified significant financial and operational challenges associated with implementing, operationalizing and supporting an alternative metering solution. Moreover, it would introduce future challenges that would impact the customer and technology strategies and roadmaps. Therefore, one could conclude that BC Hydro should continue to require new MURBs units to be individually metered and that it shouldn't offer an alternative metering solution for use in retrofitting existing bulk metered MURBs. However, as part of its SMI 2.0 strategy it could explore the viability of alternative metering devices that would be interoperable with the future SMI 2.0 solution."[1]

BC Hydro has reviewed JTS' findings and agrees with this conclusion. Accordingly, we do not have plans to further pursue alternative non-socket-based metering solutions at this time. BC Hydro's current smart metering infrastructure (**SMI**) will reach the end of its design life in five to ten years. We will consider opportunities to retrofit existing master metered buildings as part of our future SMI 2.0 solution so that these customers may be able to receive service directly from BC Hydro and have access to rate options, energy efficiency programs and assistance programs. Future residents of new MURBs will receive these benefits since the BCUC approved BC Hydro's proposal to remove the master-metering option for multi-unit residential properties in Section 4.4 of its Electric Tariff.

The remainder of this submission is organized as follows:

- Section 1 – Background
- Section 2 – Summary of the JTS Reports;
- Section 3 – BC Hydro's Considerations and Conclusions.

[1] Appendix B, page 5.

1 Background

There are approximately 60,000 MURB developments in BC Hydro's service territory. Based on BC Hydro's billing records, about 1,154 or 1.9% of these developments are currently master metered[2] with service provided through a single master meter to approximately 16,300 residential end-users.

These residents pay for their electricity through an arrangement with the account holder associated with the master meter (i.e., it is typically the building owner or strata who is the BC Hydro customer). The account holder may engage a third-party sub-metering company to provide metering and billing services or electricity costs may be included within the rent for the resident or charged based on a unit allocation.

This metering arrangement is appealing to some developers because utility standard socket-based meters can be avoided in favour of less expensive, faster to install non-socket-based meters that take up less space in the building.

All residential end-users of master metered MURBs are not BC Hydro customers. This means they do not receive service directly from BC Hydro and do not have access to BC Hydro's rate options, energy efficiency programs or assistance programs.

2 Summary of the JTS Reports

BC Hydro engaged JTS Consulting Inc. (**JTS**) to support our investigation of the feasibility of non-socket-based metering solutions. As attachments to this submission, BC Hydro provides:

- **Appendix A – Suite Metering Analysis – Preliminary Assessment Report:** This report was prepared for BC Hydro in June 2024 by JTS to assess suite metering solutions as an alternative to socket-based meters to individually meter units in new Multi-Unit Residential Buildings (**MURBs**).
- **Appendix B – Suite Metering Analysis – Alternative Metering Solutions for Multi-Unit Residential Buildings:** This report was prepared for BC Hydro in July 2025 by JTS to analyze whether BC Hydro should provide an alternative metering solution for new MURBs and whether BC Hydro should offer an alternative metering solution that could be used for retrofitting existing bulk metered MURBs.

The following sections provide a summary of the JTS Reports.

[2] Refer to BC Hydro's response to BCUC IR 1.15.1 in the 2024 Rate Design Application proceeding.

2.1 Suite Metering Analysis – Preliminary Assessment Report

The Preliminary Assessment Report identified four technically viable solutions:

- Suite Metering Solution that uses BC Hydro's Itron IPv6 mesh network;
- Suite Metering Solution that uses its own separate network;
- Suite Metering Solution where the vendor provides the network-as-a-service; and
- Suite Metering Solution where the vendor provides a solution-as-a-service.

Table 1 below provides JTS' preliminary assessment of these solutions.

Table 1 Summary of the Preliminary Assessment[3]

Key Considerations	Itron IPv6 Mesh Network Alternative A	Separate Network Alternative B	Network as a Service Alternative C	Solution as a Service Alternative D
Customer Experience	🟢	🟢	🟡	🟡
Developer Experience / Support	🟢	🟢	🟢	🟢
Operating and Maintenance Cost	🔴	🔴	🟡	🔴
Cloud Operating and Maintenance Costs / Capital Cost	🔴	🔴	🟡	🟡
IT Complexity / Impacts	🔴	🔴	🔴	🔴
Inventory & Asset Management	🔴	🔴	🔴	🟡
Metering Impacts	🔴	🔴	🔴	🟢
Field Network Impacts	🔴	🔴	🟢	🟢
BC Hydro Resourcing				
Customer Service	🔴	🔴	🟡	🟢
Operations	🔴	🔴	🟡	🟢
Materials Management	🔴	🔴	🟡	🟢
Revenue Metering	🔴	🔴	🟡	🟢
Metering Operations	🔴	🔴	🟡	🟢
Distribution Design	🔴	🔴	🟡	🟡
Business Transformation Complexity / Impacts	🔴	🔴	🟡	🟡
Change Management Impacts	🔴	🔴	🟡	🟡
Implementation Timeline	🔴	🔴	🟡	🟡

Legend	
Low Impact	🟢
Medium Impact	🟡
High Impact	🔴

[3] Appendix A, page 24, Table 4.

A Suite Metering Solution that uses BC Hydro's Itron IPv6 mesh network was determined to be impractical because Itron does not currently have a suite metering solution and because BC Hydro's current Itron head-end system does not support Distribution Automation gateway data. This means that a complicated and expensive technology solution would be required to enable this alternative.[4]

JTS also interviewed several MURB developers and industry representatives and found that:

> "In general, the sentiment shared by MURB developers is that they would prefer for BC Hydro, versus the MURB developer (or a third-party submetering vendor), to manage the metering, billing and revenue collection of electricity for the residents in MURBs."[5]

JTS concluded by stating:

> "BC Hydro should conduct a structured decision-making process to assess the options and suite metering solutions alternatives for metering units in new MURBs. A Request for Information (RFI) and/or a Request for Proposals (RFP) may be necessary to provide critical data to support the analysis."

2.2 Suite Metering Analysis – Alternative Metering Solutions for Multi-Unit Residential Buildings

The Suite Metering Analysis – Alternative Metering Solutions for Multi-Unit Residential Buildings conducted the recommended structured decision-making process for alternative metering solutions for both new MURBs and for retrofitting existing bulk metered MURBs.[6]

JTS estimated that the approximate cost to implement an alternative metering solution for new MURBs would be $2.2 million to $8.6 million with an expected cost of 4.3 million based on AACE Class 5 estimate (+100% / -50%). The project duration would be two to three years depending on the final requirements, project scope, procurement timeline and vendor timeline. Table 2 below provides a high-level breakdown of these estimated implementation costs.

4 *Ibid*, page 25.

5 *Ibid*, page 28.

6 Appendix B, page 7.

Table 2 Suite Metering Implementation Project Cost Estimate[7]

Area	$ (k)
Technical Development & Testing	1,823
Business Analysis and Process Design	583
Business SMEs	452
Project Management	339
Technical Design (includes Architecture)	359
Vendor Integration	100
Change Management	88
Sub-Total	**3,745**
Contingency	562
TOTAL, unloaded[19]	**4,306**
Cost Estimate Range (+100% / -50%)	*2,153 – 8,613*

In addition to one time implementation costs, there would also be annual sustainment costs. Table 3 below provides a summary.

7 Appendix B, page 40, Table 4.

Table 3 Annual Sustainment Costs Summary[8]

Business Group	Full Time Equivalent Resources	$	Cost Range / Notes
Revenue Metering	0.5 – 1.0		
SMNO	0.5 – 1.0		
Vendor Management	0.5 – 1.0		
Customer Field Metering	TBD	TBD	Estimate 1 hours of resource time for each the manual disconnect and the reconnect.
Others	TBD	TBD	
Technology		80,000	
TOTAL	**1.5 – 3+**	**80,000+**	

Other	Annual Fee per Suite	Notes
Vendor Network Fee	$10 – 20+	These values would need to be confirmed as part of a formal procurement process.

Customer Field Metering and Total Vendor Network Fees depend on the number of suites. Based on an estimate of 4.5% of suites being disconnected each year and taking one hour at a standard labour rate of $56 / hour, the total Customer Field Metering cost could range from approximately $2,758 to $172,350. The Total Vendor Network Fees could range from $12,000 to $922,350, assuming a fee per suite of $15.[9]

There would also be installation labour and materials costs. These costs would vary depending on the total number of suites where the alternative metering solution is installed. Table 4 below provides a summary.

8 Appendix B, pages 42 to 43, Table 5.

9 Appendix B, page 45, Table 8.

Table 4 Installation Costs Summary[10]

	Estimated Incremental Cost relative to socket meters[23]	Number of Suites				
		800	5,000	10,000	25,000	50,000
Installation Labour	$200	160,000	1,000,000	2,000,000	5,000,000	10,000,000
Materials	$50	40,000	250,000	500,000	1,250,000	2,500,000
Total, $		**200,000**	**1,250,000**	**2,500,000**	**6,250,000**	**12,500,000**

JTS considered these costs and concluded:

> "As previously noted, there are only approximately 800 new units each year that are in buildings that bulk meter so a relatively small number of MURB Developers would be impacted by now needing to install meter bases for BC Hydro's socket-based meters. Furthermore, the costs and impacts on BC Hydro to execute a project to implement, operationalize, and provide ongoing support of an alternative suite metering solution outweigh the limited benefits."[11]

Overall, JTS concluded:

> "The primary benefits of offering an alternative metering solution are for MURB Developers and MURB residents that could become BC Hydro customers should a technical option for retrofitting existing master metered MURBs be introduced. However, the analyses of both questions identified significant financial and operational challenges associated with implementing, operationalizing and supporting an alternative metering solution. Moreover, it would introduce future challenges that would impact the customer and technology strategies and roadmaps. Therefore, one could conclude that BC Hydro should continue to require new MURBs units to be individually metered and that it shouldn't offer an alternative metering solution for use in retrofitting existing bulk metered MURBs. However, as part of its SMI 2.0 strategy it could explore the viability of alternative metering devices that would be interoperable with the future SMI 2.0 solution."[12]

10 Appendix B, page 44, Table 7.

11 Appendix B, page 25.

12 Appendix B, page 5.

3 BC Hydro's Considerations and Conclusions

BC Hydro has reviewed JTS' findings and agrees with their conclusions.

Specifically, with regard to cost, BC Hydro used the analysis provided by JTS to consider the per suite cost of a non-socket-based suite metering solution. Table 5 below provides the calculation of the per suite costs assuming 10,000 total suites.

Table 5 Incremental Costs per Suite to Provide Alternative Suite Metering Solution

Cost Item	Average Cost per Suite
One-Time Costs	
Implementation Project	$431 ($4,306,000 project cost / 10,000)
Incremental One Time Costs	$250 ($200 installation labour + $50 materials)
Total One-Time Costs	$681
Ongoing Annual Costs	
Sustainment Costs[13]	$53 (($450,000 + $80,000) / 10,000)
Network Costs	$15
Manual Disconnect and Reconnect Costs	$3 $34,470 / 10,000
Total Ongoing Annual Costs	$71

For new MURBs, developers are the primary beneficiaries of an alternative metering solution for residential suites as they could benefit from potentially lower costs and space requirements relative to the existing BC Hydro socket-based metering solution.

For existing master metered MURBs, the residential end-users would be the primary beneficiaries since they would receive service directly from BC Hydro and have access to rate options, energy efficiency programs and assistance programs.

BC Hydro considers that a one-time implementation cost of $681 per suite and total ongoing annual costs of $71 per suite are likely to outweigh these benefits. Accordingly, we do not have plans to further pursue alternative non-socket-based metering solutions at this time.

[13] Estimated based on the FTE (assuming annual standard labour rate of approximately $150,000 X 3 FTEs) and technology costs provided in Table 3 above.

BC Hydro's current SMI will reach the end of its design life in five to ten years. We will consider opportunities to retrofit existing master metered buildings as part of our future SMI 2.0 solution so that these customers may be able to receive service directly from BC Hydro and have access to rate options, energy efficiency programs and assistance programs.

Future residents of new MURBs will receive these benefits since the BCUC approved BC Hydro's proposal to remove the master-metering option for multi-unit residential properties in Section 4.4 of its Electric Tariff.

For further information, please contact Shiau-Ching Chou at bchydroregulatorygroup@bchydro.com.

Yours sincerely,

Chris Sandve
Chief Regulatory Officer

cc/ma

Enclosure

Suite Metering Analysis

Preliminary Assessment Report

jts UTILITY CONSULTING

June 2024

SMP1.1.0

Disclaimer

The information contained in this preliminary assessment report ("Report") is provided for informational purposes only and is not intended as legal, financial, or professional advice. This Report is based on data and information available to JTS Consulting Inc. ("JTS") at the time of its preparation. The findings and recommendations in this Report are the result of our professional analysis and are intended to assist the client in making informed decisions.

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1.0 Executive Summary

Driven by a mission to provide safe, reliable, affordable, and clean electricity, BC Hydro is exploring options to establish direct relationships with every resident in new Multi-Unit Residential Buildings (MURBs). Today, MURB developers can choose between installing individual socket-based meters for each unit or a single bulk meter for multiple units. Each year there are approximately 800 new units in MURBs that are not individually metered. For a resident to be a BC Hydro customer – enabling access to BC Hydro rates, programs and incentives – their unit needs to be individually metered. Issues related to bulk metering in MURBs has resulted in numerous complaints to the British Columbia Utilities Commission (BCUC). To address this, BC Hydro is proposing amendments to the Electric Tariff to mandate individual metering for each new MURB unit.

This report assesses Suite Metering Solutions, as an alternative to socket-based meters, to individually meter units in new MURBs. Suite Metering Solutions are comprised of a different type of metering device, require a communications network and head-end system to transmit energy data to a Meter Data Management System (MDMS). A preliminary assessment using core business (e.g., customer experience, impacts on BC Hydro's resources, Business Transformation Complexities, Change Management impacts) and technology considerations (e.g., complexities and impacts) identified three technically viable and practical suite metering solution alternatives:

- Suite Metering Solution that uses its own network
- Suite Metering Solution where the vendor provides the network-as-a-service
- Suite Metering Solution where the vendor provides a solution-as-a-service

Should BC Hydro seek to make every resident in new MURBs a BC Hydro customer, there are technically viable options to do so. This could be achieved by either mandating socket-based meters or implementing a suite metering solution. The analysis also highlighted that the implementation of a suite metering solution would neither be trivial nor inexpensive. While identified as technically viable, these three solutions would require foundational technology changes to support the introduction of a new type of meter. For example, the creation of the master data structure and records in SAP, giving the means to associate each metering device with a given MURB unit and customer as well as for the ingestion and processing of the metering data in BC Hydro's MDMS.

To proceed further, BC Hydro's next step should be to conduct a structured decision-making (SDM) process to further assess the options and suite metering solution alternatives for metering units in new MRUBs. This would be where requirements, costs, timelines and business impacts would be further assessed and validated. Thereby, enabling the identification of a leading approach for metering every unit in new MURBs.

2.0 Context

Scope

This report captures key considerations relating to a suite metering solution and includes a preliminary analysis of the information technology and overall system architecture in support of several potential business models.

This report is not a comprehensive analysis and does not aim to recommend whether BC Hydro should invest in a suite metering solution, nor does it recommend which alternative may be best suited for BC Hydro. Rather, this report provides considerations that may be incorporated into subsequent analysis. A next phase should include a structured decision-making (SDM) evaluation to ascertain a recommendation for metering residential MURB units (that would otherwise be bulk metered). Detailed regulatory considerations, which are essential for the decision-making process, are also out of scope for this report.

Methodology

To conduct the analysis to support this report, interviews were held with key BC Hydro stakeholders from key areas including Customer Service, Revenue Metering, Regulatory, and Technology, as well as MURB developers, industry representatives, and other Canadian utilities. Additionally, internet research was conducted on suite metering vendors, technology considerations, and other utilities that provide suite metering services. Insights from this research were used to support the analysis throughout the report.

3.0 Introduction

With a mission to safely provide customers with reliable, affordable, clean electricity[1], BC Hydro is exploring options to establish a direct relationship with residents in newly constructed Multi-Unit Residential Building (MURB). Many MURB residents do not currently have a BC Hydro meter, so they are not a BC Hydro customer and do not have the access to BC Hydro's rate choices, participate in energy efficiency and incentive programs.

