All our energy.
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MARITIME ELECTRIC
A FORTIS COMPANY

November 25, 2022

Island Regulatory & Appeals Commission
PO Box 577
Charlottetown PE C1A 7L1

Dear Commissioners:

2022 Supplemental Capital Budget Request
Advanced Metering for Sustainable Electricification Project

Please find attached five copies of Maritime Electric's 2022 Supplemental Capital Budget Request Application for the Advanced Metering for Sustainable Electrification Project. The Advanced Metering for Sustainable Electrification Project involves replacing and upgrading the Company's current customer information and metering system.

An electronic copy will follow.

If you require further information, please do not hesitate to contact me at 902-629-3641.

Yours truly,

MARITIME ELECTRIC

Gloria Crockett

Gloria Crockett, CPA, CA
Manager, Regulatory & Financial Planning

GCC35
Enclosure

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C A N A D A

PROVINCE OF PRINCE EDWARD ISLAND

BEFORE THE ISLAND REGULATORY

AND APPEALS COMMISSION

IN THE MATTER of Section 17(1) of the *Electric Power Act* (R.S.P.E.I. 1988, Cap. E-4) and **IN THE MATTER** of the Application of Maritime Electric Company, Limited for the approval of a 2022 Supplemental Capital Budget Request for the Advanced Metering for Sustainable Electrification Project.

APPLICATION

AND

EVIDENCE OF

MARITIME ELECTRIC COMPANY, LIMITED

November 25, 2022

TABLE OF CONTENTS

1.0 APPLICATION

C A N A D A

PROVINCE OF PRINCE EDWARD ISLAND

BEFORE THE ISLAND REGULATORY AND APPEALS COMMISSION

IN THE MATTER of Section 17(1) of the *Electric Power Act* (R.S.P.E.I. 1988, Cap. E-4) and **IN THE MATTER** of the Application of Maritime Electric Company, Limited for the approval of the Advanced Metering for Sustainable Electrification Project.

Introduction

Maritime Electric Company, Limited ("Maritime Electric" or the "Company") is a corporation incorporated under the laws of Canada with its head or registered office at Charlottetown and carries on a business as a public utility subject to the *Electric Power Act* engaged in the production, purchase, transmission, distribution and sale of electricity within Prince Edward Island ("PEI").

Application

Maritime Electric hereby applies for an order of the Island Regulatory and Appeals Commission ("IRAC" or the "Commission") approving the capital expenditure of the Advanced Metering for Sustainable Electrification Project ("Project"). Upon Project completion, the assets will be included in Maritime Electric's rate base. In future, any capital expenditures required by Maritime Electric to replace these assets will be applied for as a part of the Company's annual capital budget application process.

The proposal contained in this Application represents a just and reasonable balance of the interests of Maritime Electric and those of its customers and will, if approved, allow the Company

to continue to operate and maintain these assets and perform necessary capital additions and improvements at a cost that is, in all circumstances, reasonable.

Procedure

Filed herewith is the Affidavit of Jason C. Roberts, T. Michelle Francis, Angus S. Orford and Enrique A. Riveroll which contains the evidence on which Maritime Electric relies in the Application

Dated at Charlottetown, Province of PEI, this 25th day of November, 2022.

D. Spencer Campbell, Q.C.

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65 Grafton Street, PO Box 2140
Charlottetown PE C1A 8B9
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Solicitors for Maritime Electric Company, Limited

2.0 AFFIDAVIT

C A N A D A

PROVINCE OF PRINCE EDWARD ISLAND

BEFORE THE ISLAND REGULATORY AND APPEALS COMMISSION

IN THE MATTER of Section 17(1) of the *Electric Power Act* (R.S.P.E.I. 1988, Cap. E-4) and **IN THE MATTER** of the Application of Maritime Electric Company, Limited for the approval of the Advanced Metering for Sustainable Electrification Project.

AFFIDAVIT

We, Jason C. Roberts of Suffolk, T. Michelle Francis of Emyvale, Angus S. Orford of Charlottetown and Enrique A. Riveroll of New Dominion, in Queens County, Province of Prince Edward Island, MAKE OATH AND SAY AS FOLLOWS:

We are the President and Chief Executive Officer, Vice President, Finance and Chief Financial Officer, Vice President, Corporate Planning and Energy Supply and Vice President, Sustainability and Customer Operations for Maritime Electric, respectively, and as such have personal knowledge of the matters deposed to herein, except where noted, in which case we rely upon the information of others and in which case we verily believe such information to be true.

Maritime Electric is a public utility subject to the provisions of the *Electric Power Act* engaged in the production, purchase, transmission, distribution and sale of electricity within PEI.

We prepared or supervised the preparation of the evidence and to the best of our knowledge and belief the evidence is true in substance and in fact.

Confidential Appendix E contains a proposed Order of the Commission based on the Company's Application.

SWORN TO SEVERALLY at
Charlottetown, Prince Edward Island,
the 25th day of November, 2022.

Jason C. Roberts

T. Michelle Francis

Angus S. Orford

Enrique A. Riveroll

A Commissioner for taking affidavits
in the Supreme Court of Prince Edward Island.

3.0 INTRODUCTION

3.1 Corporate Profile

Maritime Electric owns and operates a fully integrated power system providing for the purchase, generation, transmission, distribution and sale of electricity throughout PEI. The Company's head office is located in Charlottetown with generating facilities in Charlottetown and Borden-Carleton.

Maritime Electric is the primary provider of electricity on PEI delivering approximately 90 per cent of the electrical energy supplied to Islanders. To meet customer energy demand and supply requirements, the Company has contractual entitlement to capacity and energy from NB Power's Point Lepreau Nuclear Generating Station and an agreement for the purchase of capacity and system energy from NB Power delivered via four submarine cables owned by the Province of PEI. Through various contracts with the PEI Energy Corporation, the Company also purchases the capacity and energy from 92.5 megawatts ("MW") of wind generation on PEI.

Maritime Electric is a public utility subject to the PEI's *Electric Power Act*. As a public utility, the Company is subject to regulatory oversight and approvals of the Commission. IRAC's jurisdiction to regulate public utilities is found in the *Electric Power Act* and the *Island Regulatory and Appeals Commission Act*.

3.2 Purpose

Maritime Electric submits this supplemental capital budget request application ("Application") seeking approval of the Advanced Metering for Sustainable Electrification Project.

3.3 Background

The Advanced Metering for Sustainable Electrification Project involves replacing and upgrading the Company's current customer information and metering systems.

Customer Information System

Maritime Electric serves more than 86,000 customers throughout PEI, ranging from individual residents to large industrial operations. Customer information is retained within an internally developed Customer Information System ("CIS") software program that supports most customer service functions, as well as day-to-day, meter-to-cash operations. The CIS stores and provides

access to information associated with all active customer accounts and over 175,000 past accounts.[1] The CIS generates over one million customer bills each year, manages all customer payments, provides a record of customer inquiries and is the primary tool for maintaining customer relationships.

The CIS was originally programmed in-house using the COBOL language in the 1980s and had an expected service life of 20 years. The system was updated with a rewrite of the codebase in 2000 using PowerBuilder, and subsequent enhancements to facilitate the issuance of e-bills, provide customer self-service options, and generate customer correspondence concerning payment collection processes have since been added to extend its service life. The CIS has also evolved to integrate additional applications for meter orders, field maintenance, outage management, agent payments, line maintenance and work management. The CIS, as the primary database for all the customer information, is central to these associated applications.

The CIS is heavily reliant on the Maritime Electric information technology ("IT") staff for maintenance and continued operation. Technical support of the CIS software is limited to a small group of long-term IT employees. The ability to hire replacements with suitable skills and provide training on the customized system and its processes presents a significant challenge, and represents a material risk to business continuity. There is no support or expertise from an outside software developer if the existing system experiences an issue that impacts business operations. Other challenges associated with the existing CIS include a cumbersome process for creating reports using CIS data (or from an integrated application) that requires the involvement of IT staff, and increased difficulty ensuring CIS cybersecurity, which depends entirely upon in-house resources.

For several years, Maritime Electric has identified CIS as a strategic issue with risk factors including aged technology, reliance on a small group of in-house experts, lack of configuration functionality, and vulnerability to data privacy and cybersecurity breaches. The Company's IT department has done well to maintain the existing legacy CIS and complete upgrades as required

[1] Past accounts refer to inactive customer accounts. Most are accounts that have been closed due to changes in responsibility for accounts. For example, when a house is sold and changes hands, the original account is closed and a new one opened, even though the physical facilities remain the same. Information from both closed and new accounts remain in the CIS.

to suit Company operations, but the resource requirements to maintain this system are burdensome.

The existing legacy CIS has served the Company well over the past several decades, but it cannot be economically or efficiently integrated with newer software protocols or standards without time consuming and extensive rewrites of the existing codebase. In addition, it would be very difficult to fully leverage new technologies, even with extensive rewrites, due to the age of the CIS application's source code. While daily operations and business processes can still be performed by the current platform, modernization initiatives such as AMI technology and innovative rate structures would be impractical with Maritime Electric's legacy CIS still in use.

Metering Systems

Prior to 2005 Maritime Electric used mechanical meters which required Company staff to visually read each meter. Meters were typically read bimonthly, and customers were provided with an estimate of consumption in the intermediate months. Estimated values were often inaccurate and required a significant customer service effort to deal with customer concerns.

Maritime Electric implemented an automated meter reading system using radio frequency ("RF") meters beginning in 2005. This was a cost-effective system that greatly improved electricity consumption data collection, relative to the labour intensive process of manually reading mechanical meters. The Company began reading all meters on a monthly basis, while at the same time reducing the number of meter department staff from twenty to six.[2] The automated meter reading system improved accuracy and reduced the high volume of customer service and billing issues that resulted from missed or estimated readings.

RF meters typically broadcast a small number of data values. For most residential customers, the meter only broadcasts the current consumption value on the meter. This value is then compared to the previous month's reading, and a customer's bill is determined based on the difference between these two readings. A small number of meters (typically for General Service customers) also record and broadcast the highest demand measured during the past month.

[2] Presently, two of the six meter readers are able to complete the required meter reading activities and the remaining employees focus on connects, disconnects, meter installations, arrears collections, etc.

While RF meters provide significant metering and customer service cost savings for the Company, they have several limitations. First and foremost, they are broadcast-only meters, meaning that two-way communication with the meters is not possible. As such, any changes to the meter must be physically completed onsite or in the shop. In addition, their data collection processes are not designed to measure, record and transmit large amounts of customer usage data, nor do they record and broadcast any additional information or system status.

Advanced Metering Infrastructure ("AMI") is the next logical progression for Maritime Electric to modernize its metering capabilities, as it provides: a) meter readings at a frequency of one hour or less; b) a two-way communications system capable of collecting the metering information and meter status; and c) the ability to deliver remote connect/disconnect commands and software upgrades. The existing RF meter system does not have any of these capabilities.

3.4 Rationale and Necessity

Maritime Electric's energy sales and annual system peak load has been increasing steadily over the past several years, partially as a result of a government policy-driven conversion, from oil to electricity, for space heating. This trend is forecast to continue through 2040, when the Province expects all homes will use a non-emitting energy source (mainly electricity) as their primary heating system.[3] This conversion is expected to increase electricity sales by 35 per cent if the Province's forecast is met.[4] In addition, the Provincial and Federal Governments have stated goals of 100 per cent electric vehicle ("EV") sales by 2035, and the Province has set targets of 60 per cent of passenger vehicles and 40 per cent of medium and heavy duty vehicles on the road to be non-emitting by 2040.[5] Meeting this transportation electrification goal could result in an approximately 29 per cent increase in electricity sales as compared to 2021, and an additional 60 MW of load at system peak.[6,7]

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3 PEI 2040 Net Zero Framework - https://www.princeedwardisland.ca/sites/default/files/publications/2040_net_zero_framework.pdf.

4 Based on converting the 117,683 cubic metres of light fuel oil (Annual Statistical Review – 2021) to kilowatt hours, and assuming a coefficient of performance of 2.5 for heat pumps and an 80/20 split of heat pumps/resistive heat.

5 NRCan Zero Emission Vehicle Infrastructure Program website - https://www.nrcan.gc.ca/energy-efficiency/transportation-alternative-fuels/zero-emission-vehicle-infrastructure-program/21876.

6 Based on converting 60 per cent of 2021 taxed gasoline sales and 40 per cent of diesel sales (2020 PEI Statistical Review Tables 92 and 93) to electricity sales using conversions from NRCan Fuel Consumption Guide.

7 Based on a 20 per cent reduction in motor vehicles by 2040, 60 per cent of light duty and 40 per cent of medium/heavy duty vehicles converting to electric, and a demand of 1.25 kW per light duty vehicle and 2.5 kW per medium/heavy duty vehicle (per "*A First Look at the Impact of Electric Vehicle Charging on the Electric Grid in The EV Project*").

With electrification increasing, the Advanced Metering for Sustainable Electrification Project will modernize Maritime Electric's ability to interact with its customers and provide the Company with new ways to accommodate the increases in electricity consumption and peak demand that are forecast. The need to replace the legacy CIS, which is at the end of its service life, coincides well with the conversion to AMI given the interdependence of the two systems. The opportunity to procure and install new CIS and AMI products concurrently, will help to ensure that the technologies are well integrated and will provide the full range of expected benefits.

The PEI Energy Corporation has listed AMI as an important step in meeting its demand response strategy.[8] The Provincial Government is also supportive of the move to AMI, as it sees AMI as a key tool to supporting the Government's goals of electrification and increased renewable generation.

If the Company is able to influence when electricity consumption occurs through time-of-use or other innovative rate structures, the infrastructure investments and capacity costs that would otherwise increase significantly with electrification will be more manageable. An ability to influence when electricity consumption occurs will also help support the efficient use of on-Island renewable energy sources, by shifting load from peak to off-peak periods when surplus renewable energy might otherwise be exported to off-Island markets.

AMI will also be valuable during system outage events such as storms, equipment failure, vehicle accidents, etc., as it will enable the Company to see if a customer has power, or not. This will increase outage reporting accuracy, provide insight into the type of outage that occurred (e.g., line or individual outage), and help with damage assessment and the estimation of restoration timelines. Recent experience during the response to Hurricane Fiona highlighted a need for real-time outage data and earlier provision of restoration timelines.

As it is not practical or feasible for the legacy CIS and RF metering system to support innovations that can impact customer-usage patterns, including innovative rate structures, the Advanced Metering for Sustainable Electrification Project must proceed now, as proposed.

[8] Page 26 of Appendix A - 2022-23 to 2024-25 Electricity Efficiency and Conservation Plan filed with the Commission.

4.0 PROPOSED CAPITAL INVESTMENT $ 47,585,000

The Advanced Metering for Sustainable Electrification Project is proposed as a multi-year capital investment involving two interdependent projects that are required for Maritime Electric to upgrade its existing customer information and metering systems with new technologies. The project components are:

a. Replacement of the existing legacy CIS with a commercially available product; and
b. Replacement of the existing RF metering system with AMI technology.

On a broad basis, the Advanced Metering for Sustainable Electrification Project will deliver benefits to Maritime Electric and its customers, including:

- Enhanced customer service and self-service, through access to detailed account and electricity usage information;
- Improved reliability for customers through automatic outage notification;
- Modernization of the electrical grid through two-way communication with meters at customer premises;
- The opportunity to design and implement innovative rate structures, such as time-of-use billing; and
- Future innovations to enhance services to customers such as increased distribution system automation (e.g., remote connect/disconnect), ability to support home automation (e.g., smart homes/appliances) and demand response, streetlight monitoring, and ability to control EV charging or vehicle-to-grid capabilities.

Specifically regarding the CIS, replacement is also necessary due to the age of the system, technological obsolescence and a diminishing availability of software technicians capable of maintaining and supporting the system.

The proposed multi-year budget for the Advanced Metering for Sustainable Electrification Project is shown in Table 1.

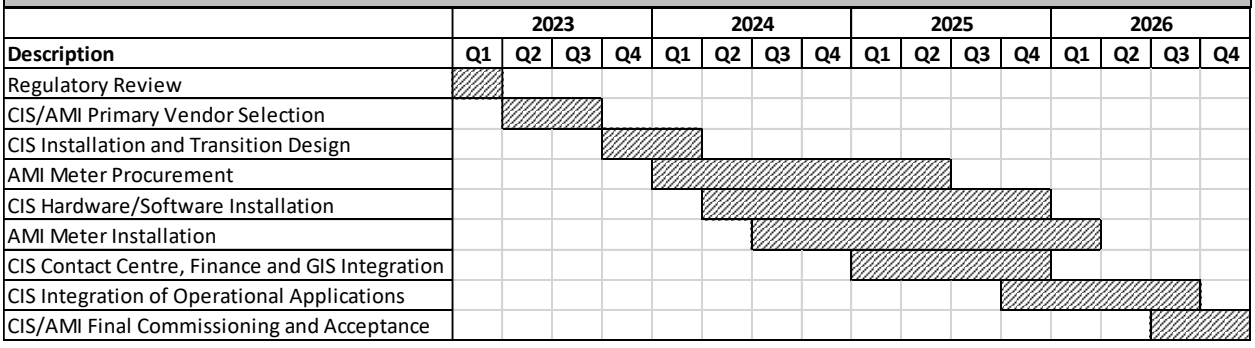
Table 1
Advanced Metering for Sustainable Electrification Project
Multi-Year Budget

Description	2023	2024	2025	2026	Total Budget
Customer Information System	$ 3,190,000	$ 6,450,000	$ 6,355,000	$ 5,540,000	$ 21,535,000
Advanced Metering Infrastructure	-	12,585,000	11,825,000	1,640,000	26,050,000
Total	**$ 3,190,000**	**$19,035,000**	**$18,180,000**	**$ 7,180,000**	**$ 47,585,000**

The CIS and AMI components of the Advanced Metering for Sustainable Electrification Project will run in parallel. Independent project teams will be established for each component of the Project comprised of existing Maritime Electric employees, new employees hired specifically for the project, and outside consultants specializing in CIS and AMI. Executive oversight and periodic coordination meetings will ensure that the independent components of the project are properly coordinated with each other and with day-to-day operations.

The proposed multi-year schedule for the Advanced Metering for Sustainable Electrification Project is shown in Figure 1.

Figure 1
Advanced Metering for Sustainable Electrification Project
Multi-Year Schedule



4.1 Customer Information System (Work Support Services) $ 21,535,000

The existing legacy CIS has evolved over the past 35 years and is critical to many of Maritime Electric's core business functions. The CIS is the primary software program for the Company's contact centre operations, and many other key software programs are imbedded within it, such as outage management, field maintenance, agent payments, line maintenance and work

management. Corporate planning activities have highlighted the need to examine the existing CIS, as continued operation of the system through obsolescence exposes the Company to a high degree of business continuity risk.

Maritime Electric's 2021 Capital Budget Application included $330,000 for a Customer Information System/Billing project that involved hiring a consultant to provide expertise and assist the Company with defining its CIS requirements, identifying potential solutions, developing a business case and providing a plan for migrating to a new CIS system.[9] TMG Consulting, Inc. ("TMG") was hired by the Company as the subject matter expert.

The process of defining Maritime Electric's CIS requirements involved a comprehensive assessment that included:

- A review of the legacy CIS and integrated applications through interviews and supporting documentation;
- An assessment of the legacy CIS and integrated applications through system demonstrations, functional fit comparisons, business fit assessments, and technical assessments;
- A series of workshops to capture the executive business vision, the business environment, and the technical environment;
- A function and features workshop to define new requirements and grade the legacy CIS; and
- Definition and evaluation of alternative strategies to retain, enhance, migrate, or replace the current systems, and selection of the optimal alternative strategy.

The results of TMG's assessment work is documented in the *Digital Solution Roadmap, Project Report Summary* ("TMG Report"), provided as Appendix A. The TMG Report identified issues of concern associated with continuing to operate the legacy CIS, which included:

[9] The 2021 Capital Budget was approved by Commission Order UE21-02.

- AMI integration – The legacy CIS was not built to process the volume of data associated with AMI, and modifying it to accommodate innovative rate structures would be impractical;
- Dated codebase with diminishing ability to support – The legacy CIS was developed using a PowerBuilder framework that is outdated with diminishing available resources for technical support. The ability to use and support the system is also challenging due to a lack of development and end-user documentation;
- Data analytics and reporting limitations – Access to data for analysis and reporting is labour intensive, requiring IT staff to extract the raw data from servers for custom development of analytic methodologies and reports; and
- Increasing customer support requirements – As customers increasingly rely on electricity for heating, cooling and transportation, they will need to better understand and manage their energy usage through two-way communication with the utility. Advanced customer communication capabilities would require extensive modifications to the legacy CIS, but are readily available in modern CIS systems.

Continued reliance on the existing legacy CIS would require ongoing investment to modernize outdated and inflexible technology, and to secure and retain the staff resources needed to support it on an ongoing basis. Even with such a commitment, it is not practical or feasible to upgrade the legacy CIS to support new technologies such as AMI, rendering it functionally obsolete and forcing its replacement.

Maritime Electric intends to replace its legacy CIS with a commercial off-the-shelf core CIS product over a three-year period. The commercial CIS vendor is expected to provide a product that can be integrated with AMI and specific third-party applications currently used by Maritime Electric, and also has integrated add-on applications to deliver a fully-integrated solution as itemized in Table 2. The alternative, a core CIS with extended products from multiple third-party suppliers, will only be considered if the supplier of the core CIS provides and supports the integration.