Current Metering Practices and Challenges

MURB developers currently have the option to install individual socket-based meters for each unit or a single bulk meter to measure consumption for multiple units. According to BC Hydro data, approximately 800 new MURB units were constructed where the units are not individually metered[2]. Residents in these units are not BC Hydro customers, thus they cannot benefit from BC Hydro's energy rates, services (such as access to the energy visualization portal and self-serve functionality on bchydro.com), programs, and incentives. This situation has resulted in numerous complaints to the British Columbia Utilities Commission (BCUC). To address this, BC Hydro is proposing amendments to the Electric Tariff to mandate individual metering for each new MURB unit.

To better serve MURB residents, BC Hydro believes it would be advantageous to amend the Electric Tariff to mandate that each unit in new MURBs be individually metered. Therefore, BC Hydro seeks to understand the viability of implementing an alternative means of metering individual units in MURBs, aside from the current socket-based smart meters.

Proposed Modifications and Regulatory Considerations

A significant driver for this report is the proposed modification in the 2024 Rate Design Application filing, which suggests amending Section 4.4.1 of the Electric Tariff to require individual metering for every dwelling unit. This proposed change does not specify the method of metering each dwelling unit (BC Hydro, 2024). BC Hydro aims to confirm that there are technically viable options to enable this requirement.

Additional Metering Options

BC Hydro is investigating methods for metering individual MURB units and assessing the viability of the options. One new option is the implementation of a suite metering solution, which includes a different type of metering device to measure energy consumption and a network to transmit the data to a head-end system and BC Hydro's Meter Data Management System (MDMS)[3].

[1] https://www.bchydro.com/toolbar/about.html
[2] Out of approximately 37,000 new MURB units
[3] A noted requirement is that the meter data shall be ingested by the MDMS so that it can be efficiently used for billing and presentment on BC Hydro's energy visualization portal.

4.0 Background

4.1 Types of Multi-Unit Residential Buildings (MURBs)

Within BC Hydro's service area MURBs generally fall within one of two categories:

(1) those where the **units are sold to the public**; and

(2) those which are intended to be **Income Producing Properties**, meaning that they are Rental Buildings, for the MURB developer or another property rental business.

4.2 How are Units in MURBs Metered?

Based on the current Electric Tariff, MURB developers have two options for metering MURBs. They can either (1) have units individually metered by a socket based smart meter or (2) have a single master meter to measure the energy consumption for multiple units (Bulk Metering). Figure 1 below illustrates these two options.

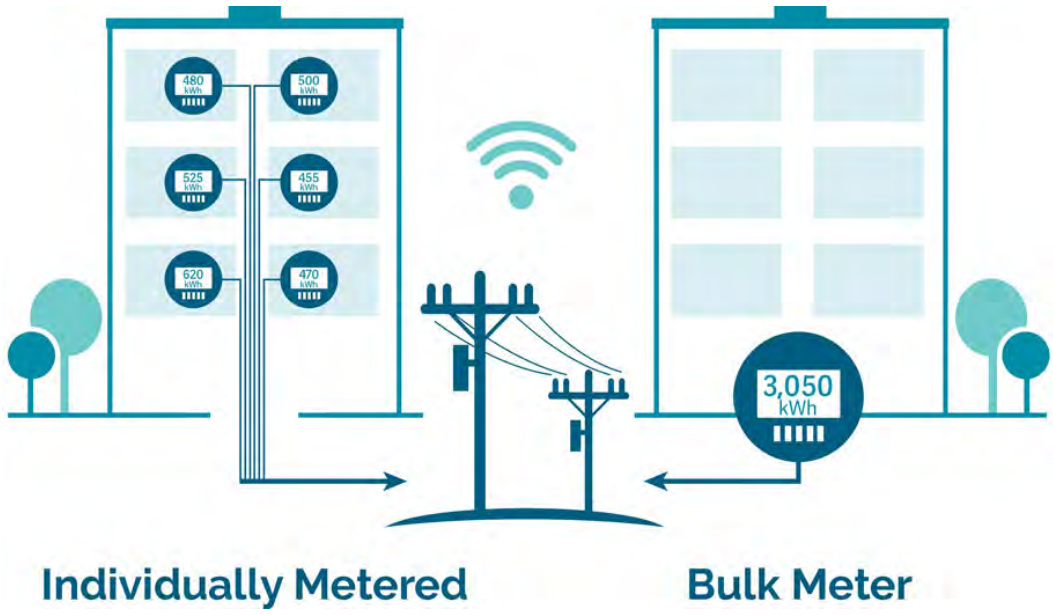

Figure 1 - Illustration of Socket-based vs. Bulk Metering in a Multi-Unit Residential Building

Units in developments that are sold to the public are individually metered. Whereas units in Income Producing Properties are either individually metered or bulk metered. One explanation for bulk metering in rental buildings is that it enables the MURB developers to save space that would otherwise be used for metering rooms and provide more flexibility for floor plan designs. Another contributing explanation is that it is cheaper and simpler for the MURB developers to construct. In some buildings where the units are not individually

metered (with a BC Hydro meter), MURB developers retain third-party submetering vendors to measure electricity consumption and bill residents for their usage.[4] Note that these residents are not BC Hydro customers.

4.3 MURB Bulk Metering Disadvantages

One of the primary disadvantages – for residents – with bulk metering in MURBs is that the residents are not BC Hydro customers. Residents may pay for electricity usage as part of their rent payments, or it may be charged to the residents separately. If the latter, then the charge may be based on a unit's allocation (based on square-feet), or actual consumption if measured through a non-BC Hydro meter. Table 1 below outlines some of the disadvantages with Bulk Metering in MURBs.

Table 1 - Disadvantages with Bulk Metering MURBs & not individually metering suites

Electricity is included in cost of rent	Electricity costs are charged on a cost allocation basis	Electricity costs are charged based on actual consumption measured through sub-meters
• Residents are NOT BC Hydro customers and therefore, are not eligible for BC Hydro's rates, programs, incentives, or rebates.		
• Residents are not charged for their actual usage and may be paying for more than their share. • Limited motivation for conservation.		• Rates charged to the resident may be higher than BC Hydro's rates.

These disadvantages have led to residents filing complaints with the BCUC, Regulatory Interveners and BC Hydro. It is important to note that because these residents are not BC Hydro customers, BC Hydro is unable to support them in resolving their concerns. Furthermore, because they are not BC Hydro customers, they also do not have access to BC Hydro rate options (e.g. volunteer time of use), programs and incentives.

A visual comparison of a BC Hydro customer versus a non-BC Hydro customer is outlined in Table 2 below.

[4] Note that some submetering vendors also measure consumption and bill for other utility usage (e.g., gas, water, heating, etc.)

Table 2 - Comparison of BC Hydro v Non-BC Hydro Customers

Capability	BC Hydro Customer	Bulk Metering or 3rd Party Sub-Metered (non-BC Hydro Customer)
Resident can select optional rates (e.g. voluntary time of use rates)	☑	✕
Resident receives a BC Hydro Electricity Bill	☑	✕
Resident has access to BC Hydro's Energy Visualization Portal	☑	✕
Resident has access to www.bchydro.com self-service functions	☑	✕
Ability to be remotely disconnect/reconnect service	☑ SMI socket meter ✕ suite metering solution*	✕
Customer access to submit online Move-in / Move-out requests	☑	?
Resident has access to BC Hydro programs, incentives & rebates	☑	✕
Resident receives reliable BC Hydro customer service and support	☑	✕

* BC Hydro stakeholders acknowledge that disconnects/reconnects will need to be manually performed.

4.4 Opportunity

To better serve residents in Multi-Unit Residential Buildings (MURBs), particularly those whose electricity consumption is not individually metered by BC Hydro, the company is exploring alternative metering solutions. This initiative aims to allow residents to become BC Hydro customers, providing them with significant benefits, including access to BC Hydro's rates, programs, incentives, and rebates.

One potential solution is a Suite Metering Solution, which would involve the use of a different type of metering device. This solution could complement BC Hydro's current socket-based metering system for MURBs.

4.5 Suite Metering

This section highlights the key elements of a suite metering solution and how it differs from traditional socket-based submetering.

A suite metering solution uses current transformers (CTs) attached around the electric wire(s) servicing individual suites or units within a MURB to measure electricity consumption. Each suite meter device can measure multiple CTs, therefore each suite meter device can measure electricity consumption for multiple MURB units, unlike typical socket-based meters which are one to one (meter to unit). Similar to advanced metering infrastructure (AMI) socket meters, suite meters communicate[5] energy consumption data to a central data collector or head-end system, and a meter data management system (MDMS) may be employed to manage customer billing and energy visualization portals.

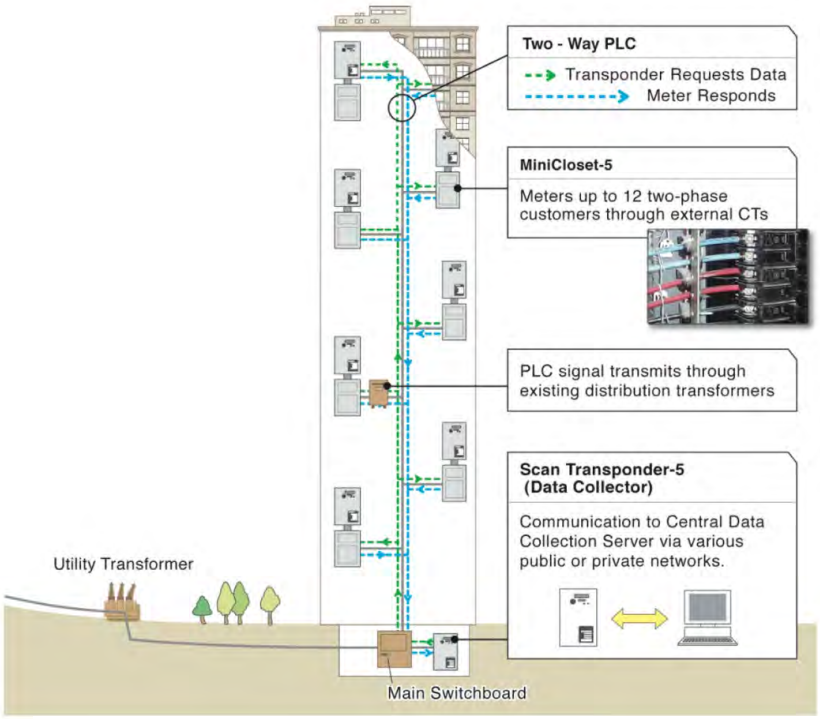

Figure 2 – Typical Suite Metering Solution Configuration

Figure 2 above illustrates a representative suite metering solution configuration where each floor of a MURB houses a suite meter that is capable of measuring up to 24 single-phase, 12 two-phase, or 8 three-phase units by attaching CTs to the wire servicing each unit. The devices communicate with a central data collector unit that is optionally equipped with a communications module to interface with a central collection or head-end system.

[5] Multiple network options exist to manage communications (e.g., cellular or mesh).

Figure 3 below illustrates the difference in space required for a suite meter versus standard socket-based meters.

Suite Metering **Socket Metering**

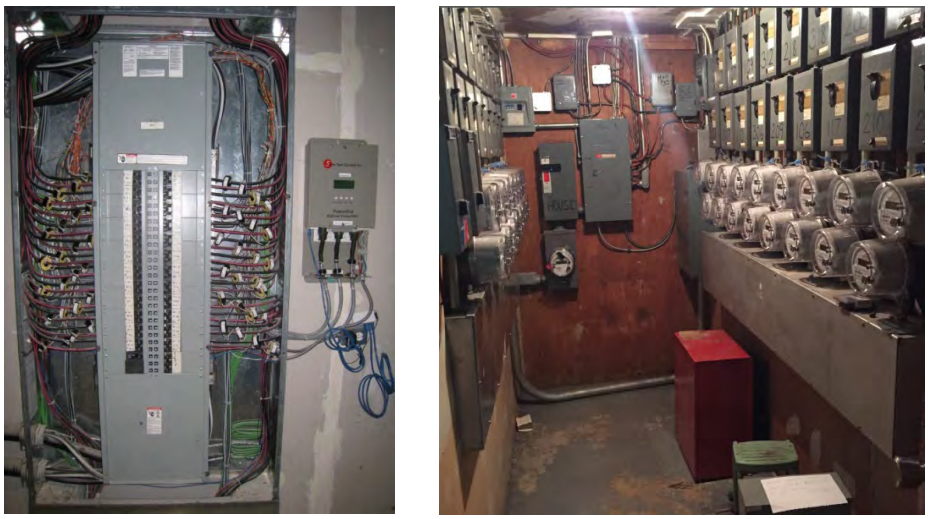

Figure 3 – Comparison of a Meter Room with a Suite Metering Device and Socket Meters[6]

Technically a suite metering solution that BC Hydro is considering is the same as a submetering system that MURB developers use to individually meter a suite. The systems use the same measurement devices and communicate the electrical consumption data to a head-end system. However, the main difference between suite metering and sub-metering is the electrical configuration of the metering devices. Sub-metering is where there is an upstream BC Hydro meter. Whereas Suite Metering there is not a meter (for billing) between the suite and BC Hydro's distribution system. However, there may be an informational meter in place to verify consumption within the MURB.

[6] Pictures provided by BC Hydro

5.0 Suite Metering Alternatives

The investigation and analysis undertaken for this report identified that there are two primary options for metering individual units in a MURB.

Option 1 – **Socket Based Meters** (BC Hydro's Existing Metering Solution); or
Option 2 – **Suite Metering Solution**

This section will focus on describing the potential models ("**Alternatives**") for BC Hydro to support Option 2 –Suite Metering Solution. These alternatives are differentiated by (i) who owns the metering device, and (ii) who owns and operates the metering network.

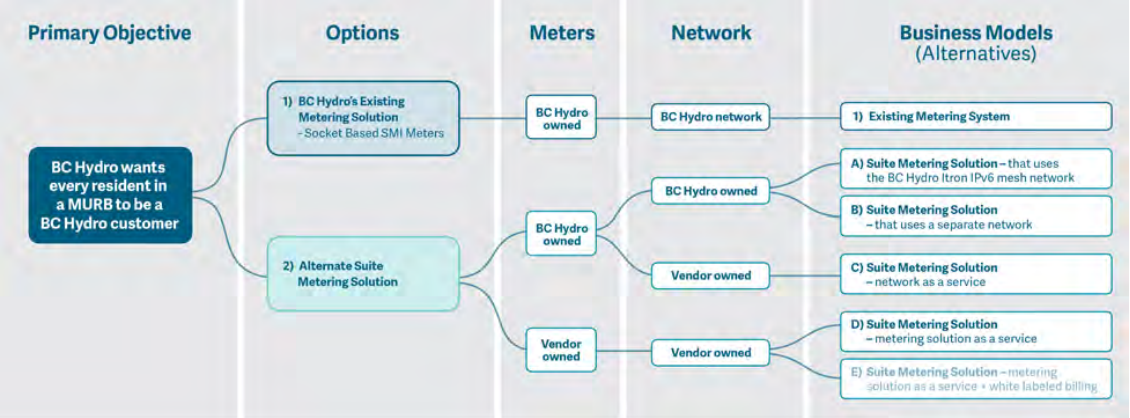

Figure 4 - Mapping of the Potential Suite Metering Alternatives for BC Hydro

As outlined in the prior section a suite-metering solution is comprised of the following components: measurement device, means to communicate with head-end, a head-end system and for BC Hydro a means to transfer metering / consumption data to BC Hydro's meter data management system.

Figure 4 above, illustrates the differences in the five identified alternatives for Option 2 – Alternate Suite Metering Solutions, specifically with respect to the ownership of the meters and network.

The four alternatives[7] for Option 2 – Alternate Suite Metering Solutions are:

A) Suite Metering Solution that uses the BC Hydro Itron IPv6 mesh network
B) Suite Metering Solution that uses a new separate network
C) Suite Metering Solution where the vendor provides the network as a service
D) Suite Metering Solution where the vendor provides the metering solution as a service

Table 3 below describes the 4 technically viable suite metering solution alternatives.

Table 3 - Suite Metering Alternatives

Suite Metering Solution Alternative	Description
A) Suite Metering Solution that uses the **BC Hydro Itron IPv6 mesh network**	For this alternative, the suite metering devices would be owned and maintained BC Hydro. The devices would communicate to its own head-end system via BC Hydro's Itron IPv6 mesh network. The communications for the metering devices would be managed in the same way as BC Hydro's current Itron smart meters.
B) Suite Metering Solution that uses a **new separate network**	This alternative is like (A), except the metering devices would communicate on a separate network which BC Hydro would need to operate and maintain.
C) Suite Metering Solution where the vendor provides the **network as a service**	For this alternative, BC Hydro would own the metering devices; however, the vendor would be responsible for operating and maintaining the communications network, the head end system and would also be responsible for making the data available for ingestion into BC Hydro's meter data management system.
D) Suite Metering Solution where the vendor provides the **metering solution as a service**	For this alternative, the suite metering solution vendor would own, operate, and maintain the metering devices and communications network. They would inform BC Hydro as to where the metering devices are installed and be responsible for providing the applicable metering data for ingestion into BC Hydro's meter data management system.

[7] A fifth alternative, metering solution as a service + white labeled billing was identified but determined to not be viable because it does not meet the customer service requirements. Therefore, it will not be discussed further in this report.

For all the above suite metering alternatives, it is expected that the meter data will be provided to BC Hydro's Meter Data Management System (MDMS) where it can be processed and used for billing and presentment on the customer portal (that is accessible on BC Hydro's website).

Based on a preliminary market scan, there are multiple vendors who could support these alternatives. To further confirm the suitability of the specific vendor's solution, an appropriate procurement process, e.g., a Request for Information (RFI) and/or a Request for Proposals (RFP) would need to be undertaken. Appendix I – Suite Metering Vendor Update contains a table listing some vendors and some information about them.

6.0 Technology Environment

Regardless of which alternative BC Hydro considers for suite metering, there are common impacts to systems and processes. The approach taken to understand these impacts is to review the current processes and systems with an overlay of suite metering.

6.1 Current Meter Lifecycle

The current Meter Lifecycle Process below illustrates the full process from request (how meters are ordered) through to their installation.

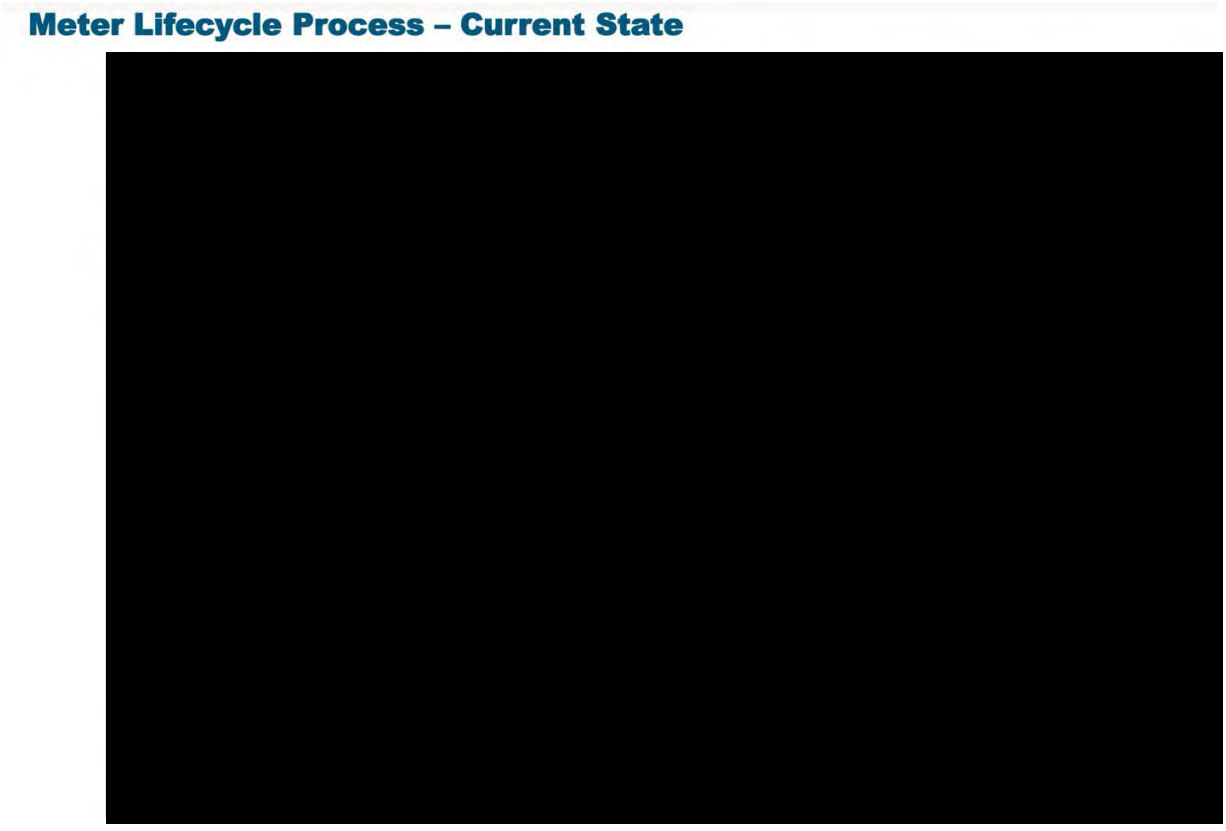

Figure 5 – Current State Illustration of the Meter Lifecycle Process[8]

[8] Graphic provided by ([redacted])

6.2 Suite Metering System and Process Overlay

Figure 6 – Incorporation of the Suite Metering Solution into BC Hydro's Existing IT infrastructure[9]

The numbered steps illustrate the high-level order in which the suite meters are ordered, inventoried, Quality Assured and installed, these steps are as follows:

1. Suite metering system is required for developer project(s)
2. SAP MDG requires meter hardware configuration to be in place prior to any procurement process is initiated
3. Purchase request is issued to suite metering vendor
4. Vendor fulfills the order and sends the Advance Ship Notification (ASN) file for the meters to BC Hydro
5. The ASN file is processed, and meters are added to inventory in SAP
6. The meters are QA'ed by the meter shop
7. The meters are physically placed in inventory
8. Meters are moved to field stores for customer installation as required
9. A work order is generated for meter installs
10. The work order is scheduled
11. The scheduled work order is downloaded to ServiceLink for dispatch and installation
12. The meters are installed, and corresponding work order information is updated.

[9] Graphic provided by ([redacted])

6.3 Current Meter Data Flow

Additionally, Figure 7 illustrates the data flow from the current BC Hydro SMI meters into the Itron IEE MDMS, with the red box specifically indicating how meter data flows into the Itron MDMS.

Figure 7 – Current State Customer Service Data Flow[10]

6.4 Suite Metering Meter Data Overlay

To minimize the complexity, cost, and implementation timelines, one approach is to load data into the Itron MDMS in the same CRF XML format as the current smart meters.

Figure 8 - Incorporation of a Suite Metering Solution into the Customer Service Technology Flow[11]

Irrespective of the suite metering solution selected, the energy data should be made available to the BC Hydro MDMS. This interface would require orchestration to have the systems extract, transform, and load meter data. Additionally, the MDMS will need to be configured to manage the energy data through validation, estimation & editing (VEE), prior to sending the data to SAP for billing.

[11] Graphic provided by ( )

6.5 Additional Technology and Architecture Considerations

To conduct this analysis, interviews were conducted with stakeholders from BC Hydro's Technology organization, specifically from Smart Metering Operations, SAP support, Enterprise Architecture as well as from Revenue Metering. They identified several key initiatives that could impact the introduction of suite metering solution.

The initiatives include the following:

- SAP upgrade timeline from current ECC 6.0 to S4 HANA RISE on Cloud in ~2025.
- SMI 2.0 in 2031 with technology assessments beginning in ~ 2026.
- As part of SMI 2.0, there are likely going to be changes to the meter data processing with SAP and ITRON IEE MDMS in ~2031 leveraging the capabilities of cloud application architecture.
- There is currently an analysis being conducted to identify any potential changes to the existing SAP and ITRON architecture that could occur before SMI 2.0 (between 2025-2031) but the feasibility of those changes has not yet been determined at the time of writing of this document.

Potential impacts the introduction of suite metering solution include:

- Suite metering as an interim solution if SMI 2.0 includes suite metering capabilities.
- Suite metering solution implementation timelines conflicting with SAP upgrades.
- Suite metering data integration rework with changes to SAP and Itron IEE MDMS data flows.
- Freezes to SAP changes preventing any suite metering solution integration.

7.0 Alternatives Analysis

7.1 Business Considerations

To assess the suite metering solution alternatives more comprehensively, a structured decision-making (SDM) process should be completed (out of scope for this report). To support the SDM process, this report outlines some of the important factors that BC Hydro should consider.

These factors include, but are not limited to:

- Impacts on MURB residents. This is an assessment from the resident's perspective of being a BC Hydro customer.
- Impacts on MURB Developers. This considers how MURB Developers would react to the solution noted in each alternative.
- Ownership implications of metering devices and other supporting equipment. Does BC Hydro want and / or need to own the metering devices.
- Business Transformation & Change Management Impacts. This is an assessment of the impacts on the organization to enable and support the changes required as part of the implementation of a suite metering solution. Three of the more impacted processes include:[12]
    - 1.0 Service the Customer
    - 3.0 Manage Assets
    - 4.0 Manage Work – Operations

  There would also be impacts on BC Hydro resourcing and an assessment of the impacts on key business groups would also be important to assess.
- Technical complexities.
    - Data modeling
        - Devices in SAP, MDM, etc.
        - Data in MDM
    - Integration of suite metering solution with BC Hydro's existing systems, including but not limited to, Meter Data Management System and SAP.
    - Implementation timelines and the alignment with other Technology roadmaps items, priorities as well as in-flight and planning projects.
- Ownership of the metering devices. BC Hydro will need to determine if it needs to own the devices to support billing, Measurement Canada compliance and/or to mitigate any reputational issues related to customer disputes.
- Measurement Canada (MC) Certification and re-certification. There are MC certified suite metering solution available. Therefore, the bulk of the impacts would be on resources to manage the program.

[12] The Process Areas and Document Libraries are published on the BC Hydro Process Home Wiki (BC Hydro, 2024)

- Vendor Management. This includes an assessment of the dependency on the vendor to provide important and timely services to support the solution and BC Hydro's customers.
- Costs (OMA, Cloud OMA, Capital)
- Timelines to implement
- Functionality of the solution
    - Dis/Reconnect. Based on discussions with BC Hydro stakeholders it was noted that remote disconnect / reconnection functionality would not be a 'must have' requirement for a suite metering solution

In addition to these that are other bigger picture considerations such as:

- SMI 2.0 timing, scope
- Evolving BC Hydro technology architecture environment.

7.2 Technology Considerations

To minimize the impact and costs to BC Hydro processes and systems, the approach is to treat suite meters as another meter type and then process them in a similar fashion as its current Itron smart meters.

This approach requires:

- The suite meter specifications such as channel specifications, units, multipliers, and unique identifier be entered in SAP Master Data.
- The suite meter vendor must provide an Advance Ship Notification (ASN) in the similar format as other meter manufacturers.
- The ASN file be delivered to BC Hydro as part of meter order and processed.
- The suite meters must be Measurement Canada type approved for billing and be part of any sampling program requirements.
- The suite meters be QA'ed by Revenue Metering group.
- The suite metering components such as Data Collection Unit, Suite Meter and Current Transformers need to be uniquely identified and separately inventoried.
- The MDMS must have processing jobs scheduled to handle the suite meter data.
- The MDMS must have validation, estimation, and editing (VEE) rules defined for suite metering data.
- The suite metering meter read files must be transferred securely from the Head End System (HES) to the MDMS.
- The meter read files must be transformed to the same format as the current meter read files.

7.3 Assessment Summary

To support the initial alternative assessment, a structured framework was developed with the key considerations outlined above and is based upon qualitative data. A summary of the assessment is presented in Table 4 below.

Suite Metering Solution Alternatives

- **A** - Suite Metering Solution that **uses BC Hydro's Itron IPv6 mesh network**
- **B** - Suite Metering Solution that **uses a separate network**
- **C** - Suite Metering Solution where the **vendor provides the network-as-a-service**
- **D** - Suite Metering Solution where the **vendor provides a solution-as-a-service**

Table 4 – Summary of the Preliminary Assessment

Key Considerations	Itron IPv6 Mesh Network Alternative A	Separate Network Alternative B	Network as a Service Alternative C	Solution as a Service Alternative D
Customer Experience	🟢	🟢	🟡	🟡
Developer Experience / Support	🟢	🟢	🟢	🟢
Operating and Maintenance Cost	🔴	🔴	🟡	🔴
Cloud Operating and Maintenance Costs / Capital Cost	🔴	🔴	🟡	🟡
IT Complexity / Impacts	🔴	🔴	🔴	🔴
Inventory & Asset Management	🔴	🔴	🔴	🟡
Metering Impacts	🔴	🔴	🔴	🟢
Field Network Impacts	🔴	🔴	🟢	🟢
BC Hydro Resourcing				
Customer Service	🔴	🔴	🟡	🟢
Operations	🔴	🔴	🟡	🟢
Materials Management	🔴	🔴	🟡	🟢
Revenue Metering	🔴	🔴	🟡	🟢
Metering Operations	🔴	🔴	🟡	🟢
Distribution Design	🔴	🔴	🟡	🟡
Business Transformation Complexity / Impacts	🔴	🔴	🟡	🟡
Change Management Impacts	🔴	🔴	🟡	🟡
Implementation Timeline	🔴	🔴	🟡	🟡

Legend	
Low Impact	🟢
Medium Impact	🟡
High Impact	🔴

7.3.1 Alternative A - Leveraging the BC Hydro Itron IPv6 Mesh Network

While this alternative is theoretically possible, based on the technical complexities and discussions with BC Hydro, at this time this alternative is not practical. Therefore, it will not be discussed further in this report as an alternative.

This alternative aligns with BC Hydro's customer experience requirement.

However, based on discussions with BC Hydro's Revenue Metering team while there have been many conversations with Itron about suite metering, they do not currently have a suite metering solution. However, Itron does support a Distribution Automation (DA) gateway that can leverage the IPv6 mesh network as a transport layer. BC Hydro is not using this technology and has only conducted some small-scale pilots on the DA gateway capabilities. A suite metering solution would require a telecom connection to the DA gateway. Further, BC Hydro's current Itron head-end system does not support DA gateway data, therefore, BC Hydro would need to implement a second head-end and integrate it with its MDMS.

Overall, it would be complicated and expensive to implement a technology solution to enable this alternative.

The main benefit of this solution is that suite metering devices would communicate on BC Hydro's existing Itron IPv6 mesh network; thereby, enabling the existing metering and network operations teams to manage the additional devices via its existing processes and systems.

BC Hydro would be responsible for installing, managing, and maintaining the suite metering devices in each MURB and any additional communications equipment. All meter related operations would also be BC Hydro's responsibility.

7.3.2 Alternative B – A New Separate Network

This alternative also aligns with BC Hydro's customer experience requirements.

By using a new separate network - e.g., cellular or some other proprietary means – to enable the communications the challenges associated with integrating the suite metering solution with BC Hydro's Itron IPv6 mesh network are avoided. However, this alternative would also require BC Hydro to stand up and operate a separate head end system.

BC Hydro would be responsible for installing, managing, and maintaining the suite metering devices in each MURB and any additional communications equipment. All meter related operations would also be BC Hydro's responsibility.

As noted in the Technology Environment section above, all technology processes and system considerations would need to be addressed.

7.3.3 Alternative C – Network as a Service

This alternative also aligns with BC Hydro's customer experience requirements. However, the customer experience for this alternative is noted as amber because of the dependency of working with a third party to resolve potential customer service and technical issues with the suite metering solution.

The IT complexity and challenges, as noted in the Technology Environment section, related to implementing foundational technology changes remain true. However, because the vendor would be responsible for the network portion of the solution, that is getting the data from the suite metering devices to a location where it could be ingested by the MDMS, the resourcing impacts on BC Hydro would be lower compared to Alternatives A & B.

Because BC Hydro is not responsible for the full solution, the Business Transformation and Change Management impacts would also be lower than the first two alternatives.

7.3.4 Alternative D – Metering Solution as a Service

This alternative also aligns with BC Hydro's customer experience requirements. However, like Alternative C, the customer experience for this alternative is noted as amber because of the dependency of working with a third party to resolve potential customer service and technical issues with the suite metering solution.

Also, like the other Alternatives the IT complexity related to the foundational technology changes required to support inventory and asset management and field impacts remain with this alternative.