Table 2 Advanced Metering for Sustainable Electrification Project CIS Integrated Solution Components			
	Description	**Status**	**Deliverable**
1.	Core Customer Information System	New	Software
2.	Customer Interaction Centre	New	Application
3.	Electronic Bill Representation and Payment	New	Application
4.	Advanced Metering Infrastructure	New	Integration
5.	Meter Data Management	New	Application
6.	Great Plains Financial	Existing	Integration
7.	Data Analytics and Reporting	New	Application
8.	ESRI Geographic Information System	Existing	Integration
9.	Outage Management System	New	Application
10.	Work and Asset Management	New	Application
11.	Mobile Workforce Management	New	Application

The core CIS and integrated applications are also expected to be purchased as an on-premise ("OnPrem") platform with a perpetual license. OnPrem refers to a platform where the software is hosted within Maritime Electric's facilities as opposed to using cloud-based computing. This avoids the risk associated with internet connectivity issues, especially during extreme weather events when the CIS is critically important to outage management and restoration. Potential vendors will be required to prove that the OnPrem solution includes a supported cloud migration path if the Company elects to transition to cloud based in the future. Perpetual license refers to software purchased upfront by the owner with ongoing maintenance and support provided by the vendor through a licensing fee. The license will require annual renewal at a predetermined rate to provide continuous system maintenance and support. Through the license, the software would also receive regular patch upgrades and purchased release upgrades, similar to many software products operated by the Company today.

The new CIS will be implemented using a phased approach that involves replacing the legacy CIS first, followed by sequential replacement of its integrated applications. Not all products will be launched in one step. Rather, once the transition to the new CIS is complete, the existing integrated applications will be supplied data from the new CIS using temporary interfaces developed by Maritime Electric IT staff. This will allow for a start-to-finish implementation process that ensures all utility operations remain fully functional through all phases. As the new integrated

applications are phased into use, the corresponding existing applications will be retired along with the temporary interfaces.

Business, technical and other target state considerations are detailed in the TMG Report and will be used to inform the supplier requirements listed in the technical specifications for a fully integrated CIS solution. This will be issued to prospective vendors following Commission approval.

Justification

The replacement of the existing legacy CIS is primarily justified based on the age and technological obsolescence of the software which is now difficult to modify, maintain and support. Where minor enhancements to legacy systems are time consuming and cost prohibitive, software based on new technologies and more open architecture are platform independent and, as such, are easier to use, customize and maintain. The legacy CIS is also limited in its ability to accommodate programming changes that involve processing large amounts of data and is increasingly vulnerable to data privacy and cybersecurity breaches. In addition, the legacy CIS is highly reliant on a limited number of long-serving IT staff who will be difficult to replace if there is an ongoing need to support and maintain the legacy CIS software.

Costing Methodology

A breakdown of the proposed multi-year budget that is required to upgrade to a new CIS is shown in Table 3.

Table 3 Customer Information System Multi-Year Budget					
Description	**2023**	**2024**	**2025**	**2026**	**Total Budget**
Software	$ 300,000	$ 1,020,000	$ 800,000	$ 350,000	$ 2,470,000
Hardware	25,000	85,000	105,000	-	215,000
Vendor Labour	1,190,000	2,075,000	2,100,000	2,125,000	7,490,000
Internal Labour	490,000	1,050,000	1,060,000	1,065,000	3,665,000
Owners Engineer	260,000	795,000	810,000	735,000	2,600,000
Other Project Costs[a]	105,000	150,000	220,000	160,000	635,000
Contingency	350,000	805,000	790,000	635,000	2,580,000
Subtotal	**2,720,000**	**5,980,000**	**5,885,000**	**5,070,000**	**19,655,000**
Maintenance During Project	470,000	470,000	470,000	470,000	1,880,000
Total	**$ 3,190,000**	**$ 6,450,000**	**$ 6,355,000**	**$ 5,540,000**	**$ 21,535,000**

a. Costs associated with project facilities and related equipment/supplies, communications, travel/accommodations and related expenses, professional fees, etc.

All maintenance and licensing costs incurred before the final go-live period, identified as Maintenance During Project in Table 3, will be considered capital costs.[10] Training costs for end users and maintenance fees incurred following the final CIS software launch will be considered part of the Company's operating budget.

The budget shown in Table 3 is based on cost estimates in the TMG Report, provided as Appendix A.

Replacing the legacy CIS will be a significant undertaking for Maritime Electric and will require input and support from all Company departments and an external consultant. Approximately 45 per cent of the estimated 85,000 work hours required to complete the replacement will be provided by the CIS vendor, with the remaining 55 per cent being provided by Maritime Electric and its consultant. This will require additional internal labour resources, in addition to the existing IT departmental staff, throughout the three-year implementation period.

The internal labour that will be required is expected to be a combination of existing senior employees and new IT department hires to support the legacy CIS replacement. The positions

[10] An annual maintenance fee for the new software is anticipated as part of the initial contract cost.

left vacant by existing employees assigned to CIS replacement will be temporarily backfilled so that all departments can continue to perform their existing functions during the CIS replacement period.

Upon Commission approval, Maritime Electric anticipates a six-month CIS procurement period involving solicitation of vendor proposals, vendor selection and contract negotiation. Focus will then shift to system design and implementation. Introduction of the new system will be methodical, and significant testing will be required prior to go-live launch for each product. The team will work to operationalize several systems at any given time, but will stagger their implementation where possible. Each platform will be monitored closely following launch and the existing legacy CIS, and some of its integrated applications, are expected to continue to operate in parallel until project completion. The timeline will vary based on the specific vendor's execution strategy.

Within the Advanced Metering for Sustainable Electrification Project, the AMI component is interdependent on a CIS that is capable of receiving and processing the large volume of metering data that will be generated once AMI is operational throughout the province. Conversely, the requirement for a new CIS is not interdependent on AMI, as the legacy CIS must be replaced due to age, technological obsolescence and the diminishing availability of software technicians with the expertise to maintain and support the system.

To ensure the CIS replacement is completed at the lowest possible cost, all materials and external labour will be obtained through a combination of competitive procurement processes and sole source purchase (e.g., where materials and services are best supplied by preferred vendors and service providers for reasons such as product quality and availability, or where specific expertise is known to exist).

Alternatives

The only alternatives to replacing the legacy CIS with a commercially available product are to continue operating the current system as is, with no AMI compatibility, or to rewrite the codebase so that it is at least partially able to receive and process AMI data. Neither of these alternatives are preferable to the proposed solution, as the risks to business continuity and significant peak load growth warrant a CIS that can exploit the full range of potential AMI benefits.

Future Commitments

This is a multi-year project that is to be completed over four years, from 2023 to 2026. If there are any material changes to the evidence provided herein, including changes in scope, budget or schedule subsequent to approval, further supporting evidence will be provided to the Commission.

4.2 Advanced Metering Infrastructure (Justifiable) $ 26,050,000

Electricity usage is presently increasing at a significant rate in PEI, driven primarily by population growth and clean-energy electrification initiatives.[11] The resulting increases in consumption are putting pressure on the electrical system and will drive significant infrastructure upgrades and capacity requirements in the future, if current consumption patterns continue.

PEI's annual system peak load has historically occurred in the winter and during the hour ending at 18:00, which coincides with a large number of customers returning home from their daily activities, when it is typically cold and dark outside. Electrified transportation has the potential to significantly add to this peak load, as customers will have a tendency to plug in their EV when they get home, leading to large demand increases, unless they have sufficient incentive to charge during off-peak hours.

In 2020, the Commission directed Maritime Electric to investigate and consider the implementation of an "innovative rate structure" as a tool to help mitigate the projected infrastructure and capacity cost impacts of the electrification of space heating and transportation.[12] With PEI's energy and demand profiles, any future innovative rate structure will likely need incentives to shift load from peak to off-peak periods. Through shifting load to off-peak times, the electrical system has the potential to supply more energy, without incurring significant additional infrastructure or capacity costs. This approach will require hourly (or more frequent) meter readings and associated communications capabilities, to transmit vast amounts of data from customer meters to centralized data processors.

Hourly meter readings are beyond the capabilities of the existing RF meters, which are currently read once per month using vehicle drive-past technology. As the foundational data that will enable

[11] Maritime Electric's total system load increased 2.9 per cent in 2021 compared to 2020 and 10.5 per cent since 2016 (5 years) – PEI Annual Statistical Review - 2021.

[12] Paragraph 203, in Section 15.4 – Rate Structures of Order UE20-06 - General Rate Application.

system modernization go beyond what can be achieved with RF meters, AMI must be considered as it is the next logical progression in metering capability. Without detailed insight into customer consumption patterns, Maritime Electric will be limited in its ability to influence customer energy usage.

Maritime Electric's 2020 Capital Budget Application included $300,000 for a Smart Meters project that involved hiring a consultant to provide expertise and assist the Company with assessing the financial viability and potential benefits of AMI, scoping an AMI system design, identifying AMI risks and mitigation strategies, and developing an AMI deployment strategy. The project was approved as a part of the 2020 Capital Budget and Util-Assist Inc. was hired by the Company as the subject-matter expert.[13]

The process followed by Util-Assist to determine Maritime Electric's AMI requirements involved educational sessions with Company staff to highlight the differences between an AMI system and the existing RF based system, and workshop sessions to review AMI conversion and deployment issues based on past Util-Assist engagements. The Company then made decisions on the criticality of certain requirements, concerning issues such as functionality, security, and service level agreements. The sessions provided information on the technology and the vendor landscape, and provided the opportunity to compile a comprehensive requirements list.

Util-Assist documented the process and results of its work for Maritime Electric in the report *Business Case for Advanced Metering Infrastructure for Maritime Electric Company, Limited* ("Util-Assist Report") provided as Appendix B. The Util-Assist Report describes a typical AMI project as consisting of automated two-way metering technology and network infrastructure, as well as implementation and integration services. The Util-Assist Report also states that an AMI system generally involves the following component technologies:

- Smart meters with communication modules (to collect and transmit meter data);
- Data collectors (to collect data from meters and transmit that data to the head-end system);[14]

[13] The 2020 Capital Budget was approved by Commission Order UE19-09.

[14] The head-end system provides short-term storage of data before it is moved to the MDM where long-term storage is provided. The definition of short-term versus long-term depends on the volume of data and system design.

- AMI head-end system and software (to receive and store data – short-term storage); and
- A meter data management ("MDM") system (to store, analyze, validate and edit meter data).[15]

Util-Assist and Maritime Electric have started to develop the AMI system requirements which will be used to solicit proposals from prospective AMI vendors, and the Company has communicated with Nova Scotia Power ("NSP") and NB Power ("NBP") regarding their ongoing AMI projects.[16] Maritime Electric has paid particular attention to issues that have occurred in the NSP and NBP projects with the goal of avoiding these issues in its own AMI upgrade.

Following Commission approval to proceed, the Company will seek proposals from prospective vendors, and once the preferred vendor is selected, it will:

- Work with the selected vendor to determine the specific components and better define the Company's requirements, as each vendor will offer slightly different solutions;
- Confirm the exact equipment and communication network design to be supplied, and negotiate final contract terms and conditions; and
- Work with the vendor to ensure that the necessary equipment/infrastructure is ordered and delivered to site in a timely and reliable manner.

The installation portion of the conversion to AMI will vary depending on the successful vendor. Installation will likely begin with the head-end system, and the collectors or repeaters required to send the large quantities of data back to this head-end system. This collector/head-end system will be tested and commissioned while the existing RF meters will continue to operate as they do today. The next step will be to deploy the smart meters in a small area such as a substation or a single feeder/circuit from a substation. Each smart meter installation must be tested to ensure it is communicating with the collector system, and meter data is being correctly relayed back to the head-end system.

[15] MDM is identified by Util-Assist as an AMI component technology based on its function as a bridge tool between AMI and CIS; however, it is included as a component of CIS for this project to ensure seamless CIS integration.

[16] Util-Assist is also involved in both AMI upgrade projects (NSP and NBP) and therefore is aware of the details of these projects.

Once the system is operating as expected in the initial test area, full deployment of AMI will begin in a systematic manner. Collector systems will be installed in defined areas and once operational, the installation team will follow with smart meters in the same area. This will ensure the installation team is nearby and able to respond quickly should there be issues with recently installed meters. During the AMI system installation period, AMI meters will be read through the new communication system while the remaining RF meters will continue to be read by the drive-by meter reading equipment.

After the AMI system has been fully deployed and all RF meters have been removed from operation, the system will continue to operate based on monthly consumption billing for a considerable time. During this period, the MDM, CIS, billing and other systems will run monthly consumption and interval data in parallel, testing and debugging the full operation of the system.

Initial, near-term and potential future benefits of AMI include:

Initial Benefits

- Information to better serve customers, as the Company will be able to see each meter in almost real time along with its associated hourly historic data;
- Remote meter reading and connect/disconnect capability, significantly reducing labour and travel costs associated with these activities;
- Customer ability to access their consumption data and see the results of their conservation efforts on a much more rapid and granular level than today;
- Capability to receive and process inputs, like remote connect/disconnect commands, or over-the-air updates; and
- Capability to output alerts and alarms to notify the Company about power quality or outage issues, with the latter providing customer connection status information during a system outage event, such as was recently experienced with Hurricane Fiona.

Near-Term Benefits

- Opportunity to introduce innovative rate structures such as time-of-use rates, which would provide customers with incentive to shift their consumption from peak to off-peak periods;

- Potential for advanced analytics to identify or predict system issues such as transformer overloading, and contribute to load forecasting, capacity planning and demand management; and
- Potential for conservation voltage reduction, to reduce energy consumption and demand by dynamically optimizing voltage levels throughout the system automatically, based on real-time data analytics.

Potential Future Benefits

- The ability to provide customer notifications, such as up to date information prior to or during power outages, which could include details such as expected outage duration and cause;
- Disaggregation of customer load through analyzing the specific signature of appliances connected behind the meter and helping to locate inefficiencies, predict equipment failures, and identify phantom loads;[17]
- The ability to use digital twin virtual models to help gain real-time and predictive insights on performance of assets, including better integration of distributed energy resources;
- Ability to communicate with customer home area network devices through a field area network, which could enable future control and management of customer-owned devices such as water heaters or EV chargers; and
- Potential to increase distribution system automation through increased access to information on system conditions and status.

Many of these additional services and future capabilities will take time to implement, with considerable testing and debugging required before each is launched. A customer web portal will likely be the first new service to be implemented. Innovative rate structures will require at least one year's interval data before a study can be initiated, and likely another year of data analysis and rate design work. The Company will require a minimum of two years after completion of both the CIS and AMI components of this project before it is in a position to make application to the Commission for implementation of innovative rate structures.

[17] Phantom loads are devices that continue to use energy and drain power, even when they are turned off. These energy draining devices account for at least 5 per cent of electricity used in the average Canadian home according to NRCan - https://www.rncan.gc.ca/sites/www.nrcan.gc.ca/files/energy/pdf/energystar/Standby-Power-brochure-eng.pdf.

Justification

The proposed conversion from RF metering to AMI is primarily justified on the need to alter customer consumption patterns in a way that will shift load to off-peak periods, and to generate and collect the customer usage data that will be needed to accurately bill customers based on the amount and timing of their energy consumption. Without the ability to incent load shifting from peak to off-peak periods, there is significant potential for peak load growth to drive system infrastructure and capacity costs well beyond where they could otherwise be, over a relatively short timeframe. Other justifications include benefits to the utility and its customers, such as more informative customer service and customer self-service capabilities, remote connection/disconnection of customers, and two-way communications with customer meters to provide connection status and options for customer load management.

Costing Methodology

A breakdown of the proposed multi-year budget that is required to replace the existing RF metering system with AMI is shown in Table 4.

Table 4
Advanced Metering Infrastructure
Multi-Year Budget

Description	2023	2024	2025	2026	Total Budget
Meter Equipment	$ -	$ 6,500,000	$ 4,440,000	$ -	$ 10,940,000
Meter Vendor Services	-	3,440,000	2,290,000	-	5,730,000
Meter Installation[a]	-	800,000	1,300,000	500,000	2,600,000
Network Infrastructure	-	365,000	935,000	-	1,300,000
Head-End System	-	440,000	1,130,000	-	1,570,000
Internal Labour and Transportation	-	320,000	350,000	380,000	1,050,000
System Upgrade[b]	-	600,000	1,000,000	480,000	2,080,000
Professional Services	-	120,000	260,000	140,000	520,000
Customer Support[c]	-	-	120,000	140,000	260,000
Total	**$ -**	**$ 12,585,000**	**$ 11,825,000**	**$ 1,640,000**	**$ 26,050,000**

a. Costs for services provided by an outsourced contractor to carry out meter installations during the initial mass deployment.
b. Costs associated with enabling integration capabilities, as well as up-front work to build necessary interfaces.
c. Costs associated with educating customers on the AMI initiative.

The budget in Table 4 is based on cost estimates in the Util-Assist Report, provided as Appendix B. A contingency allocation of approximately 2 per cent is included in the estimates.

The AMI component of the Advanced Metering for Sustainable Electrification Project has a larger overall budget, as compared to the CIS component, but with significant infrastructure and outside labour components there is less internal labour required by Maritime Electric employees. Util-Assist has estimated an internal labour requirement of approximately $1.0 million. This includes a full-time AMI lead position to manage the installation services vendor and system integrator vendor throughout the project. A metering/customer service lead, IT lead, and safety and field operations supervisor will support the AMI lead through different stages of the project. Additional support will be required for the IT lead and metering/customer service lead, as well as support from other Company departments at different stages of the project. It is estimated that the average labour requirement from Maritime Electric will be 2.5 to 3 full time equivalent positions.

Most of the labour costs incurred during the AMI component of the project will be considered capital costs rather than operational expenses. All maintenance and licensing costs incurred before the final go-live period will be considered capital expenses. Training costs for technical staff, and maintenance fees incurred following final AMI commissioning and acceptance, will be considered part of the Company's operating budget.

Maritime Electric intends to select the successful AMI vendor within six months of receiving Commission approval to proceed. Final system planning and design will occur while contract negotiations are being completed. Maritime Electric will ensure that the meters, communication equipment and all other equipment required for the project is ordered as early as possible to help avoid delays due to component availability, an issue that has impacted AMI rollout in neighboring provinces. Maritime Electric expects to begin installation of the communication network and head-end system within nine months of vendor selection. This phase is expected to take 6 to 9 months. The initial communication system installation will focus on the area where the phase one meter deployment will occur, allowing this initial rollout of meters to occur within the same 6 to 9 month timeframe. The initial rollout of meters is expected to occur over 1 to 2 months and full deployment will require 18 to 24 months. The timeline may vary based on the AMI vendor's execution strategy.

The AMI conversion project is interdependent with the CIS replacement project as AMI will require a CIS that is capable of receiving and processing the large volume of meter data that will be generated once AMI is operational throughout the province.

To ensure the AMI conversion is completed at the lowest possible cost, all materials and external labour will be obtained through a combination of competitive procurement processes and sole source purchases (e.g., where materials and services are best supplied by preferred vendors and service providers for reasons such as product quality and availability, or where specific expertise is known to exist).

Alternatives

The only alternatives to replacing the RF meters with AMI are to continue operating the RF metering system as is, or to replace them with new RF Bridge meters that can record hourly consumption data.[18] Neither of these alternatives are preferable as part of the overall Advanced Metering for Sustainable Electrification Project, as the existing RF meters cannot be used to support innovative rate structures, such as time-of-use billing, and RF Bridge meters capable of recording hourly consumption data would significantly slow down the drive-by meter reading process used today, requiring more staff and vehicles if deployed Island wide. Also, RF Bridge meters would not include additional benefits available with AMI, such as remote connect/disconnect, outage alerts, remote updates and future enabling technologies, as they do not have two-way communications.

Future Commitments

This is a multi-year project that is to be completed over three years, from 2024 to 2026. If there are any changes to the evidence provided herein, including changes in scope, budget or schedule subsequent to approval, further supporting evidence will be provided to the Commission.

[18] RF meters that can record hourly consumption data, known as Bridge meters, were customized meters used by Maritime Electric for a Residential and General Service Customer Load Study at roughly 600 customer locations installed in 2019 and 2020. They continue to gather data that can be analyzed by the Company for customer usage patterns.

5.0 ESTIMATED IMPACT ON RATE BASE, REVENUE REQUIREMENT AND CUSTOMER RATES

In accordance with the Capital Expenditure Justification Criteria, this section provides an estimate of the impact of the proposed Application on rate base, revenue requirement and customer rates. The Company's General Rate Application ("GRA") filed June 20, 2022, includes the impact of this project.

Maritime Electric's forecast annual return on rate base includes the combined cost of debt and equity in a given year and is equivalent to the Company's weighted average cost of capital for that year. The return on rate base will fluctuate over the life of the assets as new debt is issued and if the Company's return on average common equity, as approved by the Commission, changes. Table 5 provides the Company's estimated return on rate base from 2023 to 2030 for the Advanced Metering for Sustainable Electrification Project, based on its current forecast return on rate base of 6.9 per cent.[19]

Table 5
Advanced Metering for Sustainable Electrification Project
Estimated Rate Base Increase and Return on Rate Base for 2023 to 2030

Year	Increase in Rate Base ($)	Annual Return on Rate Base[a] ($)
2023	1,621,000	57,000
2024	9,001,000	252,000
2025	11,569,000	15,000
2026	14,649,000	290,000
2027	13,664,000	941,000
2028	14,889,000	1,026,000
2029	14,861,000	1,024,000
2030	14,394,000	991,000

a. The 2023 through 2026 Annual Return on Rate Base is net of an allocation to Capital for Interest During Construction.

The annual return on rate base is one component of the increase in annual revenue requirement of the project. Revenue requirement will also increase by the incremental depreciation expense, operating expenses, and income tax costs associated with the project. Table 6 provides an estimate of the annual revenue requirement from the proposed project for the next eight years.

[19] 2023 to 2025 forecast return on rate base was provided in Table 6-7 of the Company's GRA.

Table 6
Advanced Metering for Sustainable Electrification Project
Estimated Annual Revenue Requirement for 2023 to 2030

Year	Return on Rate Base A	Annual Depreciation [a] B	Operating Expenses [b] C	Annual Tax Expense D	Annual Revenue Requirement A+B+C+D = E
2023	57,000	-	-	14,000	71,000
2024	252,000	91,000	-	79,000	422,000
2025	15,000	1,087,000	-	101,000	1,203,000
2026	290,000	1,658,000	239,000	128,000	2,315,000
2027	941,000	1,951,000	1,329,000	119,000	4,340,000
2028	1,026,000	2,045,000	1,437,000	130,000	4,638,000
2029	1,024,000	2,196,000	1,425,000	130,000	4,775,000
2030	991,000	2,299,000	1,451,000	126,000	4,867,000

a. Depreciation estimate based on the recommended 2020 Depreciation Study rates adopted as proposed in the GRA filed on June 20, 2022.
b. Operating expense estimates were provided by third party experts TMG and Util-Assist.

If approved, the estimated increase in revenue requirement will be recovered from customers through the proposed rates, tolls and charges for electric service. Table 7 shows the estimated impact on revenue requirement expressed as a rate per kilowatt hour ("kWh") and an estimate of the increase in annual cost for electric service for a customer in Maritime Electric's Residential and General Service ("GS") rate classes based on a benchmark energy consumption level.

Table 7
Advanced Metering for Sustainable Electrification Project
Annual Rate Impact of Application on Distribution Customer Rates and Cost for 2023 to 2030

Year	Annual Revenue Requirement ($) A	Forecast Sales (kWh) [a] B	Cost per kWh ($) C = A/B	Annual Cost ($) Residential using 650 kWh per month D = C x 650 kWh x 12 months	Annual Cost ($) GS using 10,000 kWh per month E = C x 10,000 kWh x 12 months
2023	71,000	1,391,749,000	0.00005	0.39	6.00
2024	422,000	1,412,245,000	0.00030	2.34	36.00
2025	1,203,000	1,431,087,000	0.00084	6.55	100.80
2026	2,315,000	1,454,557,000	0.00159	12.40	190.80
2027	4,340,000	1,478,412,000	0.00294	22.93	352.80
2028	4,638,000	1,502,657,000	0.00309	24.10	370.80
2029	4,775,000	1,527,301,000	0.00313	24.41	375.60
2030	4,867,000	1,552,349,000	0.00314	24.49	376.80

a. GRA forecast sales for 2023 to 2025, forecast sales for 2026 to 2030 reflect a 1.64 per cent average annual growth.

APPENDIX A

TMG Consulting Report

Digital Solution Roadmap

Project Report Summary

MARITIME ELECTRIC
A FORTIS COMPANY

April 1st, 2022 DIGITAL SOLUTION ROADMAP PROJECT REPORT SUMMARY

TMG Consulting
Where Business and Technology Intersect

April 1, 2022

Table of Contents

April 1, 2022

Mr. Greg MacPhail
Greg.MacPhail@maritimeelectric.com
Phone: 902-629-3639
Manager, Information Technology & Metering
Maritime Electric
180 Kent Street, Charlottetown, PE C1A 7N2

Dear Mr. McPhail:

Thank you for the opportunity to collaborate with you and your colleagues at Maritime Electric (MECL). TMG Consulting, Inc. (TMG), is pleased to submit this 2022 DSR Project Report Summary which provides a summary of the process that the project team underwent to formulate replacement of MECL's comprehensive Customer Information System (CIS) with an on-premise COTS solution.

In addition to this summary report, TMG has provided an executive summary presentation, and a detailed report presentation under separate cover.

Please contact me with any questions you may have regarding this DSR Report Summary.

Sincerely,

Greg Galluzzi
Greg.Galluzzi@tmgconsulting.com
Phone: 512-757-1156
Executive Vice President
TMG Consulting, Inc.

1. Introduction

TMG Consulting, Inc. (TMG) was engaged by Maritime Electric to develop a Digital Solution RoadMap for its current CIS System analyzing the options of retaining (Status Quo), extending, modernizing, or replacing the current system.

1.1 Project Participants

Consultants from TMG along with a core team of MECL user and technical personnel participated in the effort. The following tables identify project participants.

MECL Participants	Position
Greg MacPhail	CIO
Rolly Young	Finance
Gloria Crockett	Business
Kate O'Brien	Business
Mike Smith	IT Analyst

TMG Participants	Position
Mario Bauer	Executive
Greg Galluzzi	CIS Expert/PM
Alec O'Brien	CIS Expert/Consultant
Jakob Clark	Advisory Consultant

MECL participated as required in scheduled workshops, meetings, interviews, etc. TMG budgeted 1 FTE and assigned two other consultants participating in project activities under a fixed price contract. TMG expended approximately 1,600 hours across the entire effort MECL conducted around 1,280 hours.

1.2 Project Timeframe

The project initiated in May 2021 with a planned 4-month or 16-week project timeframe. There was a partial shutdown in August for project participants resulting in a 5-month project. A few project activities extended through actual completion in mid-November 2021.

1.3 Project Activities

The project followed a proven methodology planned for 16-weeks across the following specific activities:

1. **Project Initiation (1-week)**. Conducted project planning activities to make sure it started successfully. The project was organized, and a kick-off conducted. An information request was developed, and information gathered along with interviews were conducted. This information was utilized to feed into all subsequent project activities.

2. **Current State Analysis (3-weeks).** Performance of a Current State Analysis of the legacy CIS environment, for 80,000 Electric Customers the business and customer service organizations, the workforce, business processes, business systems, business applications, supporting systems, systems infrastructure, and organizational dependencies on enterprise IT infrastructure and supporting utility systems. This Current State Analysis resulted in a statement of effectiveness of the current Business and IT environment and the identification of where improvements can be made across all areas of this analysis.

3. **Strategic Analysis (2-weeks)** Performance of a Strategic Analysis to identify the target state for business operations and supporting technologies. This resulted in a strategic recommendation for improvements and/or an implementation/upgrade plan for core and supporting technologies that achieves economic, financial, and operational goals. In addition, this Strategic Analysis resulted in recommendations regarding how MECL can increase customer engagement via the customer portal and strategic direction of adopting emerging technologies based on customer needs that can be supported by viable investment plans and are aligned with MECL's enterprise budget. Business and technology options were identified and feed into the next step, Solution Analysis.

4. **Solution Analysis (2 weeks).** Performance of a Solution Analysis to analyze specific options which are available to MECL regarding the current CIS and related business and technical operations in support of the Strategic Analysis. Based on this analysis an optimum solution was identified and fed into the Financial Analysis

5. **Financial Analysis (2 weeks).** Performance of a Financial Analysis which resulted in a responsible plan of operations regarding the optimum solution. TMG provided a solution implementation roadmap reflecting the timing and build sequence of the solution components, an implementation budget for the solution, an associated disbursement schedule, resource requirements, and ongoing operational costs associated with the solution in line with the implementation roadmap.

6. **Digital Solution Delivery (2-weeks).** Development of a Digital Solution Roadmap with consolidated findings from the previous activities and implementation roadmap, budget, resource requirements, and ongoing costs from the Financial Analysis. An initial Digital Solution Roadmap report. This information flowed into the next phase and development of the RFP package.

7. **RFP Development (2-weeks).** An iterative process was conducted to develop the RFP package. A final RFP package and approved vendor list will be staged and ready for distribution. Developed an RFP package to be distributed to vendors.

8. **Final DSR with RFP (2-weeks)**. All work phases fed into this final period of consensus building, review and update of the final report and presentation of the final report with delivery of the Final Digital Solution Roadmap and the RFP Package.

1.4 Considerations

1. Within the report there is a grading system which is utilized to conduct the analysis and formulate recommendations. This grading system consists of the following:

	Outstanding			Above Avg			Satisfactory			Unsatisfactory			Fail
Grade	A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
Points	12	11	10	9	8	7	6	5	4	3	2	1	0
Midpoint							Mid						
	RETAIN CURRENT SYSTEM							REPLACE CURRENT SYSTEM					

Scores to the left of the scale support the status quo and minor enhancements, while scores to the right indicate major overhaul or replacement. If an activity utilizes a different scoring or grading system, it is identified and documented.

2. Throughout the report there are references to “MECL decisions”, these decisions are the direct result of TMG’s discussion, analysis, and recommendations. TMG fully supports and is in complete agreement with all MECL decisions.

3. The report addresses a point in time from project implementation startup through successful production go-live and stabilization of the system. It excludes any procurement or pre-planning work that occurs prior to the startup of implementation activities.

4. This report focuses on the MECL CIS initiative. References to AMI are stated from the point of view that the CIS solution will position MECL with a system to realize AMI success.

1.5 Definitions

This section lists all acronyms and definitions contained within this report.

#	Acronym	Definition
1	AMI	Advanced Metering Infrastructure: Defined as a utility metering setup that aids in two-way communication between different applications and their respective service providers.
2	AMS	Application Management Services: Defined as services provided to an organization for the purpose of outsourcing an enterprise application.
3	CAPX	Capital Expenditure/Capital Expense. Defined as the money spent to improve or purchase fixed assets.
4	CCA	Community Choice Applications: Systems or applications enabling the utility to participate in deregulated or retail choice environments where end-use customers can purchase power from retailers.
5	CIS	Customer Information System: Defined as an application that provides capabilities for many end users with multiple permission levels to manage content.

#	Acronym	Definition
6	CRM	Customer Relationship Management: Defined as the platform for which a business utilizes to collaborate with customers and analyze data.
7	CSR	Customer Service Representative: Defined as a person that interacts with customers to manage complaints, process orders, and provide information about an organization's products and services.
8	CTI	Computer Telephony Integration: Defined as a technology that coordinates interaction between the telephone and computer. The most common use is via desktop computer and most functions include voice recording integration, routing of phone calls, computer dialing, call transfers, etc.
9	DB	Database: Defined as an organized collection of data stored on a file system such as a computer and/or cloud based
10	EAM	Enterprise Asset Management: Defined as the process to manage assets during lifecycle to include design, maintenance, commission, decommissioning, and replacement for optimization of the asset.
11	ESB	Enterprise Service Bus: An integrated platform that provides fundamental interaction and communication services for complex software applications using an event driven and standards-based messaging engine, or bus, built with middleware infrastructure product technologies.
12	FSM	Field Service Management: Defined as the process of managing and dispatching field service crews utilizing software designed to address the organization's needs.
13	IaaS	Infrastructure as a Service: Defined as pay as you go service in the form of cloud computing which provides data storage and network availability.
14	IT	Information Technology: Defined as anything related to computing technology, such as networking, hardware, software, the Internet, or the people that work with these technologies. Refers to the IT department for managing the computers, networks, and other technical areas of the business.
15	KPI	Key Performance Indicator: Defined as "A type of performance measurement" and is designed to measure performance while reviewing activities for success.
16	MDM	Meter Data Management: Defined as the software for storage of data delivered by smart metering systems.
17	MIS	Management Information System: Defined as is an information system used for decision-making, and for the coordination,

#	Acronym	Definition
		control, analysis, and visualization of information in an organization.
18	MVP	Minimum Viable Product: Defined as the initial version of a computer program or technology device that has met the minimum standards for use.
19	MWM	Mobile Workforce Management: Defined as a category of software and related services used to manage employees working outside the company premises; the term is often used in reference to field teams. MWM can include the procurement, deployment and management of mobile devices, Mobile applications, and PC software.
20	OCM	Organizational change management: Defined as the process for organizations to make productive changes in business. The changes may include budget allocations, operational changes, resource changes, and methodology changes.
21	OMS	Outage Management System: Defined as a network management software that can restore the network model after an outage. Outage management systems are integrated tightly, resulting in timely and accurate actions along with supervisory control
22	OPCO	Operating Company: Defined as an organization that creates a good or provides a service for sale to consumers
23	OPEX	Operational Expenditure/Operational Expense. Defined as the money a company spends on the daily expenses to run a business
24	OVP	Optimum Viable Product: A version of Minimum Viable Product, where key enhancements are allowed to accommodate regulatory and business requirements. This allows optimization of the software then minimization for adherence to the software roadmap.
25	PaaS	Platform as a Service: Defined as “As a public cloud service from a provider, where the consumer controls software deployment with minimal configuration options, and the provider provides the networks, servers, storage, operating system (OS), middleware (e.g., Java runtime, .NET runtime, integration, etc.), database and other services to host the consumer's application.”
26	SaaS	Software as a Service: Defined as software being licensed via subscription and centrally located web based. Referenced as “On-demand software.”
27	SCADA	Supervisory control and data acquisition: Defined as a system of hardware and software components that perform for an organization to collect, organize, and process data. The systems work simultaneously to record and log important files for

#	Acronym	Definition
		increased productivity and improved communication to decrease downtime.
28	SMS	Short Message Service: Defined as a text message service for telephone, Internet, and most mobile device systems.
29	SOA	Service-Oriented Architecture: Defined as a technological stye that supports service as applicable to software design for communication.
30	SOX	Sarbanes–Oxley Act of 2002: Defined as a federal law in the United States to require specific financial reporting and record keeping for corporations.
31	TCO	Total Cost of Ownership: Defined as an estimate in the buying process to assist with calculating the indirect and direct costs for purchasing. In management accounting may be used as a full cost accounting tool
32	TOU Billing	Time of Use Billing: Defined as charge consumers based on the day/time of utility usage and bill according to current rates.
33	TOU Rates	Time of Use Rates: Defined as rate plan(s) that calculate energy charges based on consumption amount and time/day of usage.
34	WMS	Work Management Systems: Defined as a Workforce management (WFM) software is an umbrella term for software that manages staff scheduling out of the contact center and other locations that control field crews for several types of work. Includes scheduling, dispatching, planning, conducting, closing the work.

This report summarizes the detailed work which the project team completed to meet the stated objectives.

2. Current State Assessment

This section of the report covers analysis of the legacy system and the current business and technical environment.

2.1 Assessment Summary Scores

The TMG decision model examines the system through five project activities resulting in a comprehensive perspective and an overall Average Assessment grade. Within each activity, evaluation criteria are defined, and a “grade” assigned indicating project position and outlook for successful completion or impact. All grades begin at a “C+” and are incremented or decremented based upon the assessment.

The following diagram presents the five assessment categories and the individual grades followed by the Average Assessment grade.

Assessment Activity	Outstanding			Above Avg			Satisfactory			Unsatisfactory			Fail
	A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
PROJECT ACTIVITY	12	11	10	9	8	7	6	5	4	3	2	1	0
1. Touchpoint Analysis											D		
2. Interviews								C					
3. Technical Workshop								C					
4. Business Workshop								C					
5. Capabilities Analysis								C					
6. Average Assessment									C-				

1. **Touchpoint Analysis Workshop**. This touchpoint demonstration and analysis resulted in a grade of “D” or Unsatisfactory, indicating that the current MECL CIS is unsatisfactory and less capable than other systems in the market.

2. **Interviews.** This resulted in an average grade of a “C” or Satisfactory. The system is comfortable and customized for MECL’s needs.

3. **Technical Workshop**. The current CIS is only doing a “C” or satisfactory job in providing the technology which supports and promotes the business needs of the MECL organization.

4. **Business Workshop**. Overall, the current CIS is only doing a “C” or satisfactory job in meeting the business needs of the MECL organization.

5. **Capabilities Analysis Workshop**. Using numeric weighting of the responses given, the team’s rating of the current CIS overall functionality resulted in a “C-” or “Low Satisfactory” position.

6. **Average Assessment**. The average of the five grades results in a “C-” or Low Satisfactory for the CIS Current Assessment. The is in the RED ZONE indicating based on these factors the system is well positioned for replacement.

2.2 Assessment Considerations

Based upon TMG’s experience and our assessment of the current CIS, the following is a summary of assessment considerations.

1. MECL can go to market and obtain a new CIS system which is more capable and functionally rich than its current CIS. These capabilities were identified within the Touchpoint analysis as TMG compared the system against what is available from vendors. MECL must also consider the fact it has embedded CIS with Outage, Work Management, and Survey based information and activities which are not readily found within the scope of a modern CIS product.

2. As identified during the interviews, management indicated that while CIS has performed diligently over the years, the need to position for Smart Meters, TOU Billing

etc. and update the current CIS may just be too much for the system and the company. TMG will provide a high-level analysis in the coming work phase.

3. In addition, customization of CIS, which has significant support issues, and trying to position CIS to be flexible to accommodate any future demands is highly risky. MECL must address the retirement of its single IT resource within 5-10 years. While PowerBuilder continues to be supported in the industry, this is not a career advancing platform for IT people, or to work at MECL, and it does not align with the technical direction of MECL and its application portfolio. The CIS support risks include, the one IT person, the PowerBuilder technology, the lack of documentation, the poorly structured code, the backlog, the reporting bottleneck, the lack of configuration, etc.

4. A huge issue found across all TMG analysis activities is the lack of MECL user access to data, reporting, and analytics. This will become even more exacerbated with the future introduction of Smart Meters into CIS/MDM.

5. It was mentioned by management that MECL is a moderate sized utility that needs to work efficiently with technology playing the role of enabler for its staff to work smarter.

6. MECL needs to consider moving to a product solution rather than the current custom CIS solution. An emphasis on coding specifically to meet MECL's business requirements requires MECL to support itself, meaning every $1 invested in maintaining the system is $1 spent with no return. For a product solution, every $1 spent results in releases containing new functionality on a regular basis and product roadmap $$$ returned. However, MECL becomes part of a user group and lives by the product roadmap losing that one-on-one touch it currently has with IT.

7. MECL also has issues with Business Operations. There is a need to utilize a new CIS Solution to address turnover in staff working with the system. There are few key business staff that understand the system and the documentation is poor or simply non-existent, general sentiment is that the system is not intuitive and takes time to learn and understand.

8. Another reoccurring theme is that the system is poorly documented and lacks standards in the way business is done. This can particularly be identified when onboarding new hires. As of now, there is a lack of formal standardized training across the organization. This especially becomes a challenge across multiple areas with unique onboarding procedures.

9. There was an expressed desire to have automated workflows that standardize, route, and track work. In addition, there was interest in having scripting standardize customer conversations and record conversation, statistics, and performance. Finally, functionality that automated review and approval and SOX compliance was considered a need.

10. Another consideration that would be beneficial for the current CIS was if the system had imbedded documentation as well as a "Help" function that would regularly be updated to reflect system enhancements and changes.

11. There are definite improvements that can be made in the MECL Customer Lifecycle as well. Introduce customer service appointment times, pay deposits by billing

deposits, automated interface to financials, integrate with MDM, offer TOU Rates, create new rates, proration, riders, taxes, Flexible Due Dates, and automate Low-Income Assistance Program. There is a need for extreme flexibility to accommodate future capabilities in a timely manner using configuration within the product roadmap.

12. MECL has defined 5,400 individual capabilities for a new comprehensive CIS, and MECL team members called approximately 134 capabilities as being strategic. The bulk of these capabilities were in the System Design, Customer Service, and Billing & Rates areas.

Given these stated considerations the current state assessment is summarized as follows.

2.3 Assessment Summary

Based on the Current Assessment TMG determined that the current 33-year-old CIS is processing the current revenue stream and doing a satisfactory job of accommodating business operations and customer service needs. To elaborate on this, an analogy is made comparing the current CIS to a house, where **MECL Can Live in the house.**

However, **MECL CIS Has a Cracked Technical (house) Foundation** which makes repairs and additions costly, time consuming, and in some instances prohibitive. At some point, the current CIS technology may jeopardize or impede MECL's future revenue stream, associated operations, and customer offerings.

As the current state assessment concluded, it became clear that specific reoccurring themes stood out and deserved attention. From a technical perspective these include:

1. PowerBuilder is not a career advancing platform for IT people,
2. PowerBuilder does not align with the technical direction of MECL and its application portfolio,
3. A single IT resource is retiring within 5-10 years,
4. Lack of documentation,

5. Outdated coding structure,
6. One year system backlog,
7. The reporting bottleneck,
8. Lack of configuration and customization,
9. Lack of user access to data, reporting, and analytics.

From a business perspective these included:

1. The need to address turnover of business staff,
2. System not intuitive requires time to learn,
3. The system is poorly documented and lacks business standards,
4. Lack of formal standardized training across the organization, each area has an onboarding process,
5. Requires automated workflows to standardize, route, and track work,
6. Requires scripting to standardize customer conversations and record the type of conversation, statistics, and performance,
7. Requires automated review and approval and SOX compliance,
8. Requires System Documentation and a Help Function regularly updated to reflect system enhancements and changes,

Each of the evaluation analysis activities and their scores are summarized in the following sections.

2.4 Touchpoint Analysis Workshop

The current MECL CIS was demonstrated for TMG during a 6-hour workshop. The demonstration was structured using TMG's Industry Standard CIS Touch Point Analysis Model which represents the primary functional components of a modern CIS. The model has 12 primary components and 256 subcomponents or touch points.

The current MECL CIS was evaluated against each touchpoint and scored to determine how current system functionality compares to what is available in the market. What does the current system do well, what is unsatisfactory or less than what is available in the market, and what might it being doing that is better than expected or available in the market?

#	Touch Point Component	Grade	Score
	Average Grade/Score =	D	2.4
1	ACCOUNT MANAGEMENT	C	2.6
2	BILLING MANAGEMENT	D	2.2
3	CREDIT & COLLECTION	D	2.2
4	CUSTOMER	C	2.6
5	CUSTOMER CARE	D	1.9
6	FINANCIAL MANAGEMENT	D	2.3
7	INVENTORY MANAGEMENT	D	2.3
8	RATES MANAGEMENT	D	2.1
9	SERVICE ADDRESS MANAGEMENT	C	2.8
10	SERVICE ORDER MANAGEMENT	C	2.8
11	USAGE MANAGEMENT	C	2.7
12	SYSTEM MECHANICS	D	2.1

The below table defines each potential grade value that can be designated to each Touch Point Component.