Because the vendor is responsible for the solution – including the installation and maintenance of the metering devices and the operations of the network, the resourcing, Business Transformation and Change Management impacts are even lower than Alternative C. BC Hydro would obtain the data for ingestion into its MDMS where it would be processed and used like its other smart metering data.

7.4 Cost Considerations

The most significant cost for implementing an alternate suite metering solution will be for the implementation of the foundational technology required to support the solution. Based on interviews with BC Hydro technology stakeholders, appropriate estimates could not be provided at this early juncture. More information about the business requirements, solution, and leading alternative are required to enable them to calculate a reasonable planning estimate.

Based on market research, a review of files provided by BC Hydro and an interview with [redacted], some cost elements were ascertained. For example, [redacted], estimates that their annual maintenance costs for suite metering devices is approximately $6 per suite. The [redacted] report also provided some preliminary cost figures for the suite metering equipment and installation – estimated equipment costs ranging from $900 to $1200 for per unit; and an unknown cost for commissioning the equipment. [redacted] also noted an estimated cost range for $8 to $35 per suite per month, for a solution aligning with Alternative E – Suite Metering solution as a service + white labeled billing. One would therefore expect that Alternatives C & D, suite metering – network as a service or solution as a service would cost less.

Once BC Hydro confirms its requirements the BC Hydro technology group should be able to provide a reasonable planning estimate. In addition, a request for information (RFI) and/or a request for proposals (RFP) would help to provide some important data to support the cost analysis (and other aspects) of the structured decision-making process.

8.0 MURB Developer Insights

The authors conducted interviews with several developers of Multi-Unit Residential Buildings (MURBs) in British Columbia, as well as other industry representatives. MURBs typically fall into one of two categories: (1) Market Developments, where units are sold to the public, and (2) Income Producing Properties (IPPs), which are rental buildings where the developer retains ownership of the units. It was noted that units in Market Developments are generally individually metered. However, units in rental buildings may be individually metered or bulk metered.

In general, the sentiment shared by MURB developers is that they would prefer for BC Hydro, versus the MURB developer (or a third-party submetering vendor), to manage the metering, billing and revenue collection of electricity for the residents in MURBs.

When developers opt for bulk metering for their Income Producing Properties, residents are billed for electricity (and other utilities) in one of three ways: (1) as part of their rent, (2) through allocation of electricity costs on a per square foot basis, or (3) via sub-meters installed by the developers or through a submetering provider to enable billing based on actual electricity consumption.

The table below outlines some of the reasons why developers choose to bulk meter their rental buildings, as well as the challenges this approach presents for them.

(1) Electricity is included in cost of rent

Impacts on Residents	Impacts on MURB Developers
• No motivation to conserve • May be paying more than their actual usage	• Simple to implement • Risk of under-collecting utility costs

(2) Electricity costs are charged on a cost allocation basis

Impacts on Residents	Impacts on MURB Developers
• No motivation to conserve • May be paying more than their actual usage	• Administrative effort to invoice residents, collect payment and manage arrears.

(3) Electricity costs are charged based on actual consumption measured through sub-meters that are installed / managed by developer, building association and/or a third-party vendor

Impacts on Residents	Impacts on MURB Developers
• Residents are billed for *their* consumption. • Encourages conservation.	• A suite metering solution would be beneficial for developers as it would reduce the amount of space needed for metering resulting in increased planning flexibility and square footage that can be used for by residents / owners – e.g., larger suites, increased number of parking stalls, increased space for storage rooms and bike lockers. This directly translates to decreased costs and increased revenue for the developer.

Note: an electrical room is not only subject to BC Building code requirements but also city building permit requirements which are more stringent. Space is mostly determined by safety and fire related requirements.

The visual below is an example of a MURB electrical room with socket-based meters.

Figure 9 - MURB electrical room with socket-based meters

The development cycle for MURBs is very long (many years).[13] Therefore, it will take some time for MURB developers to adapt to any change in metering requirements.

[13] Some of the development activities include zoning application, development permit application, drawings, demolition of existing infrastructure & Construction of the new MURB (this includes the installation of meter socket / suite metering unit).

9.0 Considerations for Next Steps

BC Hydro's still in a very early stage, pre-initiation phase, of the assessment of a suite metering project.

This report suggests that BC Hydro's next steps, with respect to a suite metering project should be to:

1) **Initiate a structured decision-making process to assess mandating socket-based meters or a new suite metering solution**.

    i. Some of the key factors for consideration, include but are not limited to: cost, technical complexity, and timelines to implement a suite metering solution versus the reputation risk associated with a small, but vocal group of MURB developers who would not want to install the electrical infrastructure required for socket-based metering.

    ii. Conduct workshops with internal stakeholders to confirm business drivers and requirements to develop the SDM framework.

    iii. Complete a structured decision making process to confirm if BC Hydro should continue assessing options for an alternate suite metering solution.
        - Note that this may include conducting a Request for Information (RFI) to learn more about the potential suite metering solutions and how they could meet BC Hydro's requirements

2) Then **if implementing suite metering, BC Hydro should commence the initiation phase of a suite metering project** – based on BC Hydro's ITDSP framework (see Figure 10 below).

    i. Conduct workshops with internal stakeholders to confirm business drivers and requirements to develop the SDM framework.

    ii. Develop a model to forecast demand for an alternate suite metering solution.

    iii. Complete a structured decision making process to confirm the leading suite metering alternative. This may require conducting an RFI to learn more about the potential suite metering solutions and how they could meet BC Hydro's requirements.

    iv. Complete an Identification Phase business case that would include items such as project and future cost modeling, timelines, regulatory considerations, risk assessments, etc.

v. The above points would be completed along the other standard Initiation Phase activities and deliverables as prescribed in BC Hydro's ITDSP Framework and/or PPM practises.

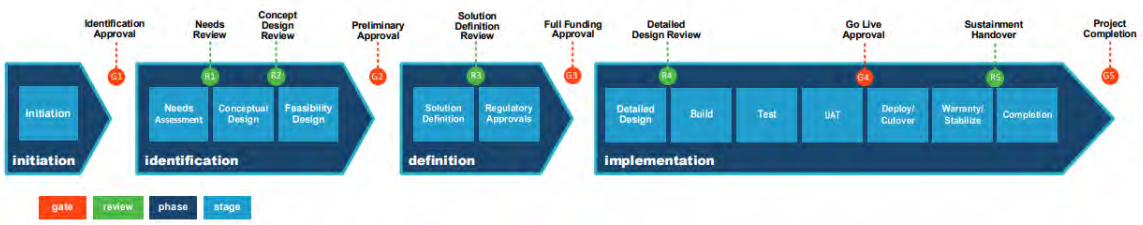

Figure 10 - BC Hydro's ITDSP Framework (BC Hydro, 2024)

Regulatory Considerations

For this report an assessment of the regulatory considerations or processes specifically related to BC Hydro implementing a suite metering solution were not assessed. However, two points that were raised in discussions that are prudent to note in this report are (1) for BC Hydro to assess the cost recovery considerations for developers / buildings who choose a suite metering solution and (2) the MURB development and construction cycle is long, therefore, it would take time for MURB developers to incorporate any metering related changes.

Other Future Considerations

Through the assessment of suite metering several additional future considerations related to suite metering were identified. While the focus for this report was the implementation of a suite metering solution in new constructions, the solution could also be used to retrofit existing unmetered units in MURBs. A suite metering solution could also be used to meter EV charging in MURBs.

There are also questions about the size of the potential suite metering market for BC Hydro. While the current data from BC Hydro notes that there are approximately 800 new unmetered units in MURBs each year, it is foreseeable that, if allowed, MURB Developers who currently have socket-based meters for each unit may elect to have a suite metering solution instead.

There is also an opportunity for BC Hydro to implement a suite metering solution where it could be seen a thought leader in suite metering space.

10.0 Conclusion

In conclusion, should BC Hydro seek to make every resident in new Multi-Unit Residential Building (MURB) a BC Hydro customer there are technically viable means to do so. This could be achieved by either mandating socket-based meters or implementing a suite metering solution. This report has evaluated the feasibility of this objective and raised two fundamental questions: (1) whether to mandate the use of BC Hydro's existing Smart Metering Infrastructure (SMI) socket or (2) to introduce an alternative suite metering solution, and, if the latter, to identify technically viable business models for such a solution.

The preliminary assessment completed for this report identified three technically viable and practical suite metering alternatives for BC Hydro:

- Suite Metering Solution that **uses a separate network**
- Suite Metering Solution where the **vendor provides the network-as-a-service**
- Suite Metering Solution where the **vendor provides a solution-as-a-service**

These alternatives were assessed based on key considerations, such as ensuring suite metering data integrates with BC Hydro's Meter Data Management System (MDMS) and leveraging existing metering processes and technology to minimize operational impacts.

BC Hydro is in the early stages of understanding the necessary context and stakeholder involvement for assessing the options and alternatives and is progressing well towards determining a leading alternative.

The model outlined in Figure 11 provides a framework for assessing its progress with evaluating these alternatives.

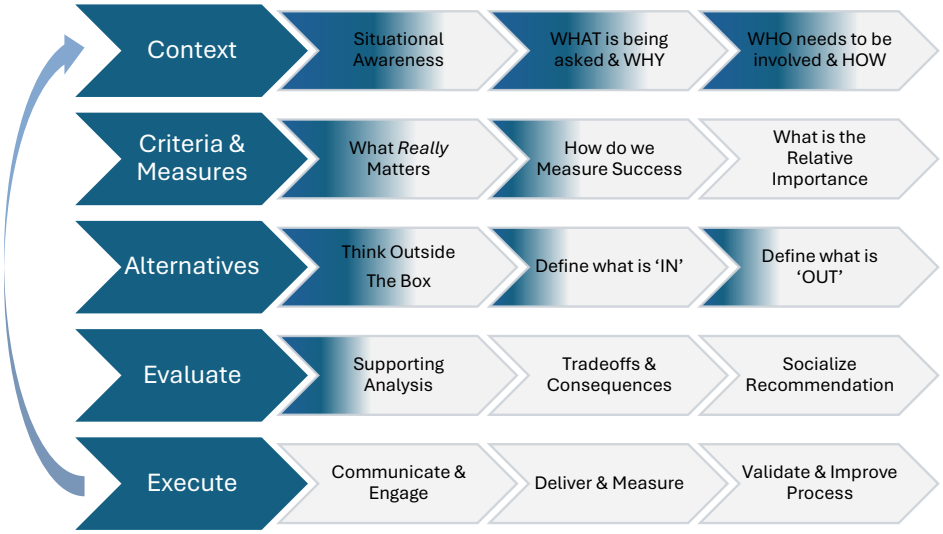

Figure 11 - Informed Decision-Making Process

Recommendation

BC Hydro should conduct a structured decision-making process to assess the options and suite metering solution alternatives for metering units in new MURBs. A Request for Information (RFI) and/or a Request for Proposals (RFP) may be necessary to provide critical data to support the analysis.

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[redacted]

12.0 Appendix I – Suite Metering Vendor Update

Table 5 - Summary of Suite Metering Vendors

13.0 Appendix II - Interview list

Name	Company	Department	Role
[redacted]	BC Hydro	Innovation & Delivery	[redacted]
[redacted]	BC Hydro	Innovation & Delivery	
	BC Hydro	Customer Operations and Experience	
	BC Hydro	Regulatory	
	BC Hydro	Revenue Metering System Management	
	BC Hydro	Revenue Metering System Management	
	BC Hydro	Technology	
	BC Hydro	Technology	
	BC Hydro	Technology	
	BC Hydro	Technology	
	BC Hydro	Technology	
	BC Hydro	Technology	
	BC Hydro	Technology	
	[redacted]		

14.0 Appendix III - About JTS Consulting and the Authors

JTS Consulting: Who we are

JTS Consulting Inc. (JTS) is a Canadian professional services company that was born in the utility sector. We have since broadened our focus on smart infrastructure to encompass the many industries navigating digital and physical infrastructure transformation. From the onset we have done things a bit differently, aiming to enable meaningful change by bringing together experienced professionals who genuinely want to be part of each engagement and have the right tools, attitude and experience to succeed. Importantly, we have always been people-powered, and clients and consultants alike are drawn to our human centric approach to defining and achieving business outcomes while building long-lasting, authentic relationships. JTS' commitment is to provide ongoing value as a trusted partner, and we do so through our high functioning team of respected professionals who bring decades of experience and a unique blend of real-world expertise from the utility, construction, legal and consulting industries.

Today, JTS has a broad suite of consultants with deep expertise actively working on smart infrastructure programs across Canada, together we bring decades of experience integrating with client teams to support a diverse number of programs, projects and initiatives. Marrying technology with urban and rural systems, JTS is at the heart of assessing, planning, delivering and monitoring programs that lead to a safer, more efficient, effective and sustainable world. We also enjoy flexing our management consulting muscles to help organizations navigate their more complex changes, define business outcomes, establish structure, and move the needle in the right direction.

Introducing the Authors

DJ Feinstadt, Senior Consultant
DJ is a highly experienced Business Transformation Advisor, skilled in strategic planning, business solution architecture and project execution, gained from almost two decades working in utilities and biotechnology. Through roles with FortisBC, BC Hydro and the City of New Westminster, DJ has acquired substantial expertise in the electric utility industry, which enables him to identify opportunities for change and innovation, then lead cross-functional teams through the development of achievable implementation plans. He is passionate about applying analytical and process-based methodologies in his work and finding creative solutions to continuously improve business operations for clients.

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Tess Eriksson, Senior Vice President, Service Delivery
Tess is an industry expert with over 20 years of global expertise in program and project delivery and technology implementation, as well as a seasoned, strategic executive with a record of driving operational excellence, leading high-performing teams and having a steadfast commitment to delivering results. Tess brings significant experience in leading high-performing teams and a strong track-record of delivering results. She is known for taking on complex challenges and working with the team to put logical and meaningful solutions in place, with the business objectives firmly in focus.

Suite Metering Analysis:

Alternative Metering Solutions for Multi-Unit Residential Buildings

jts UTILITY CONSULTING

July 2025

SMPS.1.0

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1 Executive Summary

Historically, developers of Multi-Unit Residential Buildings (MURBs) had the option of either installing a single (bulk) meter to measure the building's electrical usage, or to have each residential unit individually metered with BC Hydro's standard socket-based meters. Where the buildings are bulk metered, the residents of the individual units are not BC Hydro customers because they do not have a BC Hydro meter. Therefore, those residents do not have access to BC Hydro's rates, programs and incentives.

The BC Utilities Commission Order No G-42-25, dated February 24, 2025, removes the option for bulk metering MURBs. Thereby, requiring all new MURBs to individually meter each residential unit with a standard BC Hydro socket-based meter.

BC Hydro is aware of the concerns raised from residents about not having access to BC Hydro's rates, programs and incentives. They are also aware of concerns from some MURB developers that alternate metering solutions may be faster to install, less expensive, and take less space. BC Hydro is therefore exploring the feasibility of offering an alternative suite metering solution which it could offer MURB developers. An alternative metering solution could also be used for retrofitting existing bulk metered buildings. This would enable the residents in those buildings to become direct BC Hydro customers.

This report analyzes two key questions related to metering MURBs:

(1) Should BC Hydro provide an alternative metering solution for new MURBs;

and

(2) Should BC Hydro offer an alternative metering solution that could be used for retrofitting existing bulk metered MURBs.

This report includes an analysis of these questions that is based on several key factors that were identified through interviews with BC Hydro experts and stakeholders along with the authors' expertise. The main factors are business and customer strategy, the potential volume and scalability of suite metering devices, business operations, developer experience and engagement, futureproofing and alignment with the SMI 2.0, timelines, regulatory, Smart Meter & Smart Grid regulation, technology strategy, technology roadmap and costs.

The primary benefits of offering an alternative metering solution are for MURB Developers and MURB residents that could become BC Hydro customers should a technical option for retrofitting existing master metered MURBs be introduced. However, the analyses of both questions identified significant financial and operational challenges associated with implementing, operationalizing and supporting an alternative metering solution. Moreover, it would introduce future challenges that would impact the customer and technology strategies and roadmaps. Therefore, one could conclude that BC Hydro should continue to require new MURBs units to be individually metered and that it shouldn't offer an alternative metering solution for use in retrofitting existing bulk metered MURBs. However, as part of its SMI 2.0 strategy it could explore the viability of alternative metering devices that would be interoperable with the future SMI 2.0 solution.