A - The system exceeds all expectations and is better than what is available in the market.
B - The system is better than expected and meets market functionality.
C - The system meets expectations with satisfactory functionality.
D - The system is unsatisfactory and less capable than other systems in the market.
F - The system is failing or does not provide the functionality at all.

Overall, The **Touchpoint Analysis demonstration and analysis resulted in a grade of "D" or UNSATISFACTORY**, indicating that the current MECL CIS is unsatisfactory and less capable than other systems in the market.

A new system will address these identified gaps and provide MECL with a "A" rated system.

2.4.1 Touchpoint Gaps

During the Touchpoint Analysis demonstrations gaps were identified when comparing the current CIS solution with industry standards. Each of the gaps were grouped by the 12 touchpoint components factored in the assessment.

Account Management – While reviewing demonstrations associated with account management, it was determined that there were 6 gaps of limiting functionality in the current CIS: first, the data model of the current CIS system is limited to a "one meter to one premise relationship". If there are 2 meters, a separate premise is required. Second, the current CIS solution does not have remote account connect/disconnect. Third, the current CIS does not have the capability to restrict Account Adjustments. The fourth limitation identified, is the inability to view products on an account and the system does not allow for products. The fifth capability identified as a gap within

the account management component is that users are not able to view a hierarchy of accounts for one customer. This results in the inability to view Master Accounts or customers with multiple accounts. Finally, the systems data model does not contain the concept of Service Delivery Points at a premise.

Billing Management – While reviewing demonstrations associated with billing management, it was determined that there were 16 gaps of limiting functionality in the current CIS: first, the system has a date driven trigger for light accounts that have had 45 days of no consumption. Second, the system does not offer the ability to conduct mass bill cycle changes in an automated fashion. Third, real-time consumption calculation of interval reads is not supported by the current CIS system. The fourth limitation identified, is the inability to cancel/rebill incorrect bills calculated greater than 6 months ago. The fifth capability identified as a gap within the billing management component is that users are not able to review and approve adjustments online. Additionally, the current CIS system does not have the ability to bill merchandise accounts. The seventh functionality not offered in the current CIS is the capability to do subscription billing on the behalf of another utility. The eighth gap identified is the systems inability to do online account billing. Another finding identified as a gap is the current CIS system does not offer the capability to conduct “what if” billing simulations. The tenth limiting gap identified during demonstrations was the CIS systems inability to conduct one-time misc. billing -this functionality is currently done in the financial system. The eleventh gap identified during demonstration workshops is the inability to final bill an account and include a letter of recommendation in conjunction. A twelfth gap identified was that the system does not offer a consumption/usage graph on the bill instead, a table is offered. The final three gaps identified in system capabilities were: no ability to conduct pre-paid billing, no billing via text and finally limited bill messaging on the bill.

Credit & Collections - While reviewing demonstrations associated with credit & collections, it was determined that there were 13 gaps of limiting functionality in the current CIS: first, there is limited customer profile information captured and stored at the time of customer enrollment. Second, the system does not have a direct interface with the Credit Bureau. Third, an interface with Credit Agencies is not supported by the current CIS system. The fourth limitation identified, is the inability to process credit scores. The fifth capability identified as a gap within the credit & collections component is no Third Party/Guarantor/Co-signer setup in system. Additionally, the current CIS system has Limited Cash Only Account processing. The seventh functionality not offered in the current CIS is the Manual Freeze and Account processing. The eighth gap identified is the systems inability to allow for customer balances across multiple accounts. Another finding identified as a gap is the current CIS system does not offer the capability to configure multiple collection processes when collecting for non-payment. The tenth limiting gap identified during demonstrations was no outbound technology for collections. The eleventh gap identified during demonstration workshops is No Collection Process for Bad Debt or low debt. As a twelfth gap identified was that the system does not offer Automation for Public Assistance Agency. The final gap identified is that the system cannot accommodate partial payments across multiple accounts.

Customer - While reviewing demonstrations associated with Customer, it was determined that there were 2 gaps of limiting functionality in the current CIS: first, the customer entity cannot be linked to multiple accounts. Second, the system offers only one field for Customer Name. This has caused standardization issues

Customer Care - While reviewing demonstrations associated with Customer Care, it was determined that there were 21 gaps of limiting functionality in the current CIS: first, there is no

Customer Contact Management System. Second, the system does not have a CTI and Caller ID System to Popup an initial screen to the CSR. Third, an interface with Credit Agencies is not supported by the current CIS system. The fourth limitation identified, is the current system has no workflow engine. The fifth capability identified as a gap within the Customer Care component is No Customer Mobile Application setup in system. Additionally, the current CIS system has no Customer Instant Messaging. The seventh functionality not offered in the current CIS is No Customer SMS Texting. The eighth gap identified is the systems interact via social media. Another finding identified as a gap is No Customer Payment Kiosk Integration. The tenth limiting gap identified during demonstrations was No Customer eCommerce. The eleventh gap identified during demonstration workshops is No Customer ePay, MobilePay Solution. A twelfth gap identified was that there is No Customer Video Interactive Sessions. The thirteenth gap identified is that there is no customer SaaS Based Fax & Fax on demand for the government. The fourteenth and fiftieth gap identified in system capabilities was Limited Imaging of Customer inbound and Outbound Correspondence. The sixteenth gap identified was No Field & Mobile Computing for Customer Interaction and Appointments. The seventeenth gap identified during demonstration workshops for the customer care component was No Customer Electronic Bill Presentation and Payment. The eighteenth gap identified during the assessment was the CIS systems missing the ability to conduct On-line Prompting for Selling Customer Products, Programs, Services. The final three gaps identified were: No Customer Promotions & Sales Programs, No Measure of User Performance and No Measure of Customer Satisfaction.

Financial Management - While reviewing demonstrations associated with Financial Management, it was determined that there were 12 gaps of limiting functionality in the current CIS: first, the system lacks the ability to determine additional deposits. Second, the system Cannot track Deposits from Third Parties. Third, the system Cannot spread a Deposit across Multiple Accounts. The fourth the system cannot bill deposits. The fifth capability identified as a gap within the Financial Management component is the system cannon Process Payments from the Online Cashiering System. Additionally, the current CIS system does not process field collections integration with MWM/FSM or CIS Service Order. The seventh functionality not offered in the current CIS is No Processing of Pledges and Contributions (special assistance). The eighth gap identified was the inability to Process Payments from Venmo, PayPal, etc. Another finding identified the inability to manually process misapplied payments. The tenth limiting gap identified during demonstrations was No Voluntary Contributions. The eleventh gap identified during demonstration workshops is No Mass Customer Rebates. A final gap identified was that no automated interface with the Financial System.

Inventory Management - While reviewing demonstrations associated with Inventory Management, it was determined that there were 5 gaps of limiting functionality in the current CIS: first, the system lacks a Meter Data Management System. Second, the system does not carry the product entity. Third, the system Cannot perform Product Delivery, Product Exchange, and Product Return. The fifth capability identified as a gap within the Inventory Management component is the system cannot perform product receive capabilities or product issue. A final gap identified was that the system has No Product Warranty.

Rates Management - While reviewing demonstrations associated with Rates Management, it was determined that there were 4 gaps of limiting functionality in the current CIS: first, the system Cannot Setup and Assign Taxes. Second, the system Cannot Copy Current Rate to New Rate. Third, the system No Dynamic Rate Assignment. A final gap identified was that the system has No Rate Development Process.

Service Address Management - While reviewing demonstrations associated with Service Address Management, it was determined that there were 3 gaps of limiting functionality in the current CIS: first, Every Premise Has a Meter with No Service Point -resulting in the inability to have multiple meters at one premise. Second, the system stores the meter information at the premise entity. Third, the system has no CRM Integration Point.

Service Order Management - While reviewing demonstrations associated with Service Order Management, it was determined that there were 3 gaps of limiting functionality in the current CIS: first, the system does not offer the ability to process product orders. Second, the system also does not allow for paper collection orders. Finally, the system does not offer the ability to group orders.

Usage Management - While reviewing demonstrations associated with Usage Management, it was determined that there were 4 gaps of limiting functionality in the current CIS: the first four gaps were a result of the systems inability to View Usage/Consumption by service point, meter, or customer online. Finally, the system does not track unauthorized usage.

System Mechanics - While reviewing demonstrations associated with System Mechanics, it was determined that there were 13 gaps of limiting functionality in the current CIS: first, the CIS has limited IT Controls and configuration. Second, the PowerBuilder User Interface has an older look and feel. Third, the system has limited documentation. Fourth, the system cannot tailor screens to Individual Users/User Groups. Fifth, the system does not offer an On-Line Help Function. Sixth, the current CIS system has no workflows. Seventh the system has no automated work queues. Eighth, there are limited Notes, and they can only be attached to the Account Entity. Ninth, the current system offers limited downloads into Office 365 from screens. Tenth, CIS System has Limited Correspondence. Eleventh, current CIS has no Analytics Engine and Insights. The twelfth gap identified was that the current CIS has no Robotic Process Automation and BOTS. Finally, the system offers No Scripting and Approvals.

2.5 Interviews

As a second area of focus in TMG's current state analysis, interviews were conducted. The senior managers were interviewed to provide a perspective on the current CIS. Their issues with the system and their view of future needs of the business. They were asked to assign a grade to how well the current CIS met the needs of MECL.

Interview Results - Summary

	Average Grade	Outstanding	Above Average	Satisfactory	Unsatisfactory	Failing
What is the overall perspective and assessment of the current MECL CIS?	C			▲		

This resulted in an overall average grade of a "C" or Satisfactory. The system is comfortable and customized for MECL's needs; however, the following themes were identified throughout the interviews.

1. The need to position for and accommodate AMI, Smart Meters and TOU Billing is essential to MECL's future success.

2. CIS has performed well for a long time and has good functionality it has been tailored to our needs.

3. CIS is highly customized, but this is an obstacle to future flexibility. We must be nimble for the future.
4. The CIS support resource pool is small and diminishing, this creates a significant application risk to the business
5. The business knowledge is not well documented and is an obstacle to training and education
6. Access to data and reporting is an issue with IT as a single resource for the organization.
7. With a trend for growing data and information in the system there is a need for strong analytics.
8. A need for more customer Internet access and self-service.
9. Utilization of technology to work efficiently within a moderate sized utility trying to get a lot of work done.

Below is a more detailed view of sample comments from interviewees. This lens allows for a specified understanding of concerns or sentiments of MECL users:

1. Data Access and Reporting is an issue. We use a lot of data to conduct data analysis and manipulation, from an engineering perspective, SCADA, and CIS. We approach IT to write a query, or we must develop our own. Today we use Excel.
2. Hard to navigate CIS, it's an old system, for my job, in a few instances I can download data into Excel, but rare, I have to go customer by customer and do manual entry on the side, then have to go to IT for a query, it is cumbersome, time consuming, past the time I need it, I want to go into the DB and do my own query, sometime we think we asked for the correct data, they write the query and we have asked for the wrong data so they have to rewrite. Very time-consuming process.
3. In the future, we will have interval reads of 15-20 min, sometimes we will need hourly or monthly data, today, we do not have this interval data, and we want hourly, would be great to have it NOW, rather than working through IT as it is not very timely, it can take weeks.
4. We need to be flexible because we are not sure what the future will entail; Aggregation, or Demand Response thru batteries, or hot water tanks, or vehicle charging stations.
5. In the future so much data is stored in the CIS, we will need Analytics to process this data. This needs to be part of the new solution.
6. Only two people who originally wrote this system. There is one main person who does the current system programming, this is the one person we go to. There is a huge risk if something happens to him. Not a good thing. We cannot continue with this situation. CIS is the key to our company, cannot go into the future relying on one or two people. We need a product that many people understand and is supported by others.
7. There is so much information floating around about our systems, but little documentation about how our systems work together.

8. Customers are expecting more from us, people want to see more information about their account and the status of work and their situation. They want more information on their bill, they want better understanding about restoration information regarding an outage, they want to know how to do business with us instead of calling us on the phone.
9. Smart Grid customers want more control, in the future there will be more and different Time of Use Rates, a lot of information to be gathered, stored, and reported on. All part of our future. Want to get most of our customers on these new rates.
10. The Portal is not very robust, instead customers pick up the phone to do business with us. There needs to be more emphasis on automated self-service.
11. Our reports are limited, we have 8 reports today. Everything we want to do for new reports has to go through IT to develop anything. We should be able to do our own reporting.
12. IT always designs the system for what we want it to do. It is fully customized for us; we cannot ask for more. The current CIS is 100% customized for MECL.
13. The system is not an easy system to navigate, it is very cryptic and takes time to learn, over time you might be able to figure it out.
14. We spend a lot of time putting data into the system - need to start using our data and have it more readily available. Today, we need to go to IT to get our data, and after a few tries – I get what I wanted, and I do not. It can take a few times. In my job I work with short turnaround times, and I need the information immediately, so this issue is very frustrating to me.
15. Although we have built whatever we want in the system, and have made it work, it is not necessarily the most efficient way of doing business.
16. The system was designed and built inhouse with an emphasis on distribution and transformers. It was successful, but we have not done an effective job keeping the data refreshed.
17. In January I had to a simple proration of bills, and it took us a lengthy period of time to work through this and process the bills – we need a new system.
18. We are not a big utility and have to work efficiently and use technology to do so.
19. I wish we would put reporting into the hands of the business rather than IT.
20. With a new system we must change our processes to align with the software, this will be a challenge for us, and we must be open minded.

2.6 Technical Workshop

As a third area of focus in TMG's current state analysis, a technical examination was conducted through a series of workshops. This was done in, an effort to review MECL's current CIS and related technical environment and evaluate how well it supports the business in meeting and exceeding customer expectations. In addition, there was a need to understand if the current system can serve the next generation of customers. Key elements that contribute to MECL's success are organized into the following technical categories.

#	Technical Categories
1	Strategy Analysis Category
2	Application Performance Analysis Category
3	Infrastructure/Platform Analysis Category
4	Application Programming Analysis Category
5	Operational Activities Analysis Category
6	Support Activities Analysis Category
7	Development Activities Analysis Category
8	Maintenance Activities Analysis Category

Each category was discussed with MECL, and a score assigned to specific items to determine an overall business grade for the current CIS technical environment. The following table scores and associated descriptions were used to assign a score to the current state analysis categories and each of the individual considerations.

Score	Short Description	Long Description
5	Outstanding	The current CIS is doing an outstanding job and exceeding all expectations in meeting the consideration.
4	Above Average	The current CIS is doing an above average job in meeting the consideration.
3	Satisfactory/Meets	The current CIS is doing a satisfactory or average job in meeting the consideration. Note 1.
2	Unsatisfactory	The current CIS is doing an unsatisfactory job in meeting the consideration.
1	Failing	The current CIS is failing in its ability to meet the consideration.
0	Not Applicable	There is no basis for the consideration.

Note 1: by providing a service, or a product, or a program, you are meeting a need. You are exceeding customer expectations if you are applying a human element to customer service and pleasing the customer, not just providing electricity when the customer flips the switch and turns on a light.

The average scoring for each of the technical categories is presented in the following table.

Section	AVG
1. Strategy Analysis Category	2.8 = C
2. Application Performance Category	3.3 = C
3. Infrastructure/Platform Category	2.9 = C
4. Application Programming Category	2.2 = D
5 Operational Activities Category	3.0 = C
6. Support Activities Category	2.9 = C
7. Development Activities Category	2.8 = C
8. Maintenance Activities Category	3.0 = C
Average Score: 2.9 = C	

Overall, the current CIS is only doing a “C” or satisfactory job in providing the technology which supports and promotes the business needs of the MECL organization.

2.6.2 Technical Highlights

The following are highlights from the technical workshop and review of the technical categories.

1. **Strategic.** The current CIS is written in PowerBuilder. PowerBuilder is an integrated development environment owned by SAP since the acquisition of Sybase in 2010. In 2016, SAP and Appeon entered into an agreement and Appeon is developing, selling, and supporting PowerBuilder. While this platform may continue to have some support in the industry, this is not a career advancing platform for IT people seeking work, to work on at MECL and it does not align with the technical direction of MECL and its application portfolio.

2. **Infrastructure/Platform.** While satisfactory grades were received in this area, MECL is incurring costs to implement and maintain a High Availability Server Cluster this year.

3. **Revenue Stream.** The system can be managed and operated without significant changes made which may impact operations and the flow of the current revenue stream. Introduction of AMI and the ability to make the systemic changes to CIS are questionable and may impact operations and the flow of the future revenue stream.

4. **Development Approach**. An emphasis on coding specifically to meet MECL’s business requirements requires MECL to support itself, every $1 invested in the maintaining the system is $1 spent. MECL is dependent on itself.

5. **Limited IT Resources.** MECL has one programmer to provide support and development for the current CIS and he has a potential retirement horizon of 5 to 10 years.

6. **The CIS Code**. The code does not adhere to structured application program design techniques and standards, and it does not carry inline program documentation to view while making enhancements. There is also no program documentation to view other than the source code itself. PowerBuilder is the development toolkit or workbench. This makes changes more costly, time consuming, and risky.

7. **CIS Backlog.** The CIS backlog averages six (6) months, the current backlog is one (1) year of work. These enhancements are single threaded through the one programmer.

8. **Cybersecurity Issues**. Issues in Cybersecurity were identified and require improvement. The area of security continues to grow each day in our society and will need to be monitored and will cost money.

9. **Data Reporting & Analytics.** Although not specifically addressed in this technical section. The need to provide responsible data access and necessary reporting and analytical tools. Enable users to conduct their own data reporting and analysis – data democratization.

2.7 Business Workshop

As a fourth area of focus in TMG's current state analysis, a business examination was conducted through a series of workshops. This was done in, an effort to review MECL's current CIS and related business environment and evaluate how well it meets and exceeds customer expectations. In addition, there was a need to understand if the current structure can serve and support the needs of the next generation of customers. Key elements that contribute to MECL's success are organized into the following technical categories.

#	Business Categories	#	Business Categories
1	Strategy Analysis Category	9	Data Analysis Category
2	Objectives Analysis Category	10	Customer Life-Cycle Analysis Category
3	Services Analysis Category	11	Product Capability Analysis Category
4	Products Analysis Category	12	Product Usability Analysis Category
5	Programs Analysis Category	13	Product Workflow Analysis Category
6	Organization & Staffing Analysis Category	14	Product Mechanics Analysis Category
7	Configuration Analysis Category	15	Product Viewpoint Analysis Category
8	Process Analysis Category		

Each category was discussed with MECL, and a score assigned to specific items to determine an overall business grade for the current CIS technical environment. The following table scores and associated descriptions were used to assign a score to the current state analysis categories and each of the individual considerations.

Score	Short Description	Long Description
5	Outstanding	The current CIS is doing an outstanding job and exceeding all expectations in meeting the consideration.
4	Above Average	The current CIS is doing an above average job in meeting the consideration.
3	Satisfactory/Meets	The current CIS is doing a satisfactory or average job in meeting the consideration. Note 1.
2	Unsatisfactory	The current CIS is doing an unsatisfactory job in meeting the consideration.
1	Failing	The current CIS is failing in its ability to meet the consideration.
0	Not Applicable	There is no basis for the consideration.

Note 1: by providing a service, or a product, or a program, you are meeting a need. You are exceeding customer expectations if you are applying a human element to customer service and pleasing the customer, not just providing electricity when the customer flips the switch and turns on a light.

The average scoring for each of the categories is presented in the following table.

Section	Avg	Section	Avg
1. Strategy Analysis Category	2.7 = C	9. Data Analysis Category	3.4 = C
2. Objectives Analysis Category	4.6 = A	10. Customer Life-Cycle Analysis Category	3.4 = C
3. Services Analysis Category	5.0 = A	11. Product Capability Analysis Category	3.1 = C
4. Products Analysis Category	0.0	12. Product Usability Analysis Category	2.4 = D
5. Programs Analysis Category	4.9 = A	13. Product Workflow Analysis Category	2.4 = D
6. Organization & Staffing Analysis Category	2.9 = C	14. Product Mechanics Analysis Category	2.0 = D
7. Configuration Analysis Category	2.4 = D	15. Product Viewpoint Analysis Category	3.2 = C
8. Process Analysis Category	3.1 = C		
Average Score: 3.2 = C			

Overall, the current CIS is only doing a “C” or satisfactory job in meeting the business needs of the MECL organization.

2.7.1 Business Highlights

The following are highlights from the business workshop and review of the business categories.

1. **Strategic.** Use CIS to actively promote MECL and its offerings to customers. Utilize technology to optimize MECL staffing levels. Make CIS the billing system of record by moving AR billing into the CIS.

2. **Improve Programs.** Offer customers Flexible Due Dates (not just budget billing) and automate Low-Income Assistance Program.

3. **Organization and Staffing.** Utilize the CIS to address turnover in staff working with the system. There are only a few key business staff who understand the system and the documentation is poor to non-existent, the system is not intuitive and takes time to learn and understand.

4. **Configuration vs Customization.** Rely on configuration and not on personalized customization to maintain and enhance the system.

5. **Work Processes.** The system is poorly documented and lacks standards in the way business is done. Lack formal standardized training across the organization, every area has its own onboarding process.

6. **Data Program.** Emphasis on users reporting and querying against data rather than going through IT to develop their reports and queries which can be a lengthy time-consuming process.

7. **Customer Lifecycle.** Introduce Customer Service Appointment times, make it easier for customers to pay deposits – bill for deposits. More timely recognition of revenue through an automated interface to financials.

8. **Product Usability.** Replace the old and tired PowerBuilder User Interface (UI) with a modern Internet Browser based UI. The CIS needs to be easy to use, quick to study and learn on. The CIS user experience can be tailored to the individual user and/or user workgroup.