2 Introduction

With a mission to safely provide customers with reliable, affordable, clean electricity[1], BC Hydro is exploring options to establish a direct relationship with residents in *new* Multi-Unit Residential Buildings (MURBs). While most MURB residents are direct customers of BC Hydro, some do not currently have a BC Hydro meter and are therefore not a BC Hydro customer. This means that they do not have access to BC Hydro's rate choices and cannot participate in energy efficiency and incentive programs. Additionally, BC Hydro is also exploring options for *retrofitting existing* MURBs where units are not individually metered.

This section provides an introduction and background to provide context of the opportunity analyzed later in this report. It ensures that the report can be read and understood independently of the information included within the initial Suite Metering Preliminary Assessment report that was completed for BC Hydro in the spring of 2024.[2]

Current Metering Practices and Challenges

MURB developers historically had two metering options: (1) to install individual socket-based meters for each unit in their building; or (2) to install a single bulk meter to measure consumption for multiple residential units. Figure 1 below illustrates these two options.

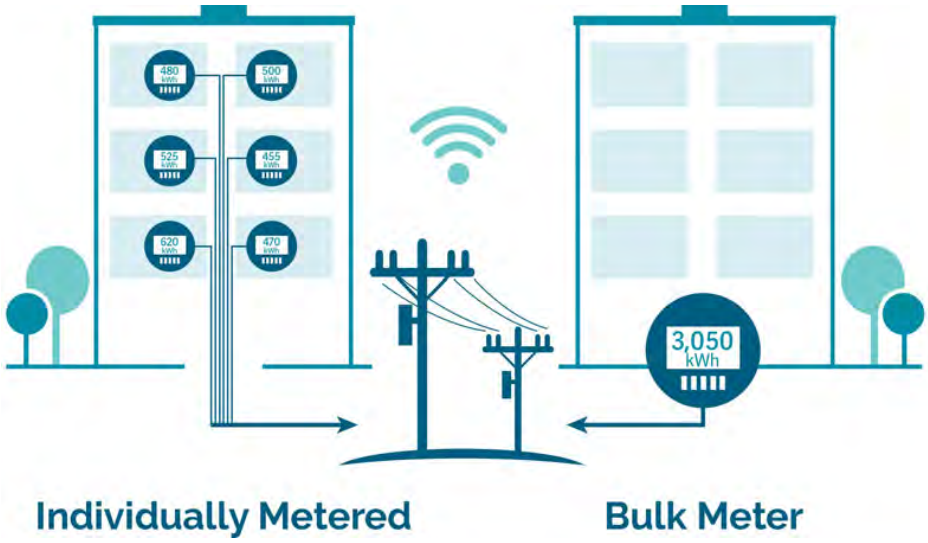

Figure 1 - Illustration of Socket-based vs. Bulk Metering in a Multi-Unit Residential Building

According to data provided by BC Hydro, there were approximately 800 new MURB units constructed each year where the units were not individually metered[3].

[1] (BC Hydro, 2025)
[2] The executive summary from that report is included in **Appendix I - Executive Summary of Phase 1 Report**.
[3] Out of approximately 37,000 new MURB units

Residents in these units are therefore not BC Hydro customers; thus, they cannot benefit from BC Hydro's energy rates, services (such as access to the energy visualization portal and self-serve functionality on bchydro.com), programs, and incentives. This has resulted in complaints to the British Columbia Utilities Commission (BCUC). To address this, in BC Hydro's 2024 Rate Design Application it proposed amendments to the Electric Tariff to mandate individual BC Hydro metering for each new MURB unit. This proposal was approved by the BCUC in February 2025.[4]

In some MURBs that are bulk metered, metering of electricity (and other utilities) for individual units is provided by a third-party sub-metering provider that act as a reseller or public utility, with residents of the building being their direct customers.

Opportunity

This report analyzes two key questions related to metering MURBs. The two questions are:

(1) Should BC Hydro provide an alternative metering solution for new MURBs;

and:

(2) Should BC Hydro offering an alternative metering solution that could be used for retrofitting existing bulk metered MURBs.

The alternative metering system being considered is referred to as a suite metering, or sub-metering. Unlike the standard socket based meters, these solutions leverage different set of metering equipment that incudes current transformers (CT) that are installed around the electrical wire feeding the individual suite from the electrical panel. The CTs are physically connected to a metering unit that transmits the data to a head-end system where the data is processed. The **Suite Metering Solution Overview** section below includes a brief description of a Suite Metering Solution.

To facilitate the analysis, this report outlines the key factors that should be considered when analyzing those two questions. It also includes a detailed analysis of the two questions and finally includes the author's conclusions from the analysis.

[4] (British Columbia Utilities Commission, 2025)

3 Scope and Methodology

This section provides an overview of the scope, methodology and key assumptions used to prepare this report.

Scope

This report builds upon the analysis conducted in the initial Suite Metering Preliminary Assessment report.[5] The initial report captured information about suite metering solutions, business models; and a preliminary analysis of the technology and overall system architecture to support of several potential business models. This report further analyzed the data collected from the first phase by developing an analysis structure and reviewing the findings with select BC Hydro stakeholders.

Key Assumptions

In preparation of this report, several assumptions were made and validated by key stakeholders to hold true at that point in time. If over time any of these assumptions are invalidated, the impacts of the change in assumptions will need to be assessed accordingly.

Numerous assumptions were identified and can be captured in the following themes:

- A suite metering solution for use in new MURBs must be capable of providing data to the applicable BC Hydro systems in the same format as BC Hydro's Itron smart meters.
- There are suite metering vendors available who can and are willing to provide and manage a network and head-end system.
- A suite metering solution must be capable of providing metering events and alarms.
- There would only be a single suite metering solution vendor. This is due to the complexities associated with procuring, integrating and managing multiple vendors and solutions.
- Any privacy and potential cyber security considerations associated with a selected option must be considered and addressed as part of the implementation of the project.
- The Provincial government would be amicable to making any necessary amendment to the Smart Meter and Smart Grid Regulation[6], should such an amendment be necessary.

Methodology

To gather the required data for the analyses, interviews were conducted with key BC Hydro stakeholders who represented various departments across the organization, including Innovation and Delivery, Customer Operations & Analytics, Revenue Metering, Regulatory, Operations, and Technology.[7] Additionally, BC Hydro organized meetings with a few suite metering vendors. The inputs for the analyses were gained from the insights obtained from these interviews, meetings, as well as data provided by BC Hydro, along with the research conducted by the authors and the authors expertise. In addition, meetings, workshops, and joint data analysis were conducted with BC Hydro to complete the analyses in this report.

[5] The executive summary from that report is included in **Appendix I - Executive Summary of Phase 1 Report**.
[6] Smart Meters and Smart Grid Regulation
[7] BC Hydro stakeholders were identified by BC Hydro.

4 Suite Metering Solution Overview

This section highlights the key elements of a suite metering solution and how it differs from traditional socket-based submetering.

A suite metering solution uses current transformers (CTs) attached around the electric wire(s) servicing individual suites or units within a MURB to measure electricity consumption. Each suite meter device can measure multiple CTs, therefore each suite meter device can measure electricity consumption for multiple MURB units, unlike typical socket-based meters which are one to one (meter to unit). Similar to advanced metering infrastructure (AMI) socket meters, suite meters communicate[8] energy consumption data to a central data collector or head-end system, and a meter data management system (MDMS) may be employed to manage customer billing and energy visualization portals.

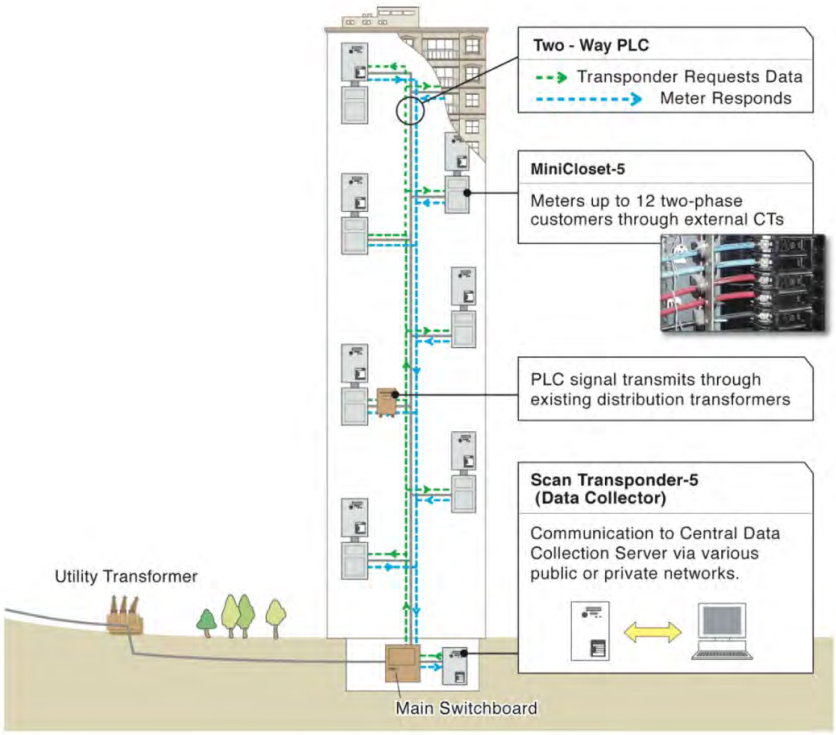

Figure 2 - Typical Suite Metering Solution Configuration

Figure 2 above illustrates a representative suite metering solution configuration where each floor of a MURB houses a suite meter that can measure up to 24 single-phase, 12 two-phase, or 8 three-phase units by attaching CTs to the wire servicing each unit. The devices communicate with a central

[8] Multiple network options exist to manage communications (e.g., cellular).

data collector unit that is optionally equipped with a communications module to interface with a central collection or head-end system.

Due to the technical design of a suite metering device, which use ferrite cores – that are around the wires – to inductively measure electricity consumption there is not a physical means to interrupt the flow of electrons. Therefore, to disconnect the power to an individual suite, the breaker on the panel that feeds the customer's service needs to be manually opened.

Figure 3 below illustrates the difference in space required for a suite meter versus standard socket-based meters. While a suite metering solution physically takes up less space, various factors such as building codes may limit any actual space savings.

Suite Metering **Socket Metering**

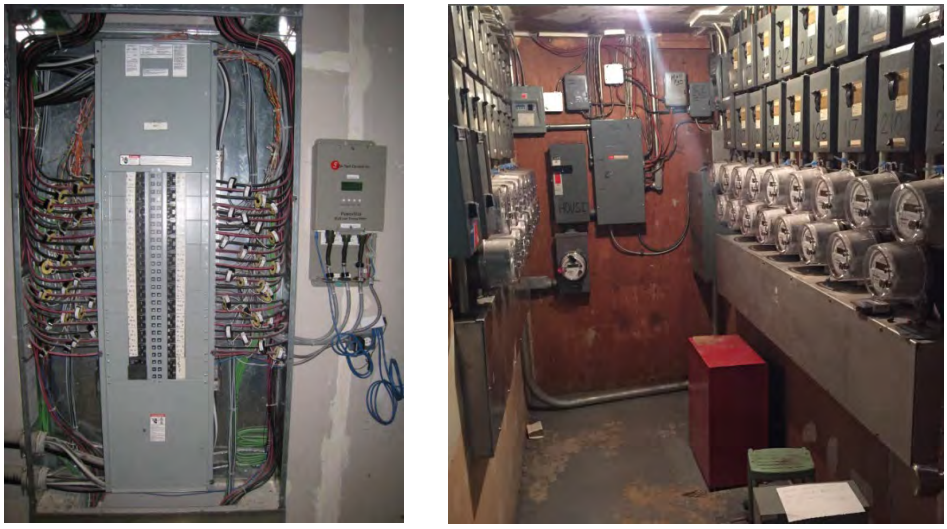

Figure 3 - Comparison of a Meter Room with a Suite Metering Device and Socket Meters[9]

Technically a suite metering solution that BC Hydro is considering is the same submetering system that MURB developers use to individually meter suites. The systems use the same measurement devices and communication to send the electrical consumption data to a head-end system. However, the main difference between suite metering and sub-metering is the electrical configuration of the metering devices. Sub-metering is where there is an upstream BC Hydro meter. Whereas Suite Metering there is not a meter (for billing) between the suite and BC Hydro's distribution system. However, there may be an informational meter in place to verify consumption within the MURB.

[9] Pictures provided by BC Hydro

5 Considerations for Offering an Alternative Metering Solution

When considering offering an alternative metering solution for MURBs, one of the first questions to consider: should BC Hydro continue to require the use of its existing socket metering solution for all new MURBs or should it give MURB developers an option by providing an alternative metering solution. This section outlines many of the important factors that should be considered and further analyzed in the subsequent decision making phase.

According to data provided by BC Hydro, each year there are approximately 800 new MURBs units that are bulk metered. Based on this, an initial focus is on how to ensure that going forward these units are individually metered, this is paired with also considering how existing bulk metered MURBs could be retrofitted so that each unit could be individually metered. It is important to note, that the estimate of 800 new units in MURBs may change substantially in the future if developers deem the alternative metering solution beneficial relative to socket based meters. In such case, it may be expected that MURB developers who currently install the infrastructure for socket based meters would potentially shift to a suite metering solution. One of the main impacts of this could be significantly higher volumes of suite metering devices in the future – well beyond the current 800 units per year for buildings that are bulk metered.

To support BC Hydro's decision making process on how MURBs should be metered several factors were identified. Through interviews with the BC Hydro stakeholders and based on JTS' expertise, the factors in the table below were identified and agreed to. While this list covers many of the key factors, there may be others that will come up during future discussions and analyses.

Table 1 - Decision Making Factors for Consideration

Key Factors
1. Business & Customer Strategy
2. Potential Volumes & Scalability of Suite Metering Devices
3. Business Operations
4. Developer Experience & Engagement
5. Future Proofing & Alignment with SMI 2.0
6. Timelines
7. Regulatory
8. Smart Meter & Smart Grid Regulation
9. Retrofitting Existing MURBs
10. Technology Strategy & Roadmap
11. Costs

More information about these factors can be found in **Appendix III - Considerations for Offering an Alternative Metering Solution** .

In addition to these factors, BC Hydro may also need to consider how to recover incremental implementation and operational costs it incurs beyond the standard metering solutions. As the

MURB Developers would be the primary beneficiary of any benefits, it may be appropriate for the developer to pay for any incremental costs to support a suite metering solution. This is consistent with the approach taken to bill BC Hydro's standard charges, including Meter Choices Program costs, in which BC Hydro incurs additional costs to provide a service benefitting only the specific customers electing to participate. If required, such a cost would reduce the benefits a developer would receive from a suite metering solution, which may impact the viability of the offering.

6 Analysis: Alternative Metering Solution for New MURBs

This analysis builds upon the data included in the first report and is summarized in Table 2 - New MURB Analysis below. Since the first report was completed the BCUC has "approve[ed] BC Hydro's proposal to remove the master-metering option for multi-unit residential properties in Section 4.4 of its Electric Tariff".[10] This means that all residential units in new MURB developments need to be individually metered with BC Hydro's standard socket-based meters.

The two alternatives compared are:

(A) **Status Quo - Existing Socket Based Metering Solution**
(this is the current approved alterative);

and

(B) **New Suite Metering Solution**

Table 2 - New MURB Analysis below compares Alternative (B) New Suite Metering Solution relative to Alternative (A) Status Quo - Existing Socket Based Metering Solution. Where (B) is relatively like (A) the box is shaded white, whereas if (B) is relatively positive it is shaded green and if (B) is relatively negative it is shaded red.

Example:

Consideration	(A) Status Quo – Existing Socket Based Metering Solution	(B) New Suite Metering Solution
1	Basis for comparison	Relatively the same as (A)
2	Basis for comparison	Positive relative to (A)
3	Basis for comparison	Negative relative to (A)

The analysis assumes that based in historical numbers provide by BC Hydro, there are approximately 800 new bulk metered units per year. However, if MURB Developers determine that a suite metering solution is beneficial to them, then the volume of suite metering devices deployed each year would likely be higher than 800.

In the initial report, four suite metering solution alternatives were identified. However, the analysis in this report doesn't differentiate these alternatives as they could be considered implementation options if it. if is determined beneficial to proceed with implementing a suite metering solution, then it would be prudent to analyze the various options for how a suite metering solution could be implemented.

It is expected that if BC Hydro were to offer an alternative metering solution for new MURBs, that the same solution could be used for retrofitting existing bulk metered MURBs.

[10] (British Columbia Utilities Commission, 2025)

Table 2 - New MURB Analysis

Consideration	Alternatives	
	(A) Status Quo: Existing Socket Based Metering Solution	**(B) Alternative Suite Metering Solution**
TECHNICAL & TECHNOLOGY		
Metering Solution	Existing metering solution. Remote dis-/re-connect enabled.	New, additional, meter solution would be required. No remote dis-/re-connection functionality. Would need to leverage an alternative communications solution (versus the existing IPv6 MESH network used by BC Hydro's Itron smart meters)
Technology Integration & Implementation.	Existing solution, no incremental effort.	Significant effort to configure existing IT systems to fully integrate with the suite metering system. There would also be considerable ongoing system maintenance & support.
Technology Strategy & Roadmap. Ensure long term alignment with the technology strategy and roadmap.	No impact to strategy &/or roadmap	Would result in a deviation from BC Hydro's planned and/or future technology strategies and roadmap for metering.
Scalability of Metering Solution	Planned to scale appropriately with growth forecast	Anticipated to scale; however, significant volumes will likely impact operations, and the required technical solution.
CUSTOMER EXPERIENCE		
Business Strategy. Minimize constraints on future business strategies.	Single metering system to align with current and future business strategy.	Future business strategies would need to account bespoke technical solution associated with a suite metering solution.

Consideration	Alternatives	
	(A) Status Quo: Existing Socket Based Metering Solution	**(B) Alternative Suite Metering Solution**
Future Proofing & Alignment with SMI 2.0. Ensure solution provides required future proofing and alignment with SMI 2.0	The use of socket based meters for all new MURB units would ensure alignment with future SMI 2.0 strategy	Units metered with an alternative suite metering system would not enable alignment with future SMI 2.0 strategy.
Customer Strategy. Enable residents who would otherwise not be direct BC Hydro customer to be BC Hydro customers – thereby enabling them access to BC Hydro's rates, programs and incentives.	Enables residents who would otherwise be in bulk metered MURBs to be BC Hydro customers.	Enables residents who would otherwise be in bulk metered MURBs to be BC Hydro customers.
Developer Experience & Engagement. Maintain BC Hydro's relationship with Developers.	Small number of developers impacted as they would now need to include individual metering via BC Hydro's socket based metering solution	Minimal impact. They will gain optionality to have a suite metering solution instead socket based meters.
REGULATORY		
Alignment with the Smart Meter & Smart Grid Regulation	Aligns with Smart Meter & Smart Grid Regulation	The Provincial Government would need to be engaged to determine their openness to amend the regulation as suite metering lacks remote disconnect/connect capability which is part of the regulation.
Measurement Canada Compliance	No considerations.	Measurement Canada compliance considerations would need to be addressed.

Consideration	Alternatives	
	(A) Status Quo: Existing Socket Based Metering Solution	**(B) Alternative Suite Metering Solution**
FINANCIAL		
Implementation Project Cost	No implementation costs	$4.3M (range of $2.2M – 8.6M)[11]
Annual Operational Costs	Incremental operating costs are aligned with growth.	1.5-3+ FTEs + $0.08M Technology + per end point network fees + incremental costs for suite metering solution (relative to standard socket meters), e.g. for manual disconnects / reconnects[12]
PROCUREMENT / VENDOR MGMT		
Minimize resourcing impacts to procure and managing vendors.	No additional procurement activities or vendors to manage.	Additional contracts for metering vendors and electrical contractors would be required and would need to be managed.
OPERATIONS		

[11] Refer to **Appendix IV - Cost Estimates** for more information on the estimated costs for the project to implement a suite metering solution. Note that this estimate does not include the costs for the installation or operation of any suite metering devices.
[12] ibid

Consideration	Alternatives	
	(A) Status Quo: Existing Socket Based Metering Solution	**(B) Alternative Suite Metering Solution**
Business Operations. Minimize incremental field work, including effort to manage additional field work.	Completed by existing work force and processes	New / modified processes, and training will be required for the implementation and ongoing support. Risks will need to be analyzed, with appropriate controls implemented and operationalized (with would include coordination with the vendor and the vendor's controls). New / amended contracts required, e.g. for electrical contractors to install/remove / exchange / troubleshoot the suite metering devices.
TIMING		
Timeline to implement solution	Solution already in place.	Anticipated to take ~2.5 years to procure, integrate and operationalize a suite metering solution.

7 Analysis: Existing Bulk Metered MURBs

The second question addressed in this report is if BC Hydro should consider offering an alternative metering solution for existing MURBs that are bulk metered. The table below provides a comparison analysis of the alternatives based on the key considerations noted earlier in this report.

The two alternatives compared are:

(A) Status quo – bulk metering of existing MURBs;

and

(B) Suite Metering Solution

Within Alternative (B) Suite Metering Solution there are several options that could be considered. Where applicable the variations are noted in the analysis. For example, the data from a suite metering solution could be provided to BC Hydro where it is loaded into its billing system, the billing agents could obtain the data from the suite metering solution and manually enter the reads into the billing system, or the suite metering vendor could provide a white labelled billing solution (this is where the vendor generates a bill on behalf of BC Hydro that is BC Hydro branded). If BC Hydro were to proceed with implementing a suite metering solution for existing bulk metered MURBs, then it would need to further analyze the options.

The analysis in this section focusses on a potential suite metering solution where BC Hydro decides not to proceed with a suite metering solution for new MURBs. Therefore, it doesn't have the ability to implement a similar solution and doesn't have the ability to spread out the implementation project costs over a larger customer base. Accordingly, to reduce costs the solution considered would likely have reduced functionality and attempt to reuse information and processes currently in use by existing sub-metering providers.

Table 3 - Existing Bulk Metered MURB Analysis below compares the Alternative (B) Suite Metering Solution (relative to Alternative (A) Status quo – bulk metering of existing. Where (B) is relatively like (A) the box is shaded white, whereas if (B) is relatively positive it's shaded green and if (B) is relatively negative it's shaded red.

Example:

Consideration	(A) Status Quo – Existing Bulk Metered MURBs remain Bulk Metered	(B) Suite Metering Solution
1	Basis for comparison	Relatively the same as (A)
2	Basis for comparison	Positive relative to (A)
3	Basis for comparison	Negative relative to (A)

The analysis assumes that only a small fraction of the current population of approximately 16,000 bulk metered units may be retrofitted in the future so that each residential unit in the building is

individuality metered via a suite metering solution. It's important to note that the decision to retrofit a unit or building would not be made by the individual resident, but rather by the building owner. Several complexities would need to be assessed, including the costs to the building owner, the electrical configuration, the space required for meter bases (which is necessary for the installation of socket meters), the age of the building (in relation to future redevelopment considerations), electrical codes, building codes, and existing long-term contracts with sub-metering vendors.

Table 3 - Existing Bulk Metered MURB Analysis

Consideration	Alternatives	
	(A) Status Quo – Existing Bulk Metered MURBs remain Bulk Metered	**(B) Suite Metering Solution**
TECHNICAL & TECHNOLOGY		
Metering Solution	Existing single account / bulk meter for the building. No visibility into energy billing for residents, except for a small subset of customers where a third-party sub-metering company has been engaged to provide this service.	Typical sub-metering solution with: Periodic files with register reads; or access to reads via vendor system. Reads could be manually entered into SAP; however, this comes with a risk of data entry errors.
Implementation Timeline	N/A	A fulsome assessment requires input from a procurement process and detailed requirements.
Technology – Integration with Sub-Metering Solution	N/A	Would need to determine how the data would be loaded into BC Hydro's billing system. Minimal, assuming vendor provides complete files in a standard format Would need to know customer billing details to support customer billing inquiries.

Consideration	Alternatives	
	(A) Status Quo – Existing Bulk Metered MURBs remain Bulk Metered	**(B) Suite Metering Solution**
Technology – BC Hydro Account Management & Billing System	N/A	There would be significant work associated with setting up and managing customer accounts including managing alternative processes, for example: Accessing billing records, handling bill inquiries and customer support, managing tickets and interactions with the sub-metering vendor. There would also need to be a means to flag the account as having an 'alternatively meter'. There would also be impacts on various workflows e.g. for handling move-ins and move-outs, disconnects and reconnects, high bill complaints and other account management related issues.
CUSTOMER EXPERIENCE		
Customer access to BC Hydro Customer energy portal	No. Residents are not BC Hydro customers and cannot access BC Hydro's portal.	Limited. Assumed that the meter data would not be available for the energy portal and therefore residents would not have access energy consumption data in the portal.
Customer Access to BC Hydro's rates	No. Residents are not BC Hydro customers.	Potentially restricted. Customers may have access to some BC Hydro optional rates, options are potentially restricted given reduced metering capabilities. Assumed to be limited to monthly register reads.
Customer Access to BC Hydro's programs and incentives	No. Residents are not BC Hydro customers.	Yes. Customers would have access to BC Hydro's programs and incentives, though potentially with some restrictions given reduced metering capabilities.

Consideration	Alternatives	
	(A) Status Quo – Existing Bulk Metered MURBs remain Bulk Metered	**(B) Suite Metering Solution**
Overall Customer Experience. Ability to provide the resident with a BC Hydro customer experience.	None. Residents are not BC Hydro customers.	Ability to provide a like-for-like customers experience may be limited due to reduced metering capabilities.
REGULATORY		
Smart metering and smart grid regulation	No amendments required.	Would require the Provincial Government to amend the Smart Meter and Smart Grid Regulation to allow a meter solution without remote disconnect/connect capability.
Measurement Canada Compliance	No considerations.	Measurement Canada compliance considerations would need to be addressed.
FINANCIAL		
Costs to BC Hydro	No cost to BC Hydro to implement, sustain or operate its existing system.	There would be capital and ongoing annual maintenance / operational costs. The costs cannot be estimated with confidence without a fulsome analysis and inputs from a procurement process.
Financial – Costs to Customers / building owners (e.g. set up / connection chargers / early termination fee) *	No incremental costs to BC Hydro.	These costs would need to be assessed and subject to BC Hydro determine its full cost for offering an alternative metering solution.
Electricity Costs to Residents	No impact to residents.	Unknown. For some residents electricity costs may be included within their rent, others may be charged based on a unit allocation, and others may be billed by sub-metered vendor or based on reads from a sub-meter vendor. It is, therefore, plausible that some residents may pay more, while others may pay less should the building be retrofitted with a suite metering solution.

Consideration	Alternatives	
	(A) Status Quo – Existing Bulk Metered MURBs remain Bulk Metered	**(B) Suite Metering Solution**
Volumes and minimum viable number of units	None.	Assumed to be a fraction of the current bulk metered population (16,000 units). Building owners / stratas would need to make the decision to transition, not the individual residents. Buildings with sub-metering vendor contracts are not likely to transition in part because of the costs to break existing contracts. Older buildings, which may be redeveloped, are also unlikely to transition because of the timing to recover the costs of an alternative metering solution. Based on the costs of offering an alternative solution, there would be a minimum number of units that would be required to justify the costs and impacts on BC Hydro resources. The minimum numbers cannot be calculated until the costs of offering an alternative metering solution are confirmed.
PROCUREMENT / VENDOR MGMT		
Sub-Metering Vendor Procurement and Vendor Management	No incremental effort by BC Hydro.	There would be incremental effort associated with the development of a procurement strategy and the execution of the procurement process. Long-term vendor management activities would also be necessary.

Consideration	Alternatives	
	(A) Status Quo – Existing Bulk Metered MURBs remain Bulk Metered	**(B) Suite Metering Solution**
OPERATIONS		
Operations	No incremental effort by BC Hydro.	New / modified process, systems and change management required to handle: Customer Inquiries, Account Management, Contact Centre inquiries, Field work, Dis/Reconnects (logistics / regulations re: means to 'flip the switch', e.g. if on customer panel, Move-outs/ins (higher volume in rental buildings), etc. This would necessitate the development and roll-out of a comprehensive changing management strategy to support BC Hydro's resources.
Field Work	No incremental effort by BC Hydro.	Logistics for coordinating with sub-metering vendor for installation, removal and troubleshooting. Mapping BC Hydro account info to sub-metering vendor's endpoints.

8 Concluding Remarks

BC Hydro is exploring options to establish a direct relationship with residents in *new* Multi-Unit Residential Buildings (MURBs) and residents is existing MURB units that are bulk metered. Residents in existing bulk metered MURB units do not have a BC Hydro meter, so they are not a BC Hydro customer. This means that they do not have access to BC Hydro's rate choices, and as such cannot participate in energy efficiency and incentive programs.

This report outlined several key factors that were important for analyzing the two questions that are addressed in this report:

(1) Should BC Hydro provide an alternative metering solution for new MURBs;

and

(2) Should BC Hydro offer an alternative metering solution that could be used for retrofitting existing bulk metered MURBs.

The data for the analyses were obtained through collaboration with BC Hydro stakeholders, research conducted by the authors and the authors' expertise. Concluding remarks pertaining to each of the questions are noted separately below.

<u>New MURBs</u>

Before discussing the analysis on whether BC Hydro should provide an alternative metering solution for new MURBs, it's important to reiterate that, based on BCUC Order No G-42-25, dated February 24, 2025, new MURBs can no longer be master (bulk) metered. Therefore, the status quo is for each new unit to be individually metered with a BC Hydro socket-based meter.

The two main benefits identified in the analysis for BC Hydro to offer an alternative metering solution for new MURBs are that (i) it enables residents in buildings that would otherwise be bulk metered to become BC Hydro customers and (ii) that MURB Developers would gain the ability to leverage an alternative metering solution, which may provide them with some benefits, such as increased design flexibility because they don't need to include a metering room with space for individual meters. However, BCUC Order No G-42-25 negates the first benefit for an alternative metering solution as all new MURB units will be individually metered. As for the second benefit, the vast majority of MURBs are already designed to include socket-based meters and it is the authors' understanding the costs of installing meter bases are minimal – relative to the cost of the project – and the added flexibility would not be significant as there a multiple building and electrical code requirements that need to be followed.

As previously noted, there are only approximately 800 new units each year that are in buildings that bulk meter so a relatively small number of MURB Developers would be impacted by now needing to install meter bases for BC Hydro's socket-based meters. Furthermore, the costs and impacts on BC Hydro to execute a project to implement, operationalize, and provide ongoing support of an alternative suite metering solution outweigh the limited benefits.

Existing Bulk Metered MURBs

The second question assessed in this report is whether BC Hydro should offer an alternative metering solution for retrofitting existing bulk-metered MURBs. If BC Hydro offers an alternative metering solution for new MURBs, it should also be able to offer it for retrofitting existing bulk-metered MURBs.

However, if BC Hydro doesn't offer an alternative metering solution for new MURBs, a potential solution for retrofitting existing MURBs would likely be significantly scaled back in scope and integration with BC Hydro's system. This is because the significant cost to implement and support the solution would be a major factor.

Based on the analysis conducted, the primary benefit of offering an alternative metering solution is that residents of the currently bulk-metered buildings could become BC Hydro customers, gaining access to BC Hydro's rates, programs, and incentives. However, they would not receive the identical service offering as BC Hydro's other residential customers with socket-based meters. For example, because of costs to integrate the suite metering solution with BC Hydro's system, residents with a suite metering solution would not have access to data in BC Hydro's energy visualization portal.

Due to the complexities in building ownership structure, anticipated costs, future development plans for the building, and existing contracts with sub-metering vendors, it is anticipated that very few of the approximately 16,000 existing units in bulk-metered buildings would request a suite metering solution from BC Hydro. The anticipated limited uptake, along with the costs and impacts on BC Hydro to implement, operationalize, and support alternative metering solutions for retrofitting existing bulk-metered MURBs, greatly outweigh the benefits to the small population of being a BC Hydro customer.

While there are significant challenges and impacts on BC Hydro with offering an alternative metering solution for MURBs, it's understood that BC Hydro is in the early stages of assessing its SMI 2.0 strategy. As part of this strategy, BC Hydro could explore the viability of alternative metering devices that would be interoperable with the future SMI 2.0 solution.