9. **Product Workflow.** Offer automated workflows to standardize, route, and track work. Offer scripting to standardize customer conversations and record the type of conversation, statistics, and performance. Offer automated review and approval and SOX compliance.

10. **Product Mechanics.** Provide System Documentation and a Help Function regularly updated to reflect system enhancements and changes

11. **Product Capabilities.** Move to integrate with MDM, offer TOU Rates, and the ability to create new rates like proration, handle riders, taxes, etc. Need extreme flexibility to accommodate any future capabilities in a timely manner using configuration within the product roadmap.

2.8 Capability Workshop

As a fifth area of focus in TMG's current state analysis, a capability examination was conducted through a series of workshops. This was done in, an effort to review MECL's current CIS and related system environment and evaluate how well its system capabilities meets and exceeds customer expectations. In addition, there was a need to understand if the current capabilities can serve and support the needs of the next generation of customers.

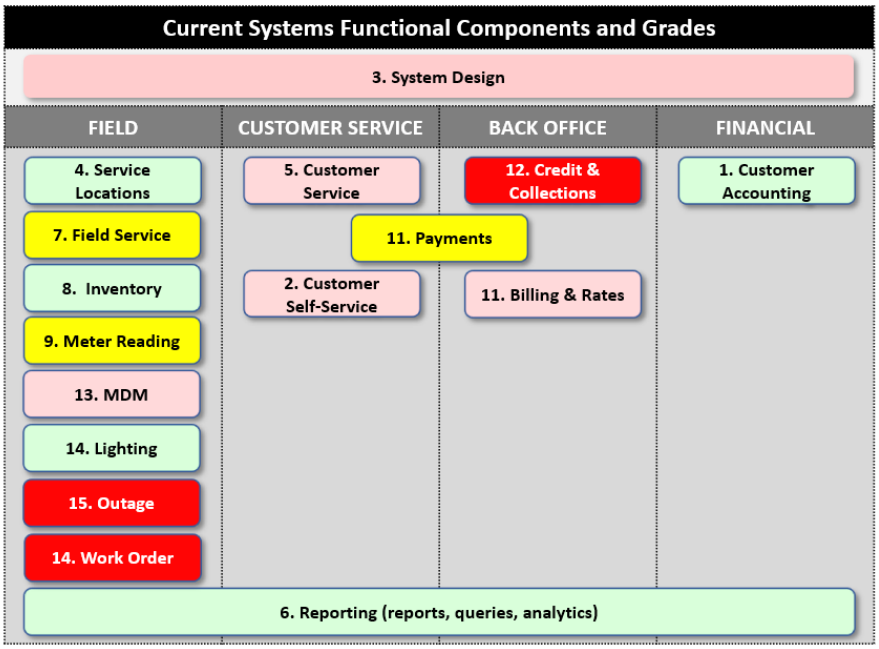
Grading Table	
Grade	Description
A	Outstanding
B	Above Average
C	Satisfactory
D	Unsatisfactory
F	Failing
NA	Not Applicable

Summary. MECL project team members participated in several workshops over three weeks to review over 5,400 system capabilities for the new CIS system. Team members rated the ability of the current CIS to provide these

functions and how important the function was to the future business needs of MECL.

Using numeric weighting of the responses given, the team's rating of the current CIS overall functionality **resulted in a "C-" or "Low Satisfactory" position.**

Current System Assigned Grades	
Functional Component	Grade
1. Customer Accounting	B-
2. Customer Self-Service	D+
3. System Design	D
4. Service Locations	B+
5. Customer Service	D+
6. Reporting	B
7. Field Service	C
8. Inventory	B+
9. Meter Reading	C-
10. Billing & Rates	D
11. Payments	C+
12. Credit & Collections	F
13. Meter Data	D
14. Lighting	B-
15. Outage	F
16. Work Order	F
OVERALL GRADE	C-



MECL project team members participated in workshops for the 16 different CIS functional areas listed to the left. The team reviewed over 5,400 individual capabilities.

TMG staff members asked the MECL participants how important each system capability would be to how MECL expects to do business with its customers moving forward. Participants were given the option providing **four different responses**:

1. **Strategic -** Supporting strategic business offerings, etc. that MECL cannot provide today without additional resources

2. **High -** Support for existing utility services to avoid any disruption in processing with a new system that would cause significant financial, regulatory, and/or reputational risk

3. **Medium -** Support for existing utility services, but the utility is flexible in how a new system provides that functionality

4. **Low -** Support for utility offerings that would be "nice to have" in a new system if they could be provided at little to no additional cost

MECL team members called out **over 100 capabilities** as being **strategic**. The bulk of these capabilities were in the **System Design, Customer Service,** and **Billing & Rates** areas.

Priorities Assigned by Team					
Functional Component	Strategic	High	Medium	Low	Totals
1. Customer Accounting	0	90	16	2	108
2. Customer Self-Service	3	173	67	57	300
3. System Design	39	228	49	5	321
4. Service Locations	5	140	5	10	160
5. Customer Service	44	275	69	42	430
6. Reporting	4	66	8	6	84
7. Field Service	3	244	12	11	270
8. Inventory	1	129	10	47	187
9. Meter Reading	7	148	6	28	189
10. Billing & Rates	18	547	132	34	731
11. Payments	3	127	15	31	176
12. Credit & Collections	3	256	55	18	332
13. Meter Data Management	3	810	16	28	857
14. Lighting	0	67	6	23	96
15. Outage	1	128	12	106	247
16. Work Order	0	597	172	150	919
Totals	134	4,025	650	598	5,407

2.8.1 Strategic Capabilities

MECL team members called out over 100 capabilities as being strategic. The bulk of these capabilities were in the System Design, Customer Service, and Billing & Rates areas. The following are summaries of the topics that drove the classification of many of these capabilities as strategic.

1. **System Design** included capabilities such as: configuration as opposed to programming, direct access to data, native support for disaster recovery, training materials, on-line help, and support for modern technologies such as XML for data exchange, Citrix virtual desktop, relational database, and server virtualization.

2. **Customer Service** included capabilities such as: integration with virtual call center functions, advanced call conversation scripting, customer communication preference tracking, customer communication preference tracking, work queue automation, scheduling / confirmation of onsite appointment times, and utilization of MDM to create CIS billing determinants.

3. **Billing & Rates** included capabilities such as: time-of-use rates & billing, pre-paid metering & billing, billing electric heating separately during certain seasons, presentation of load factor data, billing credit card fees, real-time price billing, transportation service billing, storage, use, and presentation of degree day data, mandatory pre-paid metering for some delinquent customers, and a “what-if” customer self-service billing function.

2.8.2 Low-Scoring Capabilities

The following areas were scored low in terms of future business needs by MECL.

1. **Credit & Collections.** TMG understands that bad debt and write-offs have not been a big problem for MECL. MECL does not place much importance on the current system for this type of automation. The rating of an **"F"** for this area is concerning but understandable. It is understandable since over **52% of the capabilities** reviewed were rated by the team to be both of **high priority but managed manually or not at all** by the system. In a case where over half of the capabilities are system functions that are key to MECL's current operations but are managed manually indicates this is currently not a problem area for the business, however, it is an area which MECL wants to see automated with a new CIS. Process automation in the Credit & Collections area should result in higher productivity for MECL resources.

2. **Meter Data Management (MDM).** It makes sense that the MECL team members provided responses that resulted in a "D" rating for MDM because MECL does not have a stand-alone MDM system. Over 40% of the capabilities in this area were judged to be of high importance to MECL but were managed manually or not at all by the current CIS system. Some of the responses were based on MECL's current Meter Reading functionality and its ability to communicate and manage its existing Itron "bridge" meters. As MECL continues toward a rollout of AMI, the need to have an MDM system to work with both the AMI Head-End and CIS to process and summarize the vast amounts of data produced by the Smart Meters will be necessary.

3. **Customer Service.** Management of Customers and Accounts is the functional area that drew the highest number of capabilities considered to be strategic by the MECL project team members. In addition to responding that 20% of capabilities in this section were of high priority but processed manually, 10% were determined to be of strategic importance but also managed manually. Based on this mix of capabilities rated as high or strategic but currently lack automation, it would be expected that a replacement system can bring greater efficiencies and satisfaction from both MECL employees and its customers.

4. **Billing, Customer Self-Service, & Meter Reading.** These three areas were similar in letter-grade scoring for similar reasons. All three had a sizable percentage of Strategic, High, and medium priority capabilities that were managed manually by employees or were not addressed at all by the application. MECL should expect increased levels of functionality in these areas choosing a replacement system from any of the CIS vendors actively marketing solutions in the North American marketplace.

5. **Outage and Work Order.** These two areas had a significant percentage of High priority capabilities that are managed manually by employees. Additional automation should be expected if Off-the-Shelf systems are procured and implemented.

3. Target State Workshop

A workshop was conducted with MECL to identify the future state for the business, technical, and application environments. Several decisions were made during the workshop after discussing each consideration.

TMG fully supports the decisions made and direction reflected in this throughout this section.

3.1 Application Considerations

Several constructs and considerations were discussed with MECL to identify future position that have an impact on project cost. These are summarized below.

Application Consideration Findings

1. **Construct 1 - Pricing with Extended Products**. Product pricing is determined by how vendors offer their products and how the utility purchases the solution. The price model is: Core Costs – Project Year Maintenance/Subscription Costs – Add-On Costs – Extended or Edge System Costs.

   For example, an MDM product can be purchased with the CIS product or with a third party and costs covered within the core CIS costs or these costs may be significant enough that they may be treated as Add-on costs or Extended costs. Another example, a customer portal can be purchased as part of a core CIS or part of a full blown CxT or customer communication program and treated as Extended costs. A final example, the utility can purchase a separate CRM and integrate it with the CIS, this could be treated as a separate initiative with its own budget and an Extended cost which would be integrated to the CIS. Or the utility could use the CRM functionality within the CIS product and treated as an Add-on cost.

   TMG confirmed that pursuing third party extended products can increase the price of the solution and MECL wants to **minimize pricing by purchasing a core solution with add-ons,** and only purchase extended products if not available.

2. **Construct 2 - Integrated vs Component.** This decision was to pursue either a specific product suite offering an integrated solution or multiple products from several vendors using middleware to implement a component-based (or best of product) solution. **The decision was to pursue an integrated product suite.**

3. **Construct 3 - Phased CIS Product Implementations.** The implementation of a new CIS by core component is difficult, it is costly, time consuming and risky. The same is true for the legacy CIS. To implement in pieces the systems must be maintained in sync so users can continue to use both systems depending on what has been converted and not converted. This requires a tremendous amount of additional work. **The decision was to pursue a single stream with phases of delivery due to the structure of the current CIS.**

4. **License and Maintenance Consideration**: The decision is to pursue a **perpetual license**, with an on-premise platform for an ongoing period and a payment structure of upfront within 90 days. Maintenance is planned for 24% paid annually based on the license fee.

5. **Release Schedule Consideration**: The decision is to pursue a **Perpetual On-Premise Minimum Viable Product (MVP)** option with an annual frequency, projected implementation dollars of 1 to 2% of implementation fees and an adoption requirement of N-1 Release Adoption.

6. **Design Authority Consideration**: The expectation is for the Software Vendor to be responsible for product design and implementation and to have a product model of processes, an SI / PSF will assist with implementation services, and a 3rd Party will provide independent QA services. MECL will provide design services. Only necessary modifications that were regulatory driven, would be considered permissible for the project.

3.2 Business Considerations

A second aspect of the Target State Workshop, TMG and MECL focused on Business Considerations which included the following.

Business Considerations Findings

1. **Customer Trends – Transformation Agent:** The new CIS is viewed as a transformational agent impacting multiple areas including: Systems, Processes, Organization Structure & Strategy, and People who are Satisfied and Customer Oriented.

2. **Customer Trends - Customer Workforce Empowerment:** Utilize CIS Digital Channels to Reduce Calls and Paper. Will be used to standardize Work – Processes – Scripting and will automate routine transactions - Robotics for Approvals.

3. **Customer Trends – Customer Lifecycle:** Will adapt the current customer life-cycle to the product roadmap and associated life-cycle where possible to better serve customers and stay on the product path for future releases.

4. **Customer Trends - Consider Outsource Business Functions:** Will consider outsourcing the business function of Storms Overflow and the Night Operator Function to a Third Party. Will consider a hybrid approach of outsourcing for Cashiering, Remittance Processing, Bill Production & Distribution, and Credit & Collection business functions. Retain Contact Center, Field Service, Walk-in Customer Service, Meter Reading, and Marketing & Sales in house.

5. **Customer Trends - Move CIS Application Functions to Business:** Will consider moving the following IT Functions to business: Training and Education, Batch Scheduling and Product User Group. Will retain First Level Support Desk and Operations & Production Control functions within the IT department. Will share between IT and Business departments: Requirements Definition & Backlog

Management, Testing and Acceptance, User Security, Configuration and Product Release Planning.

6. **Customer Trends - Implement A CRM Product:** Will not implement a separate extended CRM product from the new CIS.

7. **Customer Trends - The Reporting, Query, and Analytics Approach:** Will pursue a robust data democratization solution.

3.3 Technical Considerations

As a third component of the Target State Workshop, the TMG and MECL group focused on Technical Considerations which include the following.

1. **Target - Overall Technical Considerations**: identified a target on-premise solution consisting of SQL Server, Windows, and VMWare Citrix.

2. **Target - Development Considerations:** expects the solution to address: Application Development Framework & Tools, Specific Development Tools, Testing Tools Administration Tools, and Quality Management Tools, Release Management Methodology, and Developer Skills and Available Training Requirements.

3. **Target - Operation Considerations**: expects the solution to address: Approach towards Batch Processing & Scheduling, Identification of Batch Processing & Scheduling Tools & Technology required, Performance Management and Monitoring Capabilities, Identify Back-Up and Recovery Capabilities, Identify Disaster Recovery Capabilities and Recovery Time Objectives 24 hr., 48 hr., 72hr, High-Availability, Skills for Operators & Administrators and Training.

4. **Target - Support Considerations**: expects the solution to address: Capabilities for Service Management, Integration with Third-Party Service Management Tools, Typical Deployment Landscape and Support Architecture for the Proposed Solution, Timing and Lifecycle for an Upgrade of the Proposed Solution, Approach to Release Management and On-Going Maintenance, and Approaches for Maintenance Procedures, Maintenance Utilities, and Patching Procedures.

5. **Target - Infrastructure/Platform Considerations:** expects the solution to provide specifications for: Server and Operating System, Virtualization and High Availability, Database, System Software and Tools, Main Facility and DR, Network and Communications, and Client Devices and Support for Remote Client Location.

6. **Target – Security Considerations:** expects the solution to address: Security Architecture of the Solution, Solution's Approach towards User Provisioning, User Administration, Authentication, and Authorization, including Integration with Third-Party Tools. Support for the Use of Certificates and Security Tokens for Access Authorization, Delivered Capabilities to Support Integration with LDAP Identity Directories (such as Active Directory) for Authentication and Authorization, including Approaches for Single Sign-on and the Coordination of Multiple Identity Stores. Included Functionality to Manage Logging and Reporting of Security Events, including Integration with Third-Party Log Management Infrastructure.

7. **Target - Middleware Considerations:** expects the solution to address: Middleware Components and Functionality that is required, ESB (enterprise service bus) vs SOA (service-oriented architecture), Overall Approaches to Use Included Middleware Components to Interface with Other Utility Applications, Overall Approaches to Use Included Middleware Components to Interface with External Applications, Integration with Document Management Tools, Native Support for Business Process Automation, including Specific Tools, Integration with Business Process Modeling Tools such as Visio, Rational, and CaseWise.

8. **Target - Data Reporting & Analytics Considerations:** expects the solution to address: Support for Third-Party Tools, Delivered ETL & Data Extract Functionality and Support for Third-Party Tools, Delivered Querying and Reporting and Business Intelligence Capabilities, Integration with Desktop Applications for Analysis Purposes, Integration with Desktop Applications for Analysis Purposes, Included Tools for the Development and Operation of Dashboards, Scorecards, and other real-Time Monitoring Applications, Delivered Analytics Tools and Capabilities that are Delivered with the Proposed Solution, including Historical Data Analysis, Forecasting Methodologies, and Data Mining Capabilities, Approach with Working with a Vendor on Building Reports or Analytics, including Provided Tools & Techniques, and 10-years of available data for reporting with data archive for another 20-years of history.

9. **Target - Data Considerations**: the solution will address: Capabilities for Information Lifecycle Management, including Data Retention and Archiving Tools and Processes, Capabilities for Enterprise Data Management with managing both on-premise and off-premise data, Support Master Data Management, Support including Tools for Data Quality Programs, both via Manual Processes and Automation, Support for Metadata Management, including both Platform-Specific and Non-Platform Schemas, Systems, Applications, Programs, and Services, and Approach to Encrypting all Application Data At Rest.

10. **Target - Potential Outsource Current IT Functions:** consider outsourcing the IT function of Bill Printing and Finishing. will consider a shared approach of outsourcing for Application Break/Fix, Application Development, Disaster Recover, Product Release Planning and Product Training. will retain Second Level Help Desk, Infrastructure/Platform, Batch Scheduling, Operations & Production Control, and Security & Controls in house.

3.4 Additional Considerations

Several topics were presented by TMG and discussed with MECL during the target state workshop, the following are relevant to this report.

1. **Trend - Use of Pure Agile Methodology:** For CIS systems vendors utilize a Hybrid Agile approach to implement. MECL can expect to see vendors propose projects with these hybrid approaches.

2. **Data Conversion Considerations:** The outcome of this discussion was confirmation that the number of CIS source systems is one. A decision was made that access to historical data will be required as a part of the CIS solution (10 years). In addition, it was confirmed that the plan to access data that is not converted will be by views into

a file with non-converted data. MECL confirmed that 81,887 customer accounts will be converted from the legacy system to the future CIS solution.

3. **Implementation Plan Considerations:** Discussion regarding Single Launch vs. Phased vs. Streamed Approach for the implementation of the CIS solution. It was decided on a streamed approach with phases because the legacy CIS is bundled with numerous systems in addition to CIS and MECL cannot manage the significant change of all systems converting at one time across the organization.

4. **Performance Based Contract Considerations:** Discussion regarding the use of performance-based commitments from the vendor to ensure that KPI's are met with potential for punitive measures if items are not met. There is additional work and costs associated with these commitments, as a result, a performance-based contract will not be pursued with the vendor. This is consistent with most CIS projects.

5. **Service Level Considerations:** Discussion regarding the use of service levels is less important with an on-premise platform. The vendor will be held to go-live readiness performance criteria and final acceptance criteria regarding performance of the system.

6. **Go-Live Readiness Considerations:** identified a robust go-live readiness plan based on TMG's checklist. This will ensure the system is only placed into production when it is ready.

7. **Payment & Financing Considerations: i**ndicated there are no disbursement schedule limitations and no interest in vendor financing options.

8. **Financial Model Considerations:** identified several parameters during this workshop which are used in the financial model and presented in the Business Value-Case table.

9. **Stabilization Considerations:** identified the need for a minimum of 4-months after the go-live to stabilize and accept the system.

10. **Operational Considerations:** identified the vendor as responsible to provide new application releases, application development, and application maintenance and support. MECL is responsible for applying the new application releases (assess release notes, update interfaces, extensions, regression testing, configuration, etc..), provide platform refreshes for the on-premise infrastructure, provide platform operations (maintain platform, run batch, production control, security, etc..). Manage disaster recovery and provide first tier application support for help desk and coordination of problem resolution.

The results of this workshop were used as input to the application architecture and the business value case.

It is important to render these decisions, to establish direction and identify future state as it formulates scope and has cost implications.

4. Cloud Education Workshop

TMG facilitated a Cloud education workshop with MECL. The workshop focused on educating workshop attendees to enable them to make upcoming decisions regarding platform options and if possible, identify a preferred platform.

On-Premise is discussed and considered in this Cloud Platform workshop. It is a viable alternative to Cloud platforms. It has distinct characteristics which are used as a baseline to compare the Cloud platforms against.

4.1 Solution Components

TMG defines a Cloud Model with the following Solution Components.

1. **Application** - The application is provided by the vendor through a license. The licenses can be granted in perpetuity, or a subscription provided based on the life of the contract. It is a buy versus a rent option. The application is then fully owned by the utility to maintain and upgrade.

2. **Application Services & Ongoing Maintenance -** In a perpetual license model, ongoing maintenance is offered by the vendor who then provides regular product patches and releases, with ongoing support i.e., help desk, user group, etc. In Software as a Service models, vendors also provide enhanced services such as applying patches/releases to the client version, operation of the application including production control, batch processing, service level management, etc.

3. **Infrastructure & Services** - Includes the primary facility/data center, disaster recovery site, hardware (servers, firewalls), storage, network, and security, with performance, virtualization, and management services (monitoring, log access, load balancing, etc.). Also includes things like, system startup / shutdown, hardware refresh, backup/ replication/ recovery, and file transfer capabilities.

4. **Platform & Services** - Includes a database, analytical processing, operating system, runtime system, an application development environment with tools and services (middleware, and API's), data integration & data quality, and all security, performance, and related services (database tuning, disaster recovery, etc.). The platform allows companies to create, host, and deploy products and solutions.

5. **Managed Services** - Services still required around the application as well as the entire platform. This can include, but not limited to problem resolution and support, maintenance, and new development (extensions, interfaces, reports, etc.), end user profile management, service level monitoring, new release acceptance, training, transition management. etc.

4.2 Cloud Platforms

Applying these Solution Components across the primary Cloud Platforms results in the following.