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10 Appendix I - Executive Summary of Phase 1 Report

Executive Summary from Phase 1: Suite Metering Analysis: Preliminary Assessment Report[13]

"Driven by a mission to provide safe, reliable, affordable, and clean electricity, BC Hydro is exploring options to establish direct relationships with every resident in new Multi-Unit Residential Buildings (MURBs). Today, MURB developers can choose between installing individual socket-based meters for each unit or a single bulk meter for multiple units. Each year there are approximately 800 new units in MURBs that are not individually metered. For a resident to be a BC Hydro customer – enabling access to BC Hydro rates, programs and incentives – their unit needs to be individually metered. Issues related to bulk metering in MURBs has resulted in numerous complaints to the British Columbia Utilities Commission (BCUC). To address this, BC Hydro is proposing amendments to the Electric Tariff to mandate individual metering for each new MURB unit.

This report assesses Suite Metering Solutions, as an alternative to socket-based meters, to individually meter units in new MURBs. Suite Metering Solutions are comprised of a different type of metering device, require a communications network and head-end system to transmit energy data to a Meter Data Management System (MDMS). A preliminary assessment using core business (e.g., customer experience, impacts on BC Hydro's resources, Business Transformation Complexities, Change Management impacts) and technology considerations (e.g., complexities and impacts) identified three technically viable suite metering solution alternatives:

- Suite Metering Solution that uses its own network
- Suite Metering Solution where the vendor provides the network-as-a-service
- Suite Metering Solution where the vendor provides a solution-as-a-service

Should BC Hydro seek to make every resident in new MURBs a BC Hydro customer, there are technically viable options to do so. This could be achieved by either mandating socket-based meters or implementing a suite metering solution. The analysis also highlighted that the implementation of a suite metering solution would neither be trivial nor inexpensive. While identified as technically viable, these three solutions would require foundational technology changes to support the introduction of a new type of meter. For example, the creation of the master data structure and records in SAP, giving the means to associate each metering device with a given MURB unit and customer as well as for the ingestion and processing of the metering data in BC Hydro's MDMS.

To proceed further, BC Hydro's next step should be to conduct a structured decision-making (SDM) process to further assess the options and suite metering solution alternatives for metering units in new MRUBs. This would be where requirements, costs, timelines and business impacts would be further assessed and validated. Thereby, enabling the identification of a leading approach for metering every unit in new MURBs."

[13] (JTS Consulting Inc, 2024)

11 Appendix II - Technical Solution Update

Through discussions with some suite metering vendors, additional information and clarity about potential suite metering solutions were ascertained. This section provides updates on suite metering technology.

Suite Meter Capabilities

- Availability of meter real time events such as tamper, power out and power on and temperature (of the meter panel).
- Full support of metrology data such as interval and register data, demand, reactive power.
- Ability to support single, two or three phase power.
- Meters are sealed and compliant to Measurement Canada sealing and commissioning (S-E-04) regulations.
- Meters support a 10 year seal and sampling programs.
- Ability to separate meter unit from the current transformers to allow for sampling and or repair.
- Suite metering devices do not capture all the same events as BC Hydro's current socket meters. For example, they are unable to detect high temperatures, which is used to identify potential safety issues.

Communication Network

- Data collector units either at the floor level or building level communicate via wired or wireless connection to meter head end system.
- Data Collectors support wired, or wireless backhaul to head end system.
- Suite metering network can support multi-commodity meter such as water and thermal.

Head End System

- Application Programming Interface (API) allows utilities to integrate meter read data and events into their own systems for processing.

12 Appendix III - Considerations for Offering an Alternative Metering Solution

12.1 Business & Customer Strategy

When evaluating the pros and cons of providing MURB developers with an alternative to the conventional socket metering solutions, it's crucial to have a long term perspective and to consider one's business, customer and technology strategies.

Business & Customer Strategy

Suite metering systems do not have the same functionality as BC Hydro's existing smart metering system, nor the anticipated functionality of a future SMI 2.0 system[14]. Therefore, BC Hydro needs to consider its business and customer strategies, and the capabilities needed to service this customer segment now and in the future.

MURB Customer Experience

Regardless of the type of metering solution, whether a socket meter or suite meter, the MURB resident would become a BC Hydro customer. This would enable the resident access to BC Hydro rates, programs and incentives. However, due to the technical differences between the two metering solutions residents with suite meters may not be able be able to take advantage of all offerings that would be available to residents with a socket meter or a new SMI 2.0 meter.

12.2 Potential Volume & Scalability of Suite Metering Devices

The focus of this report was to evaluate the impacts of BC Hydro providing a comprehensive metering solution that could be utilized by the relatively small number of developers whose buildings are bulk metered. An additional consideration was how a suite metering solution could be used for retrofitting buildings are currently bulk metered.

If a suite metering solution proves advantageous to developers, then BC Hydro should anticipate a higher adoption of suite metering devices. Therefore, when considering the factors, it is important to consider the potential for a significant volume of metering devices to be deployed over the next 10-15 years.

Further, it will be important for BC Hydro to understand and consider how a suite metering solution as well as the operations and support of such a solution could be scaled up to support the potential volume of suite metering devices in the future.

[14] BC Hydro's smart metering infrastructure is at the midpoint of its expected life. As a result, BC Hydro is in the preliminary stages of assessing options for replacement of the initial SMI assets. Metering and communications technologies and capabilities have evolved since initial deployment. Industry terminology for the next generation of smart meters is AMI 2.0 or SMI 2.0.

12.3 Business Operations

This section looks across the BC Hydro lines of business to understand and identify several considerations.

12.3.1 Integrated Planning

Revenue Metering

Revenue Metering is responsible for ensuring compliance with Measurement Canada and various vendor management activities. It is understood and should be assumed that a suite metering solution would be Measurement Canada compliant. Depending on the volume of suite metering devices this work could create a need for increased compliance resourcing. Revenue Metering may also require a technical resource to ensure compliance and to work through any technical requirements or issues.

Electric Meter Shop

Today, the Meter Shop is responsible in supporting all metering quality assurance and compliance testing. If the Suite Metering devices undergo receiving quality assurance testing, measurement Canada compliance testing and/or any other testing at BC Hydro's Electric Meter Shop (Meter Shop), then new tools, equipment and training will be required. Depending on the volume of work, there may be an impact on resourcing.

12.3.2 Customer and Corporate Affairs

Billing, Contact Centre, and Collections

It is expected and assumed that the suite metering vendor will provide the necessary data to support BC Hydro's standard residential billing processes.

Today, when there are billing inquiries the contact centre frequently requests residents or the building manager to visit the meter room to verify the meter display. Depending on if and how the device shows the meter readings, it may be challenging for one to verify the meter readings on-site without access to the vendor's tools.

Additionally, the average handle time and other related metrics might be affected. The messaging and requests from customers may differ between those with socket meters and those without. While the potential increase in average handle time and the number of customers may not necessitate additional resources on their own, it could support the need for them.

Office and field staff will need to be trained on any new or modified processes, work instructions, and awareness/training to handle these changes.

Customer Metering

Suite Meters lack the capability to remotely disconnect or reconnect the electricity supply to customers.[15] Therefore, disconnects and reconnects would necessitate a field visit to manual flip the breaker on the customer's electrical panel. BC Hydro needs to carefully consider several factors, including the impact on the field resources that are required to perform these tasks, such as Field Service Reps. It would also need to confirm BC Hydro's authority to access and work on the customer's panel.

Field resources, for instance, Field Service Reps, may require specialized tools to interact with the suite metering devices locally. This could be necessary to support investigations into potential billing, customer or safety issues.

Revenue Assurance

Experts from Revenue Assurance did not see the implementation of a suite metering solution resulting in an increase in the volume of work. However, it would likely require new tools and/or access to the vendor's systems to enable its investigative processes. For example, the ability to do a remote on-demand read and to review meter event / alarm logs.

Key Account Management

The Key Accounts Managers should be leveraged to help with the engagement with the MURB Developers. This is further discussed in the **Developer Experience & Engagement** section below.

12.3.3 Operations

Field Metering Operations

Based on information provided by BC Hydro experts, there are regulations that prohibit utility workers from working on a customer's electrical panel. Therefore, electrical contractors would need to be engaged to install, replace and/or remove the ferrite cores that are part of the suite metering solution.

If BC Hydro resources, such as Meter Techs to perform any field work, e.g. installs, removals, investigations, etc., there would be a requirement for vendors tools that are used to physically interact with the devices. The impacted resources will required training on the tools, processes and work instructions.

[15] Suite metering devices measure consumption via ferrite cores that are around the wires. Therefore, they do not possess the means to interrupt the flow of electricity. To disconnect power to the suite, the breaker on the panel needs to be opened.

Distribution Design, Distribution Policy and Distribution Standards

The implementation of suite metering solution would require updates to the applicable BC Hydro's Distribution Technical Standards and Guides, such as the Revenue Metering Requirements and Revenue Metering Bulletins.[16] However, this would work could be managed as part of the implementation project.

Distribution Design staff will need to be trained on any new or modified processes, work instructions, and awareness/training to handle these changes.

12.3.4 Finance, Technology, Supply Chain

Smart Metering & Network Operations

The Smart Metering & Network Operations (SMNO) group is involved with monitoring the current smart metering system, identifying non-communicating meters, and supporting the resolution of the communications issues. Therefore, it is assumed, that BC Hydro would require a similar role to support operation of a suite metering solution.

Considerations related to the technology organization and technology systems are included in the **Technology Strategy & Roadmap** section.

Supply Chain / Materials Management

Depending on the volume of and supply chain models (that is if the devices are handled through BC Hydro facilities or a vendor's), there could be a space impact related inventorying suite metering devices and a resourcing impact related to managing and handling the materials.

12.3.5 Other

Labour Relations - Union Considerations

With the consideration of implementing an alternative metering solution there *may be* union considerations that would need to be addressed. For example, who would work on the suite metering solution, use of new tools / systems / applications to locally interact with the suite metering devices, and changes in work volume resulting from the use of suite meters instead of socket meters. These items may impact BC Hydro resources affiliated with both IBEW & MoveUP.

Change Management & Training

With the implementation of a suite metering solution a robust change management – awareness, training – strategy and plan will be required to ensure impacted resources are aware of the new or modified systems, processes, work instructions and customer messaging.

[16] (BC Hydro, 2025)

Organizational Impacts

Just as with the implementation of BC Hydro's smart metering system, the impacts, though to a lesser extent, will be felt throughout the organization. Many parts of the organization will experience some impact, but most of the effects will likely occur within Integrated Planning, Operations, and Customer & Corporate Affairs. A robust change management approach will be able to mitigate these impacts and ensure a smooth adoption.

12.4 Developer Experience & Engagement

MURB Developer Experience

If BC Hydro were to continue to require the use of socket meters for MURBs, most MURB developers would not be impacted as their building designs already include the necessary meter socket infrastructure required to individually meter each residential unit.

However, for the relatively small number of developers that construct the MURBs where the units are bulk metered (approximately 800 new units per year), this group of developers would be impacted as future buildings would now need to include the necessary infrastructure to support socket-based metering.

In support of JTS' first report that was completed in the spring of 2024, the authors conducted interviews with several MURB Developers in British Columbia. The general sentiment shared by these developers is that they would prefer for BC Hydro, versus the MURB developer (or a third-party submetering vendor), to manage the metering, billing, and revenue collection of electricity for the residents in MURBs.

Based on discussions with BC Hydro's Key Account Managers the engagement with the developers would likely be through direct, one-on-one discussions versus having larger sessions with multiple developers. It is expected that the developers will want to know how much more would a suite metering solution cost them. It would be beneficial to learn from developers if they would switch to designing their buildings to include suite meters instead of socket meter and if they are sensitive to potential higher fees from BC Hydro for a suite metering solution. It would also be beneficial to understand where within the development cycle they could potentially make the change to their design to account for a different metering solution.

12.5 Future Proofing and Alignment with SMI 2.0

As part of the SMI 2.0 requirements and at the appropriate time, BC Hydro will need to determine how a suite metering solution would align with offering a bespoke suite metering solution.

Aligning to a SMI 2.0 for a solution for metering MURBs would allow for a universal solution for metering versus a bespoke solution that may diverge further depending on the future capabilities of SMI 2.0. Some of the benefits of alignment include:

- Single technology solution for network, head end system and data integration;
- Simplified vendor management and procurement processes;
- Common business processes for all types of residential customers;
- Common technology operational processes; and
- Metering / meter device capabilities and programs availability for all customers

12.6 Timelines

There are multiple timelines that BC Hydro will need to consider, these including the timeline to implement the changes to enable the implementation of suite metering solution, the developers' timelines and the SMI 2.0 timeline.

Implementation Project Timeline

Based on data provided by BC Hydro, implementing a suite metering solution, which includes procurement activities, technology changes, and business readiness, is anticipated to take approximately 2.5 years.

To implement a solution that would be used, only for retrofitting existing bulk metered MURBs may require a different timeframe, however a fulsome assessment requires input from a procurement process and documented detailed requirements.

Developer Timeline – for new MURBs

BC Hydro will need to consider the MURB development timelines – specifically with respect the development and construction process – regarding when the developers would be able to modify its designs for the incorporation of alternative metering solution. Furthermore, the timelines and impacts may differ depending on if: (1) MURBs that are being designed for socket meters; and (2) MURBs that are being designed for bulk metering.

(1) MURBs with Socket Meters

It is important to note that the development cycle for high rise MURBs is quite long, approximately 5-7+ years. Figure 4 - Illustrative MURB Development Timeline below illustrates the authors understanding of a typical timeline for a MURB development. This timeline should be considered in the context of the potential adoption of a suite metering alternative for buildings that would currently be metered with socket meters and for high rise MURBs which are being designed to include bulk metering. Based on this timeline, the earliest that a developer could install a suite metering solution is during the tendering process which occurs approximately 2-3 years before construction. For developers to benefit from potential optimization of meter room spaces would be in the 5 years prior to construction in the Development/Design phase of a development project.

Phase	Estimated Duration (Years)	Year												
		1	2	3	4	5	6	7	8	9	10	11	12	13

Land Acquisition		X												
City Zoning Process	2 – 3													
Development	5 – 7													
Final Design / Approvals	1 – 2													
Tendering	1													
Construction	2 - 3													

Low Estimate
High Estimate
Estimated window for shifting from socket metering to a suite meter solution

Figure 4 - Illustrative MURB Development Timeline

(2) MURBs with Bulk Metering

These buildings should follow a similar timeline as above. However, because the MURB design does not include meter bases (for socket meters), it should be feasible to include the installation of a suite metering solution at any time.

SMI 2.0 Timeline

BC Hydro has kicked off an investigation with the aid of an external consulting firm to support the development of its SMI 2.0 strategy. The SMI 2.0 strategy and timeline should be considered when deciding how to proceed with metering MURBs and implementing alternative metering solution that could impact BC Hydro's future metering and customer strategies.

12.7 Regulatory

Cost Recovery

It will be important to determine how BC Hydro will recover the implementation project costs and the incremental operating costs associated with a suite metering solution. In particular, the percentage of implementation and incremental costs allocated to the developer would be a significant factor in the economic benefit the developer would achieve from having a non-socket-based metering option.

12.8 Smart Meter & Smart Grid Regulation

The current Smart Meter and Smart Grid Regulations mandate that smart meters possess the capability to enable remote disconnection and reconnection of the electricity supply to eligible premises. The applicable portion of the regulation is included in Figure 5 - Smart Meter & Smart Grid Regulation below.[17]

[17] (Provincial Government of British Columbia, 2012)

Prescribed requirements for smart meters

2 For the purposes of the definition of "smart meter" in section 17 (1) of the Act, the prescribed requirements for a meter are that it is capable of doing all of the following:

(a) measuring electricity supplied to an eligible premises;

(b) transmitting and receiving information in digital form;

(c) allowing the authority remotely to disconnect and reconnect the supply of electricity to an eligible premises, unless

(i) the point of metering for the eligible premises

(A) is greater than 240 volts,

(B) is greater than 200 amperes, or

(C) is three phase, or

(ii) the eligible premises

(A) has a bottom-connected meter,

(B) has an output or input pulse meter, or

(C) has a meter that measures maximum electricity demand in watts;

(d) recording measurements of electricity, and recording the date and time of the recording, at least as frequently as in 60-minute intervals;

(e) being configured by the authority at a location either remote from or close to the meter;

(f) measuring and recording measurements of electricity generated at the premises and supplied to the electric distribution system;

(g) transmitting information to and receiving information from an in-home feedback device, unless the point of metering for the eligible premises meets any of the criteria set out in paragraph (c) (i) or the eligible premises meets any of the criteria set out in paragraph (c) (ii).

Figure 5 - Smart Meter & Smart Grid Regulation[18]

Consequently, BC Hydro would need to further review the regulation and if necessary engage the Provincial Government to determine the feasibility of modifying the regulation to permit a suite metering solution that does not incorporate the mandatory remote disconnect/reconnect functionality.

12.9 Ability to be used for Retrofitting Existing Bulk Metered MURBs

MURBs that are currently bulk metered technically can be retrofitted with a suite metering solution to enable individual metering of each residential unit. However, when considering retrofitting these buildings, several important factors must be addressed. First, the cost to the building owner(s) for installing such a system needs to be evaluated. Additionally, how will access to the panel and suite metering devices be obtained and managed. The electrical configuration and space in the electrical rooms to ensure compliance with all application by-laws, regulations and suite metering solution requirements.

12.10 Technology Strategy & Roadmap

Technology Strategy

BC Hydro will need to consider its technology strategy and the potential impacts of implementing, supporting and future proofing a suite metering solution. Implementing a suite metering solution regardless of whether BC Hydro owns the meter or purchases it as a service, this result in the creation of a bespoke metering and technology solution that will impact any SMI initiatives.

Suite meters are measurement devices only and cannot be remotely disconnected or reconnected. If developer uptake of a suite metering solution increases significantly, there would be a larger

[18] (Provincial Government of British Columbia, 2012)

number of meters that could possibly not be able to update to SMI 2.0 capabilities thereby increasing the capabilities gap for BC Hydro and potentially suite metering MURB customers. This will also result in an increase in field operations requirements specifically for remote disconnect and reconnects.

A suite metering solution will require integration at a minimum to key BC Hydro systems such as its asset management, meter data management and customer information systems. Any system and data integration will increase operational complexity and support processes for technology operations groups. Additionally, data must be transferred from third party vendor suite metering head end to BC Hydro securely. Any transmission of data from external sources introduces additional threat vectors from a cyber security perspective. A privacy impact assessment and security assessment along with a potential penetration testing would need to be completed in the future. Any future changes to the current SMI technology software stack may have implications for data integration and process changes to a third party suite metering system. Adding additional systems and data sources will increase end to end testing efforts.

12.11 Costs

One of the key considerations for BC Hydro is the cost for the execution of a suite metering implementation project. In addition, there would be costs associated with the ongoing sustainment and operations of the solution. More information about the costs is included in **Appendix IV - Cost Estimates**. Cost estimates in this report align with AACE Class 5 / ANSI Classification – Order-of-Magnitude which corresponds to a range of +100% to -50%. This level of estimate is also regularly referred to as rough order of magnitude (ROM) or ballpark estimate.

13 Appendix IV - Cost Estimates

One of the key considerations for BC Hydro is the cost to implement and sustain a suite metering solution. This section provides some preliminary cost estimates – that would need to be refined to support any future business cases – the guiding principles and methodology for obtaining the estimates.

13.1 Guiding Principle

The estimates included in this report align with AACE Class 5 / ANSI Classification – Order-of-Magnitude which corresponds to a range of +100% to -50%. This level of estimate is also regularly referred to as ROM (rough order of magnitude) or ballpark.

The numbers provided below should be used to support directional decision making. However, they are based many assumptions and if any of the assumptions were to change there could be significant impact to the financial estimates.

13.2 Methodology for Cost Gathering

Technology Cost Estimate

BC Hydro provided technology cost estimates to support building out the project cost estimates. To ascertain the estimated costs, subject matter experts from various parts of the organization were engaged through a BC Hydro Project Manager to provide rough order of magnitude estimates. Two scenarios were assessed: a suite metering solution as part of a network as service model (BC Hydro would own and maintain the metering devices) and a solution as a service model (where the vendor is responsible for owning and operating the solution). However, the costs are noted as a single estimate.

The BC Hydro ITDSP Resource / Cost Estimating model was leveraged to support documenting the project cost estimates.

Balance of Project and Sustainment Cost Estimates

As part of the engagement sessions with BC Hydro internal stakeholders, some groups were able to provide some potential cost impacts; for example, related to vendor management, management of the measurement compliance program, manual disconnect and reconnect of suite metering customers.

Vendor Cost Estimates

JTS and BC Hydro met with several vendors, some of whom were able to provide high-level budgetary cost estimates. However, detailed cost information would need to be obtained through a formal procurement process.

13.3 Project Cost Estimates

Implementation Project Costs

The rough order of magnitude estimated cost for a BC Hydro project to implement a suite metering solution is $4,306k (range: $2,153k - $8,613k based on AACE Class 5, +100% / -50%;).

Table 4 - Suite Metering Implementation Project Cost Estimate

Area	$ (k)	Notes
Technical Development & Testing	1,823	1,2
Business Analysis and Process Design	583	
Business SMEs	452	3, 4
Project Management	339	
Technical Design (includes Architecture)	359	
Vendor Integration	100	5
Change Management	88	
Sub-Total	**3,745**	6,7
Contingency	562	8
TOTAL, unloaded[19]	**4,306**	
Cost Estimate Range (+100% / -50%)	*2,153 – 8,613*	*9*

NOTES

(1) Technical Development & Testing includes various BC Hydro systems.
(2) E2E testing is included in the Technology Teams cost as is calculated as 15% of the Technology Teams costs
(3) Includes Training and Change Management activities.
(4) Includes costs for procurement and engagement with developers.
(5) Placeholder for assumed vendor setup and integration costs
(6) Cost estimate is unloaded and excludes IDC
(7) Excludes the cost of suite metering devices, their installation and commissioning
(8) 15% Contingency
(9) Cost estimate +100% / - 50% based on AACE Class 5.

The scope of the implementation project includes:

- changes to BC Hydro's technology systems to support the adoption of a new type of meter, interfaces between BC Hydro's systems and the vendor's head-end system,
- project management,
- business analysis,
- technology solution architecture, technology design and implementation,
- change management,

[19] Unloaded costs exclude BC Hydro's internal capital overhead that is charged to capital projects.

- procurement, and
- business subject matter expert involvement.

According to the information provided by the key stakeholders, the project duration is estimated to be approximately 2-3 years, depending on BC Hydro's final requirements, project scope, procurement timeline and vendor's timeline.

It is important to reiterate that the cost estimate is rough order of magnitude planning estimates and actual cost estimates would need to be ascertained through business case development and procurement processes.

13.4 Sustainment Cost Estimates

At part of the interviews with BC Hydro, suite metering vendors and other Canadian Utilities, an initial set of sustainment costs were identified. These costs estimates would need to be confirmed through an appropriate procurement process.

Suite Metering Vendor Costs

There are two categories of vendor costs: (1) the cost of the suite metering devices, installation and commission; and (2) the ongoing network fees.

For budgetary planning purposes, it is estimated that the cost of a suite metering device is approximately $300 per suite. Further, the overall costs for a suite metering device, installation and commissioning by a vendor is approximately $550 – 650.[20] For these numbers it is assumed that BC Hydro owns the device, and the vendor performs the installation and commissioning.

It is assumed that a suite metering vendor would also charge BC Hydro an ongoing operational cost of approximately $10-20 per suite per year for the network and providing BC Hydro with the data from the suite metering devices. [21]

Integrated Planning

Revenue Metering has estimated that it may require 0.5 – 1 FTE to manage the compliance activities, such as Measurement Canada compliance programs, and other technical engineering related activities.

Customer Operations & Analytics

The Customer Operations & Analytics organization will be impacted by the implementation of a suite metering solution. Based on discussions with representative for several areas such as, Billing, Collections, Field Metering Operations, and Revenue Assurance the following activities will result in some incremental operating costs:

[20] Suite Metering Vendor and a Canadian Electrical Utility
[21] Suite Metering Vendor and a Canadian Electrical Utility

- Field resources to perform manual disconnects and reconnects
- Potentially increased costs to the contact centre related to potentially higher average handle time for calls from customers with a suite metering device
- For retrofitting buildings, there will be an impact to process all the customer 'move-ins' in SAP

At this time, it is difficult to provide an estimate as the impacts will likely be proportional to the volume of suite metering devices installed.

Technology

Once implemented, there would be some ongoing sustainment costs for the technology solution technology. BC Hydro estimate the annual sustainment cost to be $80,000 per year.

Other

Potentially 0.5 – 1 (or more) FTE resources may be required to support vendor management (including SLA monitoring) and coordination of field activities with the vendor. Actual numbers will be dependent upon the vendor and operating model.

Again, it is important to reiterate that these are planning estimates and actual cost estimates would need to be ascertained through a formal procurement process.

13.4.1 Sustainment Cost Summary

The table below summaries the estimated annual OMA cost impacts ascertained through discussions with BC Hydro that would be required to support a suite metering solution. Note that the costs exclude any technology OMA costs.[22]

Table 5 - Sustainment Cost Summary

Business Group	Full Time Equivalent Resources	$	Cost Range / Notes
Revenue Metering	0.5 – 1.0		
SMNO	0.5 – 1.0		
Vendor Management	0.5 – 1.0		
Customer Field Metering	TBD	TBD	Estimate 1 hours of resource time for each the manual disconnect and the reconnect.
Others	TBD	TBD	
Technology		80,000	
TOTAL	**1.5 – 3+**	**80,000+**	

Other	Annual Fee per Suite	Notes
Vendor Network Fee	$10 – 20+	These values would need to be confirmed as part of a formal procurement process.

It is important to highlight that these are rough order of magnitude estimates that are highly dependent upon the volume of suite metering devices deployed. Furthermore, these values will need to be re-calculated based on the inputs obtained via a formal procurement process.

14 Appendix V - Sizing Models

To assist with providing context on the cost impacts to BC Hydro a model was created to illustrate the impacts based on various numbers of deployed suite metering devices. The costs are categorized to show:

- the project costs on a per suite basis,
- the one-time incremental costs, relative to socket meters for the installation and materials; and
- the variable costs for the vendor's network fee for providing the network as a solution and the incremental costs for manual disconnecting and reconnection suite.

These are some of the main cost areas that were identified during the meetings with BC Hydro stakeholders; however, there may be additional costs that BC Hydro would need to consider as part of its decision making process (and if applicable its identification phase business case).

Project Implementation Costs

As previously noted, the estimated costs to implement a suite metering solution is approximately $4.3M (+100% / -50%). The table below illustrates the approximate cost on per suite basis.

Table 6 - Implementing Project Costs

	Number of Suites				
	800	5,000	10,000	25,000	50,000
Implementation Project Costs divided by the number of suites metered by a suite metering solution	5,375	860	430	172	86

Incremental One Time Costs

Table 7 - Incremental One Time Costs

	Estimated Incremental Cost relative to socket meters[23]	Number of Suites				
		800	5,000	10,000	25,000	50,000
Installation Labour	$200	160,000	1,000,000	2,000,000	5,000,000	10,000,000
Materials	$50	40,000	250,000	500,000	1,250,000	2,500,000
Total, $		**200,000**	**1,250,000**	**2,500,000**	**6,250,000**	**12,500,000**

[23] Actual BC Hydro costs were not available; therefore, these are estimated incremental costs that will need to be verified.

Incremental Annual Costs

Table 8 - Incremental Annual Costs

	Estimated Incremental Cost relative to socket meters	Number of Suites				
		800	5,000	10,000	25,000	50,000
Vendor Network Fee	$15	12,000	75,000	150,000	375,000	750,000
Manual Disconnects and Reconnects	See note (1) below	2,758	17,235	34,470	86,175	172,350
Total		**14,758**	**92,235**	**184,470**	**461,175**	**922,350**

Note (1) the estimated annual costs for manual disconnecting and reconnecting suite meters is based on BC Hydro's estimate of 4.5% of suites being disconnected each year, disconnects and reconnects taking one hour at a standard labour rate of $56 / hour.

It is important to point out that these are not the only incremental annual costs. Some additional annual operating costs would be to perform field investigations for potential billing or device issues, replacement of faulty devices, replacement and testing of devices in connection with a Measurement Canada compliance program.

15 Appendix VI - BC Hydro Stakeholder Interview list

Department
AMS Applications
Cap Infra Delivery, Gen, EP & Bus Econ Development
Customer Service Delivery
Delivery
Enterprise Architecture
Enterprise Solutions
IT Delivery
ITSM & Business Application Support
Operating Technologies
Smart Metering & Network Operations
Transmission, Distribution & Indigenous Relations
Customer Billing Operations
Customer Experience & Business Operations
Customer Contact Centre
Customer Contact Centre Operations
Customer Experience & Business Operations
Customer Experience & Program Management
Customer Field Operations
Customer Metering
Customer Operations and Analytics
Distribution Design
Distribution Policy
Distribution Standards
Field Investigations
Innovation & Delivery
Key Accounts
Meter Shop
Regulatory
Revenue Analytics & Assurance
Revenue Management & Customer Analytics
Revenue Metering System Management

16 Appendix VII - About JTS Consulting and the Authors

JTS Consulting: Who we are

JTS Consulting Inc. (JTS) is a Canadian professional services company that was born in the utility sector. We have since broadened our focus on smart infrastructure to encompass the many industries navigating digital and physical infrastructure transformation. From the onset we have done things a bit differently, aiming to enable meaningful change by bringing together experienced professionals who genuinely want to be part of each engagement and have the right tools, attitude and experience to succeed. Importantly, we have always been people-powered, and clients and consultants alike are drawn to our human centric approach to defining and achieving business outcomes while building long-lasting, authentic relationships. JTS' commitment is to provide ongoing value as a trusted partner, and we do so through our high functioning team of respected professionals who bring decades of experience and a unique blend of real-world expertise from the utility, construction, legal and consulting industries.

Today, JTS has a broad suite of consultants with deep expertise actively working on smart infrastructure programs across Canada, together we bring decades of experience integrating with client teams to support a diverse number of programs, projects and initiatives. Marrying technology with urban and rural systems, JTS is at the heart of assessing, planning, delivering and monitoring programs that lead to a safer, more efficient, effective and sustainable world. We also enjoy flexing our management consulting muscles to help organizations navigate their more complex changes, define business outcomes, establish structure, and move the needle in the right direction.

Introducing the Authors

DJ Feinstadt, Senior Consultant
DJ is a highly experienced Business Transformation Advisor, skilled in strategic planning, business solution architecture and project execution, gained from almost two decades working in utilities and biotechnology. Through roles with FortisBC, BC Hydro and the City of New Westminster, DJ has acquired substantial expertise in the electric utility industry, which enables him to identify opportunities for change and innovation, then lead cross-functional teams through the development of achievable implementation plans. He is passionate about applying analytical and process-based methodologies in his work and finding creative solutions to continuously improve business operations for clients.

Kai Hui, Senior Advisor
Kai is an experienced Information Technology and Solution Architecture leader with experience across multiple, international industry domains. He holds 30+ years of expertise spanning various aspects of Information Technology (IT) to Operational Technology (OT). He has a keen ability to navigate the complex landscape of technology delivery and drives innovation and efficiency while ensuring seamless integration of technology solutions to meet organizational goals. With a strategic vision and hands-on experience, he has spearheaded successful initiatives, from implementing cutting-edge smart metering systems to optimizing data networking infrastructure.

Travis Stevenson, President
Travis is an experienced management consultant with over 25 years of hands-on experience and expertise in driving smart infrastructure program design, delivery and operational effectiveness. Travis' experience spans working with electric, gas and water utilities, telecommunications companies, independent regulatory bodies, and provincial government organizations to drive sustainable business success. As a results-driven senior advisor known for his expansive relationships and an infectious energy, Travis and the rest of JTS' consulting team is regularly called upon to bring his experience and to deliver on complicated and specialized engagements and several multi-million-dollar, multi-vendor infrastructure programs, including playing a leadership role on a $1B utility advanced metering infrastructure program, as well as participating as an independent expert consultant for multiple provinces on major storm infrastructure response.

Tess Eriksson, Senior Vice President, Service Delivery
Tess is an industry expert with over 20 years of global expertise in program and project delivery and technology implementation, as well as a seasoned, strategic executive with a record of driving operational excellence, leading high-performing teams and having a steadfast commitment to delivering results. Tess brings significant experience in leading high-performing teams and a strong track-record of delivering results. She is known for taking on complex challenges and working with the team to put logical and meaningful solutions in place, with the business objectives firmly in focus.