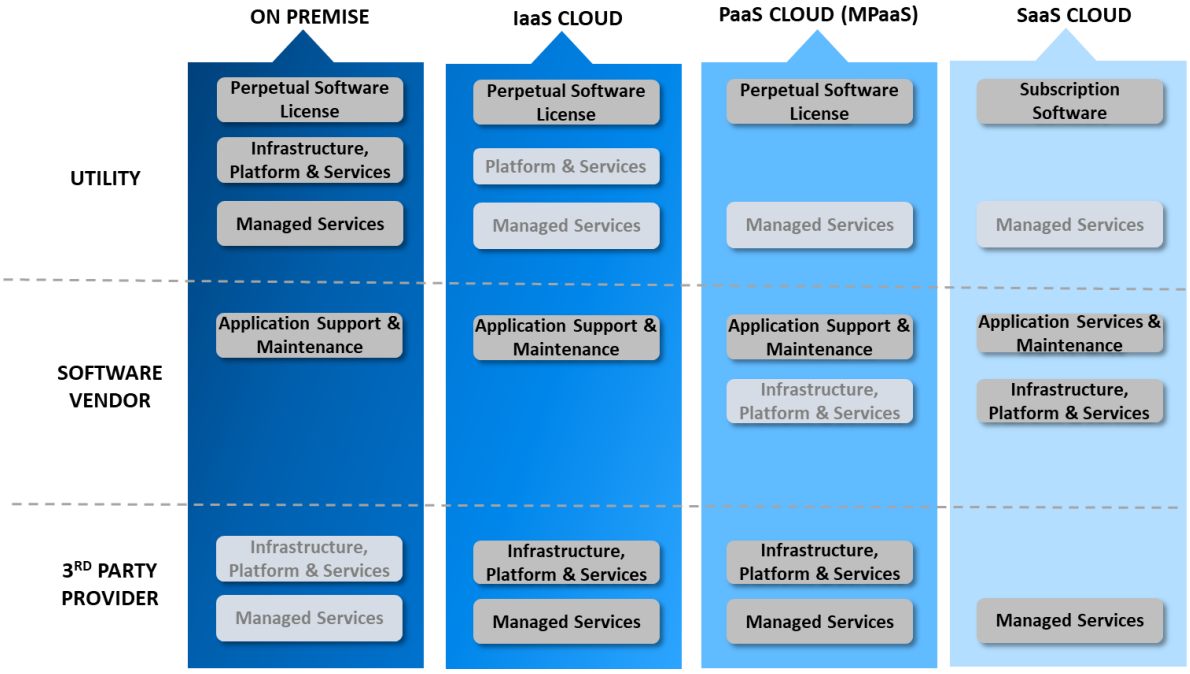
1. **On Premise:** The On-Premise model consists of a Perpetual Application, Application Services & Ongoing Maintenance provided by the Vendor, Platform Services provided by the Utility, Infrastructure Services provided by the Utility, and Manage Services provided by the Utility.

2. **IaaS:** The Infrastructure as a Service model consists of a Perpetual Application, Application Services & Ongoing Maintenance provided by the Vendor, Platform Services provided by a 3rd Party or the Utility, Infrastructure Services provided by the 3rd Party, and Manage Services provided by the Utility or 3rd Party.

3. **PaaS:** The Platform as a Service model consists of a Perpetual Application, Application Services & Ongoing Maintenance provided by the Vendor, Platform Services provided by the Vendor or 3rd Party, Infrastructure Services provided by the 3rd Party or the Vendor, and Manage Services provided by the Utility or 3rd Party.

4. **SaaS:** The Software as a Service model consists of a Subscription based Application, Application Services & Ongoing Maintenance provided by the Vendor, Platform Services provided by the Vendor, Infrastructure Services provided by the Vendor, and Manage Services provided by the Utility or 3rd Party.

This is represented in the following diagram. The light grey boxes represent alternatives.



4.3 Deployment Models

There are several Deployment Models available with the Platforms. TMG offers definitions for the following 4 related to a CIS solution.

1. **Private cloud -** Private cloud is cloud infrastructure operated solely for a single organization, whether managed internally or by a third-party, and hosted either internally or externally.

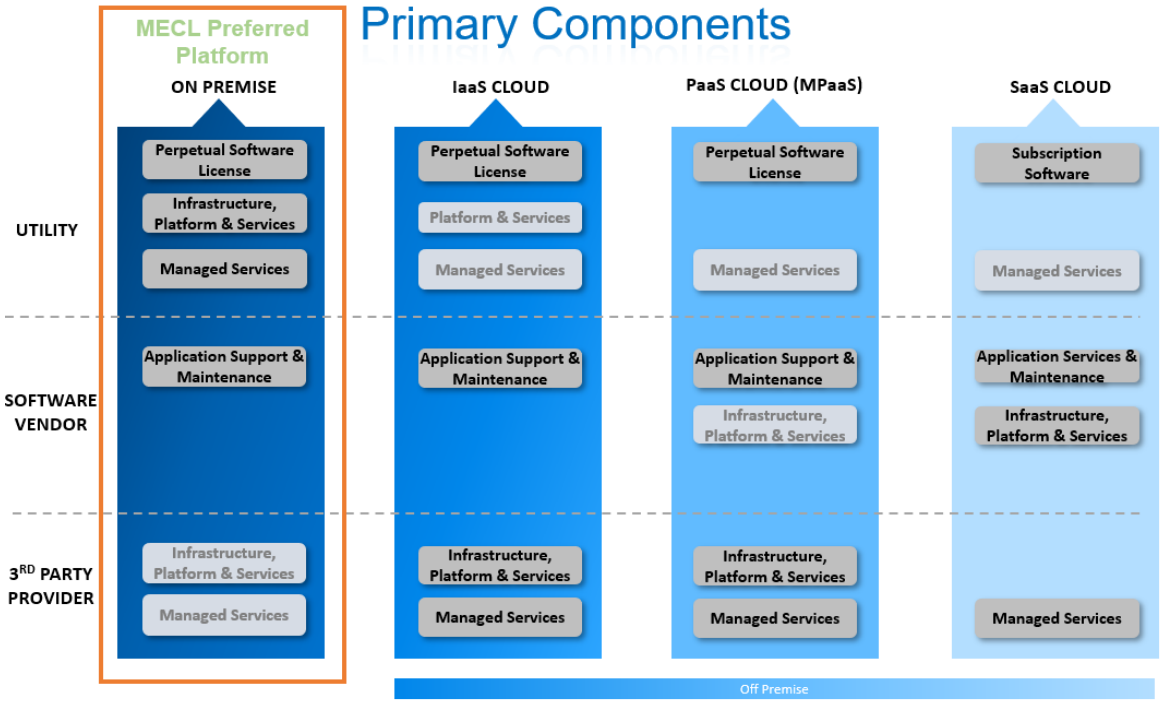
2. **Public cloud -** A cloud is called a "public cloud" when the services are rendered over a network that is open for public use. Public cloud services may be free. Technically there may be little or no difference between public and private cloud architecture, however, security considerations may be different for services (applications, storage, and other resources) that are made available by a service provider for a public audience and when communication is affected over a non-trusted network.

3. **Hybrid cloud -** Hybrid cloud is a composition of two or more clouds (private, community or public) that remain distinct entities but are bound together, offering the benefits of multiple deployment models. Hybrid cloud can also mean the ability to connect collocation, managed and/or dedicated services with cloud resources. Gartner defines a hybrid cloud service as a cloud computing service that is composed of some combination of private, public and community cloud services, from different service providers.

4. **Community cloud -** Community cloud shares infrastructure between several organizations from a specific community with common concerns (security, compliance, jurisdiction, etc.), whether managed internally or by a third-party, and either hosted internally or externally.

4.4 Cloud Workshop Findings

The TMG and MECL group identified the on-premise private cloud platform as the “Preferred” platform.

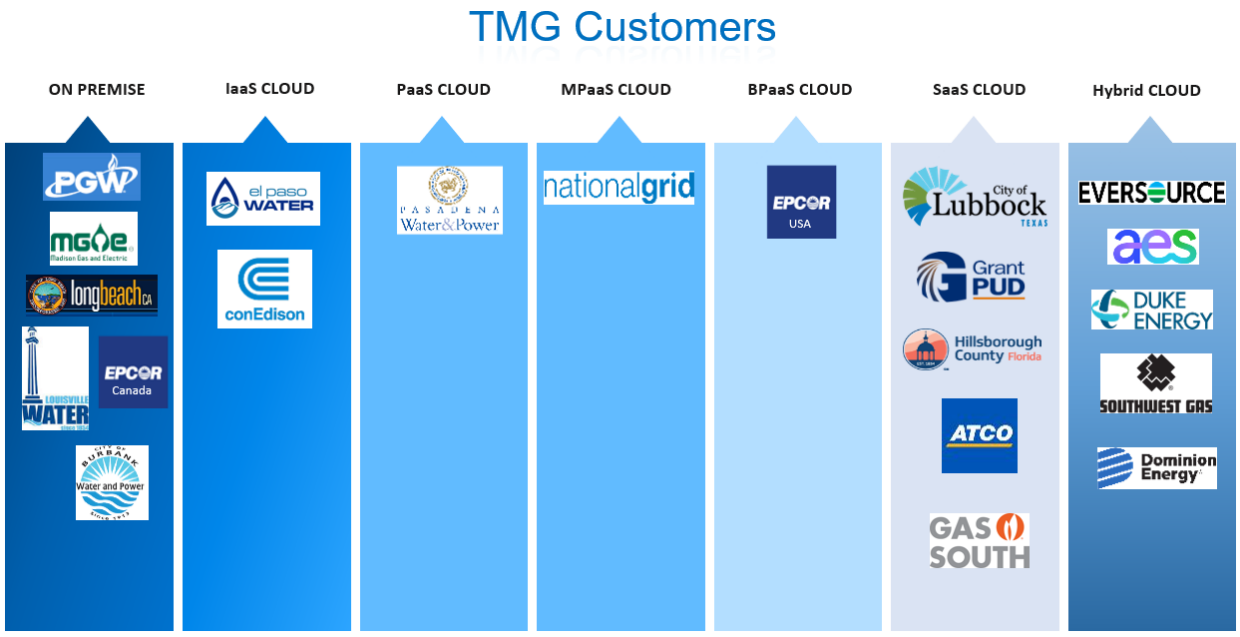


Based on TMG's experience the following items were identified as areas of focus to consider when implementing the platform for a vendor solution:

1. Confirm the platform will start day one and support development work.
2. Confirm the environment will be phased in to support a phased implementation of customers.
3. Confirm the vendor is not required to bring a "quick start" environment.
4. Confirm a robust disaster recovery solution is provided.
5. Confirm sufficient environments are included.
6. Confirm all required software tools to develop and operate the solution are included (e.g., batch scheduler).
7. Confirm the addition of AMS to any platform.

4.5 TMG Customers

The following TMG customers have made platform decisions related to their new CIS systems. Deciding to implement on-premise does not prohibit from moving to a cloud platform in the future. The same software runs across platforms, it may utilize slightly different technologies.



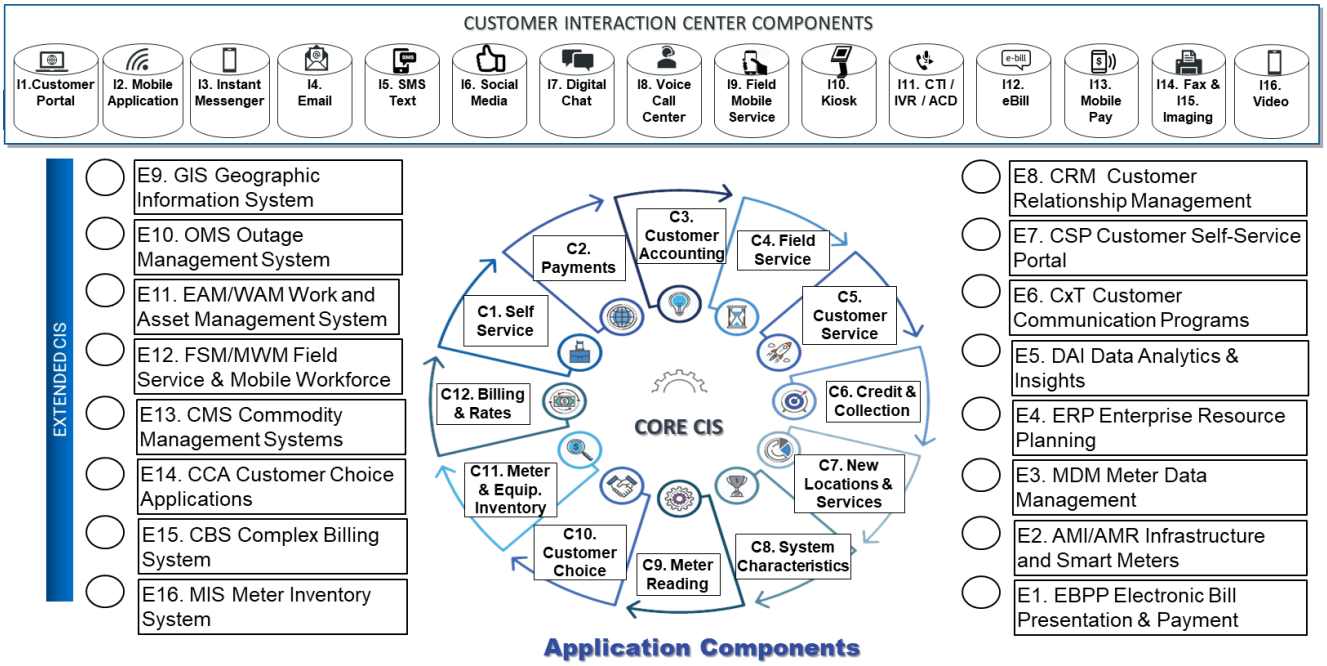
5. Application Workshop

TMG facilitated an Application Workshop with MECL. The intent was to present TMG's Application Model and to determine what components are considered in-scope for this project.

5.1 TMG Application Roadmap

The following diagram presents TMG's Application Roadmap which was reviewed with MECL.

The following diagram presents the TMG Application Components. (these will be color coded when complete).



TMG and MECL reviewed the Application Components, this analysis focused on the **Core CIS** components, **Extended CIS** components and **Customer Interaction Center Components**. The following capture the results of this review.

1. **CORE CIS:** It was determined that the following areas were considered in scope: Payments, Customer, Accounting, Field Service, Credit & Collection, New Locations & Service, System Characteristics, Meter Reading, Meter & Equipment Inventory, and Billing & Rates.

2. **CORE CIS:** Customer Choice is out-of-scope for the CIS Project. MECL is open to alternative options for various Customer Self Service (C1) functions.

3. **EXTENDED CIS:** In-scope systems include Electronic Bill Presentation, Bill Payment, AMI, MDM, DAI (Data), OMS, EAM/WMS, and MWM.

4. **EXTENDED CIS:** Out-of-Scope systems include: CMS, CBS, CCA, and MIS.

5. **CUSTOMER INTERACTION CENTER:** In-scope systems include: Customer Portal, Mobile Application, SMS Text, Digital Chat/IM, Email, social media, Voice/Call Center, CTI/IVR/ACD, Field/Mobile, eBilling, Kiosks, Mobile Pay, Internet Fax, Imaging, and Video Interaction.

6. **CUSTOMER INTERACTION CENTER:** Out-of-scope systems: crypto currency.

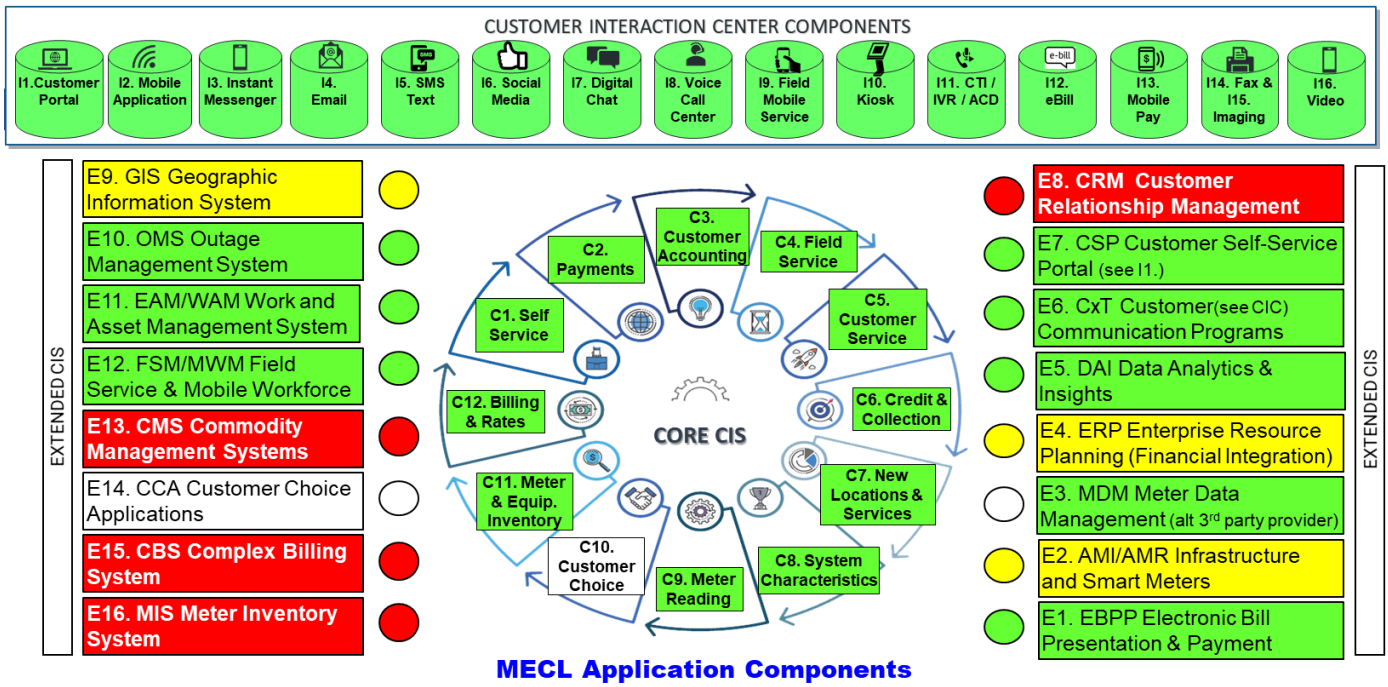
5.2 MECL Application Roadmap

This section reflects the TMG Application Roadmap updated, and color coded to reflect the identified MECL in-scope and out-of-scope systems.

Of the 44 total components in the model, 35 are in-scope, 3 are integration points, 4 are out-of-scope, and 2 are not applicable.

The MECL current CIS is more then a CIS over the years it has grown to incorporate additional capabilities and functionalities to serve the organization.

Scope Table	
IND	Description
35	In Scope
0	Partial In Scope
3	Integration Only
0	Possible Future
4	Out of Scope
2	Not Applicable
44	Total Components



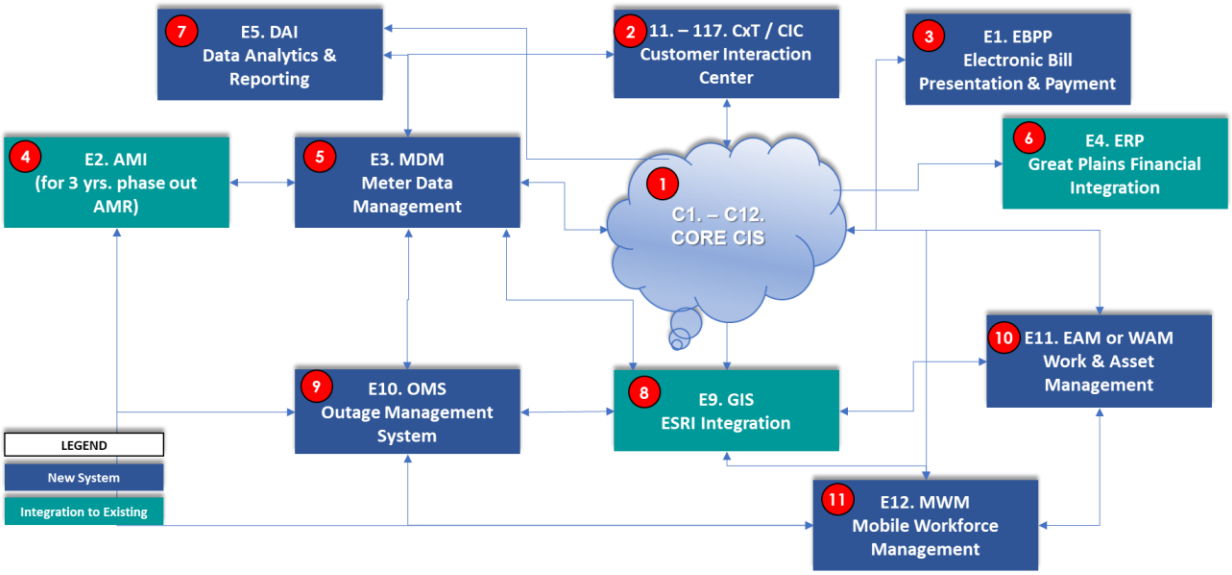
MECL Application Components

6. Project Workshop

The project workshop compiled information gathered from the prior Application Workshop and presented a project Visual Application Diagram.

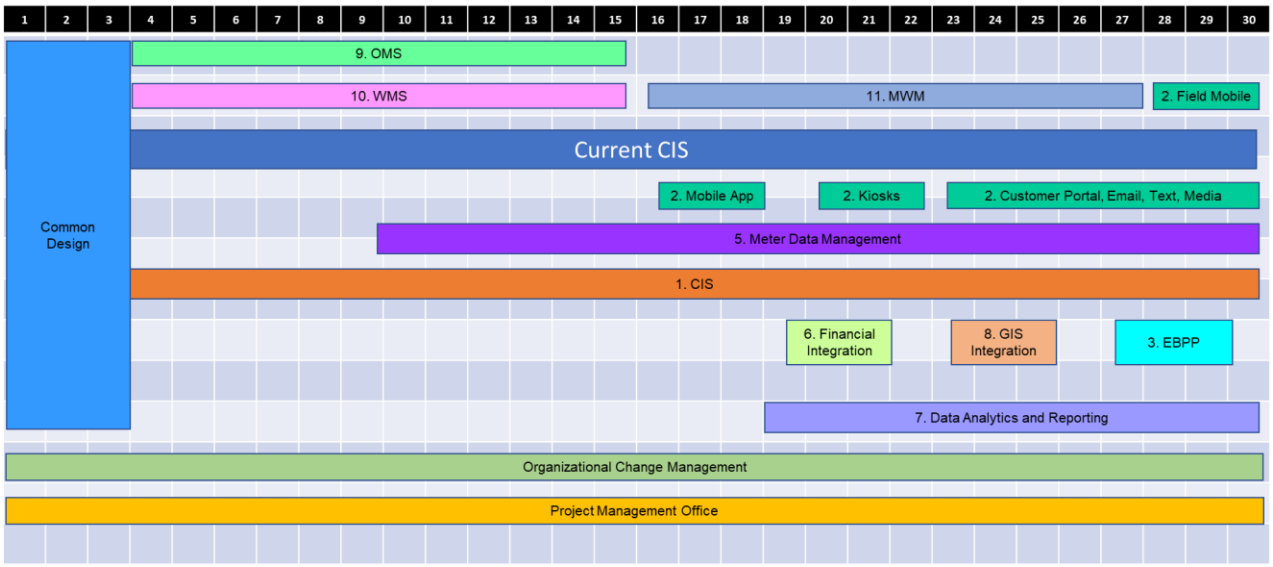
6.1 MECL Application Architecture

Based on the MECL in-scope Application Components from the prior section the following Visual Application Diagram was developed to represent a concise view of systems in project scope. The letters within the boxes refer to the MECL Application Roadmap in the prior section e.g., Core CIS, Edge Systems, Customer Interaction Center. The Red Numbers represent a translation from the Application Roadmap to an identification of unique project numbers used to track each project going forward on a project timeline.



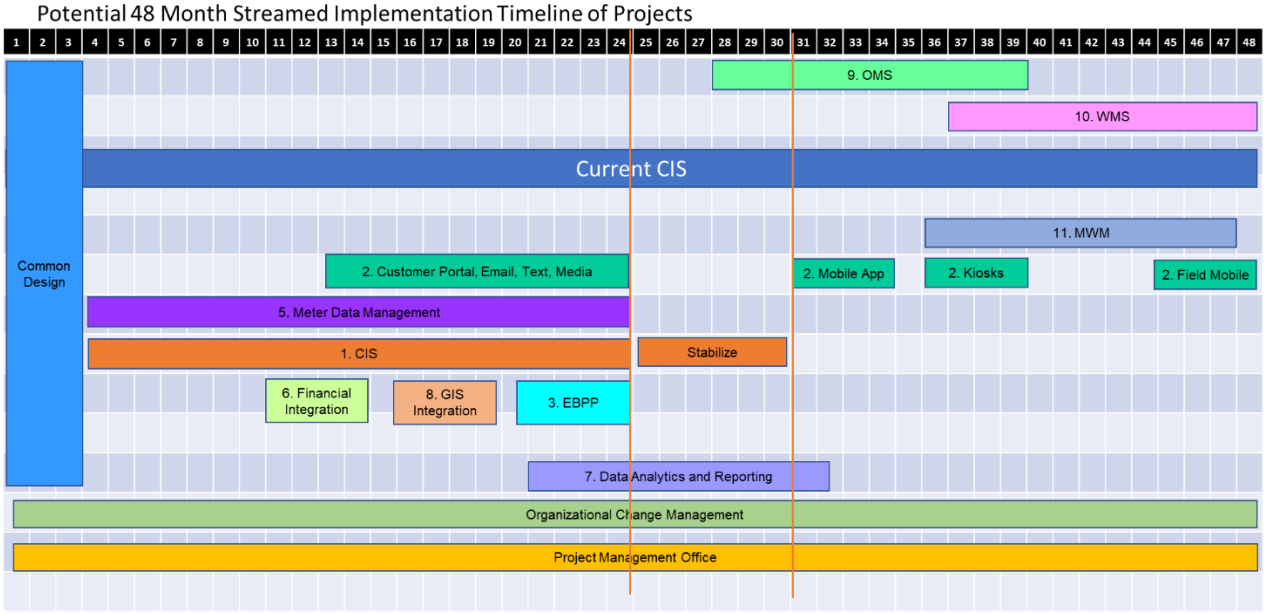
Using the defined Projects an initial roadmap/timeline was developed by TMG demonstrating how the application solution could be implemented over the next three years. This was based on TMG's project history with other utilities who planned to do this in 24-months and their projects slipped to 30-months. TMG also considered MECL resource constraints, and the need to keep the existing legacy CIS in production until all systems are placed into production.

Potential 30 Month Streamed Implementation Timeline of Projects



For comparison and planning purposes a longer timeline was considered. This was a 48-month phased timeline with a 24-month baseline for core CIS/MDM, a 6-month stabilization period (OMS overlaps 3-months), followed by an 18-month timeframe for operational systems.

Potential 48 Month Streamed Implementation Timeline of Projects



Here is a brief definition of the components on both timelines that do not have project numbers associated with them.

- **Common Design.** The vendor will work with MECL to identify all MECL Enterprise design components that will be applied across these applications. We don't want these applications configured differently, they need to have a common look and feel across the MECL Enterprise.

- **Current CIS**. The current legacy CIS must remain in production to support all systems and users until all applications are converted to the new platform. This requires integration from new system to the current CIS to keep information flowing so the systems continue to operate.

- **Stabilize.** There is a period of stabilization after each install, however after the CIS there is a significant period of 3-months plus another 3-months of continued support and final acceptance.

- **Organizational Change Management.** This is a significant impact to the organization; this represents a parallel OCM program in support of these projects.

- **Project Management Office.** The need to manage and provide oversight across all projects.

Both timelines were used in the next phase of solution options analysis as implementation considerations.

7. Solution Analysis

This section contains an analysis of solution options and the selection of an optimum solution.

7.1 CIS Solution Options

TMG utilized a Model with four quadrants representing general software scenarios for MECL to consider regarding CIS Solution Options in the formulation of a CIS Solution Roadmap. A total of 29 solution options were presented and 16 were eliminated leaving a total of 13 Solution Options to consider. The following table presents the list of solution options that were evaluated.

Short Description	Long Description
1. Status Quo	Continue operating and supporting the existing legacy CIS.
2. Complex Billing	Complex Billing Engine to manage TOU Rates and integrate to existing CIS
3. Re-Architect	Re-engineer the code base into a new programming language, get rid of PowerBuilder. Implement TOU Rates.
4. Outsource Support	Status Quo + address support issues by outsourcing support to external firms.
5. Custom System	Utilize a CIS design guide or template to plan, design, code, test and implement a new system fully customized to the needs of MECL.
6. COTS.OnPrem	Implement COTS Perpetual License - Integrated Suite – Single Stream – OnPremise Platform
7. COTS.IaaS (hosted)	Implement COTS Perpetual License - Integrated Suite – Single Stream – IaaS (hosted)
8. COTS.MPaaS	Implement COTS Perpetual License - Integrated Suite – Single Stream – MPaaS

9. COTS.Phased.OnPrem	Implement COTS Perpetual License - Integrated Suite - Phased – OnPremise Platform
10. COTS.Phased.IaaS	Implement COTS Perpetual License - Integrated Suite - Phased - IaaS (Hosted)
11. COTS.Phased.MPaaS	Implement COTS Perpetual License - Integrated Suite - Phased - MPaaS
12. Co-Sourced	Engage with another utility (NP) to procure, implement, and operate a new CIS within the same environment/platform to achieve economies of scale.
13. Defer.COTS.OnPrem	Defer CIS replacement by 5 years

Table Definitions.

- The term Perpetual License indicates MECL would purchase and own a license versus a Subscription or Cloud license where MECL would not own software.
- The term Integrated Suite indicates MECL would purchase an integrated suite of software from a single vendor and not multiple vendor products and then be required to develop and maintain integration across multiple vendor products.
- The term Single and Phased refers to the two timelines from the previous section where Single Stream is the 30-month, and Phased is the 48-month.
- There are platform terms referred to from the Cloud Workshop, On-Premise, IaaS for Infrastructure as a Service (hosted solution), MPaaS for Managed Platform as a Service
- The term COTS is defined in the following section.

7.2 COTS Definition

During the evaluation, the term “COTS” is used. What is the definition and how is the term used in this document?

1. COTS stands for “Commercial Off-the-Shelf Software” and it represents prepackaged software that is tailored to a company’s needs using settings instead of significant programming. It is similar in concept to Microsoft Word, Excel, Outlook, etc.
2. COTS is the most popular approach by far to implementing new CIS solutions in the investor-owned utility market. COTS software aligns with MECL’s business, technology, and application software strategy.
3. COTS offers several advantages including: Continual releases with new functionality, technology, and fixes constantly introduced. Provides most common utility requirements upfront during implementation. Has a large installed base of existing utilities which reduces risk and offers more available support resources.

4. COTS does have some disadvantages including: Requires adoption of industry-standard approaches to processes and procedures. Requires retraining of user and systems personnel and involves significant implementation cost and project risk to replace the legacy system.

7.3 Evaluation Criteria

The following are the primary evaluation categories and the weights that were used in evaluating the solution options.

Item #	Evaluation Category	Weight	Description
1	Installation Costs	15%	The total cost to implement the solution option.
2	Operational Costs/Savings	15%	The total annual cost to operate the solution option and realize savings.
3	Installation Timeframe	10%	The time to implement and stabilize the solution option.
4	Solution Risk & Viability	15%	The risk associated with installing and operating the solution option
5	Resource Utilization	10%	The staffing and resources to implement and operate the solution option.
6	Business Considerations	15%	The solution option meets various business constructs and considerations.
7	Technology Considerations	10%	The solution option meets various technical constructs and considerations.
8	Benefits & Improvements	10%	The scenario delivers benefits and improvements to various stakeholders.
	Total	**100%**	

Within these primary categories there are detailed sub-categories that were used in evaluating the solution options.

The following are the grades which were used by TMG and MECL to evaluate each of the solution options across all evaluation categories and subcategories.

Grade Values	Short Description	Long Description
2	Meets	The Solution Option demonstrates the capability to **meet** the evaluation criteria, or it meets defined metrics for this rating.
1	Meets Most	The Solution Option demonstrates the capability to **meet most** of the evaluation criteria or it meets defined metrics for this rating.
0	Somewhat Meets	The Solution Option demonstrates the capability to **meet** the evaluation criteria, or it meets defined metrics for this rating.
-1	Only Meets a Few	The Solution Option demonstrates the capability to **only meet a few** of the evaluation criteria or it meets defined metrics for this rating.

-2	Does Not Meet	The Solution Option demonstrates that it **does not meet** the evaluation criteria, or it meets defined metrics for this rating.

The TMG evaluation model also uses award points. The team determined it would use 10,000 as total award points. The following diagram presents an excerpt from the TMG evaluation model dashboard.

				Weighted Grade	
				1. Status Quo	1. Status Quo
		100.00%	10,000	0.18	1,775
	Evaluation Category	Assigned Weight	Assigned Points	Rating	Points
1	Installation Costs	15%	1500	2.00	3,000
2	Operational Costs/Savings	15%	1500	2.00	3,000
3	Installation Timeframe	10%	1000	0.80	800
4	Solution Risk & Viability	15%	1500	-0.35	(525)
5	Resource Utilization	10%	1000	2.00	2,000
6	Business Considerations	15%	1500	-2.00	(3,000)
7	Technology Considerations	10%	1000	-2.00	(2,000)
8	Benefits & Improvements	10%	1000	-1.50	(1,500)

To provide an example of how the scoring works. The Status Quo Option for category 1 – Installation Costs received a weighted grade of 2.0 times 1,500 possible assigned points equal 3,000 award points for that category. While for category 8-Benefits & Improvements it was awarded a negative 1,500 award points.

TMG uses the award points to determine how the options place against each other. There are 13 options, they will place as 1st, 2nd, 3rd, 4th, up to 13th place. Continuing with the Status Quo example, for the Installation Cost category, Status Quo with 3,000 points is in 1st place. Overall, it is in 7th place.

Please note, options can have the same points and tie for position, so you might see more than one option rank as 1st or 2nd, etc., in a category.

		1. Status Quo
		7
	Evaluation Category	Ranking
1	Installation Costs	1
2	Operational Costs/Savings	1
3	Installation Timeframe	1
4	Solution Risk & Viability	8
5	Resource Utilization	1
6	Business Considerations	13
7	Technology Considerations	13
8	Benefits & Improvements	12

7.4 Evaluation Results

The following summarizes the TMG evaluation model ranking of the options based on the award points for each of the 13 options. Two options that are tied are # 11 and #12. This analysis was conducted by TMG and MECL as a team. TMG supports and endorses the analysis and all decisions associated contained within this evaluation model.

		1. Status Quo	2. Complex Billing	3. Re-Architect	4. Outsource Support	5. Custom System	6. COTS.OnPrem	7. COTS.IaaS (hosted)
		7	9	11	10	13	1	3
	Evaluation Category	Ranking	Ranking	Ranking	Ranking	Ranking	Ranking	Ranking
1	Installation Costs	1	1	4	1	13	4	4
2	Operational Costs/Savings	1	1	1	6	12	4	6
3	Installation Timeframe	1	4	5	1	9	6	6
4	Solution Risk & Viability	8	13	11	9	7	1	3
5	Resource Utilization	1	3	4	1	13	8	8
6	Business Considerations	13	10	11	11	9	1	1
7	Technology Considerations	13	12	10	11	8	1	1
8	Benefits & Improvements	12	8	11	13	7	1	2

		8. COTS.MPaaS	9. COTS.Phased.OnPrem	10. COTS.Phased.IaaS	11. COTS.Phased.MPaaS	12. Co-Sourced	13. Defer.COTS.OnPrem
		2	4	8	5	5	12
	Evaluation Category	Ranking	Ranking	Ranking	Ranking	Ranking	Ranking
1	Installation Costs	4	11	11	9	4	9
2	Operational Costs/Savings	6	4	6	6	6	12
3	Installation Timeframe	6	9	9	9	3	9
4	Solution Risk & Viability	2	4	5	6	10	12
5	Resource Utilization	8	5	5	5	8	8
6	Business Considerations	1	1	1	1	7	8
7	Technology Considerations	1	1	1	1	1	9
8	Benefits & Improvements	2	4	4	4	9	9

The analysis that supports these tables is provided in Attachment – 7 Solution Option Analysis

The following TMG table presents a ranking of solution options. The use of positive and negative grade values results in 3 option categories, Green, Yellow, and Red. The items in green are considered as potential options to be pursued. Definitions for these options are found in section 7.1 CIS Solution Options.

TMG recommends pursuing these alternatives which do the best job of meeting overall criteria.	9,000	1st	6. COTS.OnPrem	**Positive Return.** Generally, solution options with the highest scores should be pursued as they provide a positive return and acceptable risk.
	6,638	2nd	8.COTS.MPaaS	
	6,413	3d	7. COTS.IaaS (Hosted)	
	2,888	4th	9. COTS.Phased.OnPrem	
	2,588	5th	11. COTS.Phased.MPaaS	
	2,588	6th	12, Cosourced	
TMG recommends not pursuing these alternatives as they do not result in net benefits or savings or realization of value.	1,775	7th	1. Status Quo	**Ground Zero.** Solution options with scores near zero.
	1,238	8th	10. COTS.Phased.IaaS	
	326	9th	2. Complex Billing	
TMG recommends not pursuing these alternative as they do not address evaluation criteria.	-1,838	10th	4. Outsource Support	**Negative Return.** Generally, solution options with a score less than zero should not be pursued as they provide a negative return or unacceptable risk.
	-2,288	11th	3. Re-Architect	
	-6,525	12th	13. Defer.COTS.OnPrem	
	-9,075	13th	5. Custom System	

Based on the TMG evaluation model the highest ranked option is #6. Implement COTS Perpetual License – as an Integrated Suite – in a Single Stream – within an OnPremise Platform.

8. Recommendation

This section addresses three questions and presents the recommendations

8.1 Retain or Replace?

The first question asked, should the MECL legacy CIS be retained or replaced?

1. The results of the Current State Assessment work – RED ZONE – indicated REPLACEMENT.

   Average Assessment. The average of the five grades results in a "C-" or Low Satisfactory for the CIS Current Assessment. The is in the RED ZONE indicating based on these factors the system could be replaced.

2. The concept of CIS as a House that MECL can live in, but it has a Cracked Foundation which must be REPLACED.

   The current 33-year-old CIS is processing the current revenue stream and doing a satisfactory job of accommodating business operations and customer service needs (MECL Can Live in The House).

However, the MECL CIS Has a Cracked Technical (house) Foundation which makes repairs and additions costly, time consuming, and in some instances prohibitive. At some point, the current CIS technology may jeopardize or impede MECL's future revenue stream, associated operations, and customer offerings.

3. The application of TMG's evaluation model which indicates MECL should REPLACE the existing legacy CIS.

   All the Green options in the model are REPLACE options

TMG RECCOMENDATION 1: Based on the results of this analysis TMG recommends REPLACEMENT of the Legacy CIS.

8.2 Defer or Replace Now?

The second question asked, if replacement, should MECL move to replace the legacy CIS now, or defer for another five years?

1. MECL should REPLACE NOW the Risks and Pressures grow each year including: Position for AMI/Smart Meters, IT Support & Retirement, PowerBuilder Framework, Custom Development Shop, Data & Reporting Needs, Business Operation Needs, Business Staffing Needs, and Electrification Needs.

2. Review the results of Option #13 and the fact the Defer Option Ranks 12th out of 13 Options analyzed. This option scores in the Red, meaning MECL should not pursue and defer replacement for 5-years.

TMG RECOMMENDATION 2: TMG recommends MECL REPLACE NOW the Risks and Pressures are Growing each Year.

8.3 Why COTS On-Premise?

The third question asked, if replacement, which is the optimum solution for MECL to consider?

1. MECL should move forward with the purchase of COTS Product, Perpetual License, operating On-Premise Platform, Implemented in a Single Phase.

This option calls for the purchase of a product bundled suite with integrated add-ons as necessary and implement within the MECL data center. It is not possible to flip the switch, so products are live at the same time, the OCM/training, and the impact is too great. As a result, mini-golive's of products are required within the single stream so that everything is live by the stream date. This requires a syncing effort between the legacy CIS and the new products as they "go-live" until all products are placed into production and the legacy system is removed from the desktop, this represents integration work between systems.

The following highlights why this is the optimum solution or option for MECL.

1. This option was 4th in implementation and ongoing operation costs.

2. This option was 6th in terms of total implementation timeframe.

3. This option takes first place in addressing risk and viability including.

    a. Addresses Application Risk, by quickly moving off the legacy CIS with the resourcing issues, lack of documentation, unstructured programming, system deterioration, support issues, a system quickly approaching end of life. Also, this option supports the direction of the utility and mitigates ongoing application risk.

    b. Addresses Business Risk supports quickly moving off the application because the business environment poses a risk to the utility including limited business resources - lack business knowledge, resourcing issues (key users have left/retired or are planning to), integration issues, impact to customer life-cycle, limited ability and obstacles to improving customer experience). It will ensure the new system and associated business environment is aligned and supports MECL and its direction regarding business operations and mitigation of business risk.

    c. This adheres to the implementation and operation of a COTS product suite which is proven, it is the direction of the industry. MECL currently operates and runs CIS within its own data center. Today, almost 70% of utilities operate their CIS onpremise or in a hosted platform with another firm. Implementing within the proposed timeframe is viable. While the long-term viability of the COTS application is strong, the industry is moving away from OnPrem operations to Cloud platforms, however, this option does not prevent this future migration path as vendor software is the same on various platforms.

4. This option is strong in supporting the business and business considerations including the following.

    a. Data Democratization. This solution will consist of internal standard and additional modules for reporting and analytics. This requirement will be a significant part of the MECL RFP and will be fulfilled as part of the comprehensive solution. This will become even more exacerbated with future introduction of AMI/Smart Meters into the CIS/MDM.

    b. Best Practices Aligned with Product. Provides a new CIS and out-of-the-box processes and procedures tied to the modern customer life-cycle and both customer and user journeys. A starting point for MECL to modify and then train in how users will utilize the system in the new business environment at MECL. MECL will modify its business to adapt to the product and industry best practices as much as possible. This will be a huge OCM/training effort. Rather than pursuing an Agile based Minimum Viable Product approach, MECL will pursue a modified Optimum Viable Product approach or OVP which TMG has found to be more palatable for utilities. This allows for utilities to accommodate

regulatory and key business rules in the design rather than following a purist and restrictive agile MVP approach.

c. Product vs Custom Solution. MECL will move to a product solution rather than continue with the current custom CIS solution. An emphasis on coding specifically to meet MECL's business requirements requires MECL to support itself, meaning every $1 invested in maintaining the system is $1 spent with no return. For a product solution, every $1 spent results in releases containing new functionality on a regular basis and product roadmap $$$ returned. However, MECL becomes part of a user group and lives by the product roadmap losing that one-on-one touch it currently has with IT. This option enables a product solution with an emphasis on a product roadmap and user group versus customization and an internal development shop, it relies heavily on configuration vs customization.

d. This option will Enable Staff to Work Smarter. Significant effort associated with a COTS Optimum Viable Product or OVP approach is OCM / Process / Training work. Using the system as a transformation tool or enabler of change across the organization.

e. This option will bring vast Improvements to the Customer Life-Cycle and Electrification. Examples such as introduction of customer service appointment times, pay deposits by billing deposits, automated interface to financials, integrate with future AMI/MDM, offer TOU Rates, create new rates, proration, riders, taxes, Flexible Due Dates, and automate Low-Income Assistance Program. A perpetual license with regular releases against the product roadmap. It is up to MECL how closely they adhere to the roadmap without changes and extensions to the product which must be kept in alignment with an update every quarter with major releases every year. MECL can elect to apply the release or not. Assistance customers with understanding their bills, usage, and when to plug-in and turn-on equipment, for subsequent recognition of consumption during peak times of energy usage.

f. This option will provide a system with Standardized and Updated Documentation. The COTS is delivered with a complete set of application, processes, training, operation, etc. It is kept updated with new releases and synchronized with MECL specific documentation.

g. This option will provide a system with Automated & Standardized Workflows. This option provides many features including automated workflows to standardize, route, and track work. Scripting to standardize customer conversations and record the type of conversation, statistics, and performance. Automated review and approval and SOX compliance.

h. This option will implement Cost Effective Strategic Capabilities. The implementation of over 100 strategic capabilities not provided for in the current CIS through the product roadmap. Most of these capabilities are

in the System Design, Customer Service, and Billing & Rates areas for MECL.

5. This option is very strong in supporting technology and technical considerations including the following.

    a. This option addresses the Componentized System Solution. MECL has embedded CIS with Outage, Work Management, and Survey based information and activities which are not readily found within the scope of a modern CIS product. This has placed heavy reliance on CIS for critical operations across the utility, not just the cash register. This option will unbundle the current CIS and provide a more componentized CIS, MWM, EAM/WAM, and OMS solution. (NOTE: With this option, although some vendors offer integrated suites, they are listed as modules, can be purchased, and implemented separately. There are some dependencies. CIS cannot be broken apart and implemented in pieces. Some vendors rely on core modules and have partners for other modules they integrate and offer as part of their solution).

    b. This option Mitigates the Cost of Implementing New Functions. While CIS has performed diligently over the years, the need to position for future Smart Meters, TOU Billing etc., and update the current CIS is extensive. This option incorporates the scope and costs to implement a new CIS, MDM, with positioning for AMI, smart meters, setup of TOU Complex Rates, access to Interval data, consumption, and billing, and real-time interaction.

    c. This option relies on Product Configuration vs Custom Code Development and Customization. Movement of control regarding configuration of tables to individuals/group within business unit(s) and away from potential bottlenecks of only 1 or 2 individuals within IT.

    d. This option addresses Modern Industry Application Alignment, ssswhich is replacement of the troublesome end of life, PowerBuilder framework with a new COTS solution. New COTS code cannot be touched and changed. It will be placed into Escrow for viewing and access if something would happen to the vendor.

    e. Addresses the CIS Application Support issue by replacing the PowerBuilder framework with a new COTS solution provided by a vendor selling a software solution specific to the Utility Industry with a code base that is well known throughout the IT industry for development, maintenance, and support.

6. This option has the following support and viewpoints.

    a. Executives and Board members should view this as the optimum solution as it is retained within MECL's data center. Executives will quickly realize benefits as it supports decision making, attracts and retains employees, emphasis is on customer focus and experience, it presents a reasonable expenditure for all the work which needs to be

done and funded, it accommodates MECL's strategies and positions for any future AMI/Smart Meter initiative.

b. Technical personnel will quickly realize benefits as it will address technical issues and make life better for the technicians, improve the work environment, efficient use of staff, quicker turnaround on application maintenance and development, and it fits with technology strategy, direction, and considerations.

c. Business users will quickly realize benefits such as enhanced access to reports / queries /analytics, new functionality, quick turnaround on application maintenance and development, an enhanced user interface, efficient use of staff, a better quality of life, it fits with the business strategy, direction, and business considerations.

d. Customers will recognize benefits including improvement in levels of customer service and the customer experience, new communication channels, self-service, improvements in their MECL customer value package, timely response to customer needs and issues, emphasis, and improvements on the customer journey rather than MECL user processes.

The next section provides the financial analysis associated with this recommendation of replacing the legacy CIS with a COTS On-Premise solution.

9. Financial Analysis

Within TMG's analysis, an effort to determine the viability of a solution option was evaluated. The recommended solution option of COTS On-Premise had multiple factors that contributed to the classification of a viable solution. The contributing factors include:

1. The MECL COTS On-Premise CIS product solution approach is proven, and it is an accepted direction within the industry.

2. MECL currently operates CIS within its own data center.

3. Approximately 70% of utilities operate their CIS On-premise or within a hosted platform at another location.

While the long-term viability of the COTS application is strong, the industry is moving away from on-premise operations to various cloud platforms. This solution does not preclude MECL from operating on a cloud platform.

9.1 Solution Components

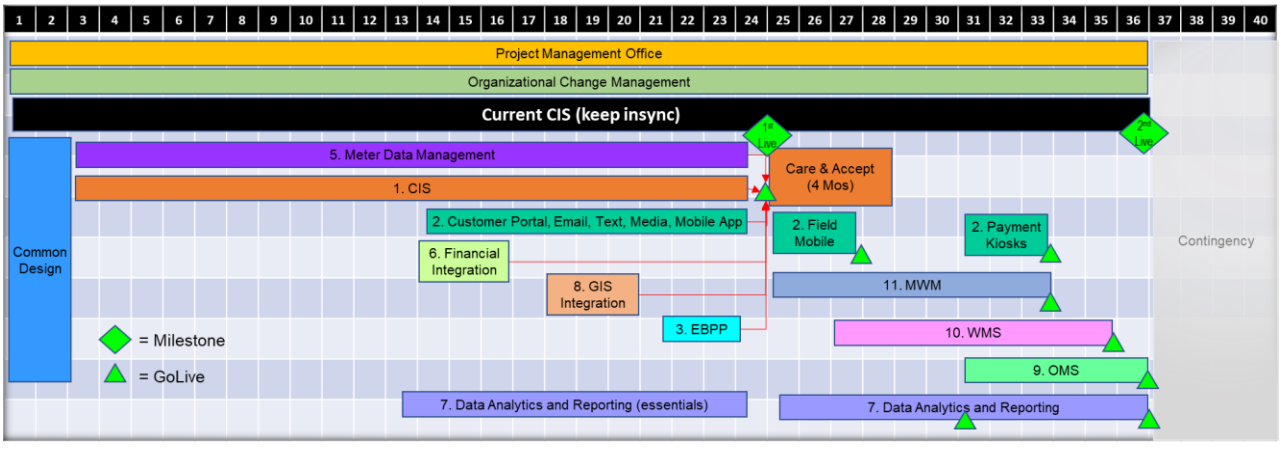
This COTS On-Premise, CIS Integrated Suite Solution is composed of 11 unique solution components (3 integrations and 8 new applications).

1. CORE CIS (new)
2. CxT/CIC Customer Interaction Center (new application)
3. EBPP – Electronic Bill Presentation & Payment (new application)
4. AMI (planned 3 years phase out AMR) **Integration**
5. MDM – Meter Data Management (new application)
6. ERP – Great Plains Financial **Integration**
7. DAI – Data Analytics & Reporting (new application)
8. GIS ESRI **Integration**
9. OMS – Outage Management System (new application)
10. EAM or WAM Work & Asset Management (new application)
11. MWM Mobile Workforce Management (new application)

One of the applications, CxT the Customer Interaction Center contains 17 communication channels including the customer portal.

9.2 Solution Timeline

A 24-month initial CIS/MDM/Portal implementation with a 4-month care & accept period with continuation of 12-months to implement operational systems each phased in with their own go-live and care & accept activities. Here is a diagram of the planned implementation timeline.



All systems will require synchronization with the legacy CIS until the 2nd Go-Live milestone is reached and all systems are converted. It was extended to accommodate resource restrictions, and the need to limit OCM impacts on the organization.

9.3 Project Activities

TMG was able to create a generic view of five primary work phases with one level of project activities across a 24-month implementation. This assumes a product implementation using a hybrid Agile approach. This generic view was used for planning, budgeting purposes, and feeds the RFP process. The view includes 5 phases: Prepare, Explore, Realize/Rebuild, Realize and Deploy. Vendors will submit their own approach which has been proven and successful with their proposed product.

9.4 Project Organization & Staffing

An initial project organizational structure was developed with a specific number of project positions identified to drive estimated project staffing costs based on MECL available staffing and vendor provided estimates. The initial structure was provided as a planning guideline which will be used in the RFP process. The structure was separated into three groups: MECL, Vendor (Software Vendor and System Integrator, and/or Professional Services Firm) and 3rd Party (Professional Services Firm).

Prior to creating the organization structure the following assumptions were made to baseline the estimates:

1. Implementation of a product suite with minimal product modifications.
2. MECL will adapt its business to the product roadmap and will apply regular releases of the product.

With use of this structure and assumptions while planning, MECL is estimated to staff the project with the following team of 6 FTE.

1. An Executive Steering Committee (4 resources at 5%),
2. Co-Program Directors (40% commitment),
3. Project Admin (as required),
4. System Users / SMEs (for the following applications: CIS, MWM, WMS and OMS),
5. Conversion/Mocks, Readiness go-live (1 IT resource at 100%),
6. Infrastructure / Database / Environments (1 IT resources at 50% also working on Integrations the other 50%),
7. Integrations, Extensions & Sync Work resources (1 IT resource at 100% and 1 IT resource at 50% also working on Database),
8. OCM/ Process Training (1 CSR resource at 100%), and
9. Product Solution Design / Config / Test (1 CSR Supervisor at 100% and 1 CSR resource at 100%).

The Vendor, which is delivering the COTS On-Premise solution, is estimated to have a team consisting of the following 7 FTE:

1. Project Executive providing oversight,
2. 1 Project Manager,
3. 1 Conversion Analyst / Programmer,
4. 2 Developers / Testers,
5. 2 Design and Configuration Analyst,
6. 1 Process / Trainer, and
7. Readiness / Go-Live / Care Analyst(s) is TBD as of now.

A 3rd party team is estimated to support MECL with the following team of 2.25 FTE.

1. Provide Quality Assurance at 25% with monthly reviews,
2. A Project Manager working 50% and working as a,
3. Data Solution, Reports, Query, Analytics consultant at 50%,
4. 1 Integrations, Extensions & Sync Work Consultant

The total project team is planned for 15.25 FTE for the first 24 month go-live effort and 13.25 FTE for the 2nd go-live period.

9.5 Project Resourcing

Based on the project timeline, staffing, and assigned hourly rates, a resourcing table was generated for the project. The following framework was established when creating the project plan:

1. Work planned for a 45/55% Vendor to MECL split, when considering QA, it is a 44/56% split
2. This results in a total of 85,280 workhours with the Vendor at 37,760 workhours and MECL at 47,520 workhours.
3. The total staffing for the 1st go-live is 15.25 FTE and 13.25 FTE for the 2nd go-live period.
4. In total MECL is projected to have 6 resources dedicated to the project. The 3rd party team is expected to have 2.25 (including QA) resources and the SI/Vendor is expected to have 7 resources dedicated to the project.
5. A blended rate of $143/hour and total fees/labor costs of $12.2 million.

9.6 Solution Implementation Cost

The costs to implement the solution using a 36-month the projected implementation cost will be $19 million. MECL can associate maintenance for 3 years or $1.8 million to the project. This results in a total price tag of $20.8 million.

A detailed breakdown of the $19 million in implementation costs includes.

1. A projected software cost of $2.3 million or a cost of $29 per customer which translates to 13% of the project cost.
2. MECL will pay $201,720 in infrastructure costs or $2 per customer which translates to 1% of the project cost.
3. $7.2 million will be the cost of the vendor or a cost of $89 per customer translating to 38% of total implementation costs.
4. MECL is projected to pay $3.5 million in labor costs or $43 per customer translating to 19% of implementation costs.
5. Third Party costs are estimated to be $2.5 million or a cost of $31 per customer equaling 13% of project implementation costs.
6. Other Costs were estimated to be $605,160 or a cost of $7 per customer equaling 3% of project implementation costs.
7. Finally, as the last component in the cost breakdown, $2.4 million in Contingency has been estimated or a cost of $30 per customer translating to 13% of project costs.

Another way to look at the costs. MECL will pay out-of-pocket costs of $15.4m to implement. A detailed breakdown of these costs includes.

1. Software costs of $2.3 million,
2. $201,720 in infrastructure costs,
3. $7.2 million dedicated to the cost of the vendor,
4. Third Party costs estimated at $2.5 million,
5. Other Costs estimated at $605,160 and
6. The Contingency costs of $2.4 million.

MECL is projected to pay $3.6 million in internal labor costs to implement this results in a total project price of $19 million.

MECL is projected to pay $595,345 annually for 3 years in maintenance for the new solution which is the $1.8m applied to the project.

This results in a total project price of $20.8 million in implementation and maintenance costs for the 3-year period.

- Note 1: The project contingency of $2.4 million which is included will cover underestimation and project risk.

- Note 2: TMG conducted a market analysis, and the total expected vendor costs of $9.7 million is within this market analysis of $10m which TMG conducted for MECL.

9.7 Fiscal Year and CAPX vs OPEX Comparisons

The costs to implement the solution using a 36-month timeframe was calculated as a part of this analysis. TMG's findings reflect total implementation expenditures planned for 88% CAPX and 12% OPEX. During the 3 project years 100% maintenance is planned for CAPX.

During procurement specifics regarding a product suite and phasing of modules related to capitalization will be determined. After the 2nd go-live period all maintenance is OPEX.

From a **project implementation cost** perspective.

1. At the end of fiscal year one (2022), TMG planned for $5.8 million in implementation costs; of that total cost, $5.4 million is CAPX and $462,981 is attributed to OPEX.

2. At the end of fiscal year two (2023), TMG planned for $5.6 million in implementation costs; of that total cost, $4.8 million is CAPX and $793,682 is attributed to OPEX.

3. At the end of fiscal year three (2024), TMG planned for $5.4 million in implementation costs; of that total cost, $4.6 million is CAPX and $768,482 is attributed to OPEX.

4. At the end of fiscal year four (2025), TMG planned for $2 million in implementation costs; of that total cost, $1.7 million is CAPX and $288,701 is attributed to OPEX.

5. These costs result in a total implementation cost of $18.9 million of which $16.6 million will be CAPX and $2.3 million will be attributed to OPEX.

From a **project maintenance cost** perspective.

1. At the end of fiscal year one (2022), TMG has planned for $347,284 in project maintenance costs; of that total cost, $347,284 is CAPX and $0 is attributed to OPEX.

2. At the end of fiscal year two (2023), TMG has planned for $595,345 in project maintenance costs; of that total cost, $595,345 is CAPX and $0 is attributed to OPEX.

3. At the end of fiscal year three (2024), TMG has planned for $595,345 in project maintenance costs; of that total cost, $595,345 is CAPX and $0 is attributed to OPEX.

4. At the end of fiscal year four (2025), TMG has planned for $248,060 in project maintenance costs; of that total cost, $248,060 is CAPX and $0 is attributed to OPEX.

These costs result in a total project maintenance cost of $1.7 million of which $1.7 million will be CAPX and $0 will be attributed to OPEX.

9.8 Summary Project Timeline & Expenditures

When combining Implementation costs and project maintenance costs TMG can depict project activities spanning the various years with expenditures by year identified by CAPX and OPEX.

1. 2022 MECL has Procurement and Implementation Stream 1 occurring. Installation costs are $5.8 million in addition to $347,284 totaling $6.2 million dollars and a breakdown of $6.2 million in CAPX and $462,981 in OPEX.

2. 2023 MECL has Implementation Stream 1 occurring only. Installation costs are $5.6 million in addition to $595,345 totaling $6.2 million dollars and a breakdown of $5.4 million in CAPX and $793,682 in OPEX.

3. 2024 MECL has Implementation Stream 1 and Implementation Stream 2 occurring. Installation cost is $5.4 million in addition to $595,345 totaling $6 million dollars and a breakdown of $5.2 million in CAPX and $768,482 in OPEX.

4. 2025 MECL has Implementation Stream 2 occurring only. Installation costs are $2 million in addition to $248,060 totaling $2.3 million dollars and a breakdown of $2 million in CAPX and $288,701 in OPEX.

5. The result, of these calculations are total installation costs for the full duration of the project are $19 million and maintenance costs of $1.7 million for a total of $20.7 million. The total CAPX of the project is $18.4 million (89%) and $2.3 million (11%) in OPEX.

9.9 Cost/Benefit Analysis

Benefits Definition

A high-level definition of benefits used as the basis for formulating the benefits model and generating benefit dollars.

Benefits realized with the implementation of a new CIS product solution are segmented into three categories:

1. Hard Dollar Cost Reduction: The reduction in existing expenditures (hard dollar savings).

2. Hard Dollar Revenue Enhancement: The time value of money and increased revenues. These can be either hard dollar or soft dollar savings.

3. Soft Dollar Cost Avoidance: The avoidance of additional expenditures (soft dollar savings).

Development of benefits does not usually result in the identification of hard dollar benefits and the reduction of costs. Most benefits are associated with efficiencies and soft dollars which are identified with cost avoidance benefits.

It is extremely difficult to develop a cost/benefit analysis which results in a positive benefit analysis for the implementation of a new CIS solution. A new CIS solution is typically justified based on a strategic initiative, and/or the avoidance of risk associated with maintaining an aging technology infrastructure and associated application architecture.

Historically, when a utility engages in detailed CIS benefit analysis, the recurring benefit dollars are 7% to 10% of the cost to implement the new CIS solution.

Of the 10% in benefit dollars:

1. **Hard Dollar Cost Reduction:** The reduction in existing expenditures (hard dollar savings). = 30%
2. **Hard Dollar Revenue Enhancement:** The time value of money and increased revenues. These can be either hard dollar or soft dollar savings. = 10%
3. **Soft Dollar Cost Avoidance:** The avoidance of additional expenditures (soft dollar savings). = 60%

9.10 Benefits Allocation Applied

A 10% Benefits Allocation was applied as a benefit factor to the total implementation costs to derive the total benefit dollars and apply the annual benefits appreciation factor for the 20-year Benefit period from year 1 (2026) to year 20 (2045).

The planned implementation costs are $18,990,260. Using TMG's10% benefits realization factor results in MECL expectation of realizing $1,899,026 a year in benefits with a new CIS.

This total benefit amount is then multiplied by the TMG % Allocation for each benefit category. Hard Cost Reductions of 30%, Hard Revenue Enhancements of 10%, and Soft Cost Efficiency or Cost Avoidance of 60%. This provides a benefit dollar for each category for benefit year 1.

9.11 Annual Benefits

MECL is projected to realize Total Benefits of $1,899,026 each year consisting of:

1. Hard Dollar Cost Reductions of $570,000 (30%)
2. Hard Dollar Revenue Enhancement / Generation of $190,000 (10%), and
3. Soft Dollar Cost Avoidance / Efficiency Gains of $1,139,146 (60%).

9.12 Cost / Benefit Analysis

TMG's cost benefit analysis compares the costs to implement and operate the new CIS against the annual benefits. This comparison was conducted over a 20-year benefit timeframe. Year 1 begins after the go-live of the CIS On-Premise solution planned for 2026 and ends in 2045.

The Cost/Benefit analysis comparing the cumulative costs to implement and operate the new CIS against the annual benefits results in the break-even point of benefit year 16 (2041).

9.13 Total Cost of Ownership

Based upon TMG's experience and our review of the current CIS, the following items are viewed as risks and pressures which influence MECL's legacy CIS and its replacement.

1. Smart Meters
    1. Deployment of smart meters (target June 2023) year 2 for start of bulk installations.
    2. TOU Interval Reads for Residential Billing
2. IT Support & Retirement
    1. A single IT resource retiring within 5-10 years
    2. No backup groomed
    3. Custom developed in PowerBuilder with poor documentation
3. PowerBuilder Framework
    1. PowerBuilder not active mainstream code base for new development. Supported with Appeon PowerBuilder.
    2. PowerBuilder, not a career advancing platform for IT people.
    3. PowerBuilder does not align with the technical direction of MECL and its application portfolio.
4. Custom Development Shop
    1. Lack System Documentation
    2. Poorly Structured Code
    3. One Year System Backlog
    4. Lack configuration – depend on customization thru IT
    5. Continuous Updates Become More Complicated and Costly
    6. Want Regular Releases and Updates Applied.
5. Data & Reporting Needs
    1. Single Thread Thru IT - The reporting bottleneck,
    2. Lack of user access to data, reporting, and analytics.
    3. Growing Need With AMI
6. Business Operations
    1. Documentation, Help Function, and Standards.
    2. Standardized training and onboarding

3. Streamline and Automate workflows to standardize, route, and track work.
4. Scripting for contacts and performance
5. Automated review, approval, and SOX compliance.

7. Business Staffing

1. Rely On Key Staff
2. Turnover In Staff
3. System Not Intuitive Requires Time to Learn
4. Poor Documentation System is Memorized

8. Electrification

1. Provide Customers with new capabilities such as TOU Rates and Billing
2. Understand their Energy Bills, Usage and When to Plug-In Electrical Equipment.

9.14 Risk & Pressure Analysis Timeline

Annual growth risk percentages were assigned to those items viewed as risks and pressures influencing MECL's legacy CIS and its movement to replace.

1. In Year 5, 2025 these factors total 43% and in Year 7, 2027 are at 51%. In 5 years, the risks and pressures influencing the legacy CIS together are significant with the largest being retirement of the IT resource and Electrification Readiness.
2. Although the legend lists AMI/Smart Meters, there is no calculation included.
3. Based on this analysis it is clear the risk and pressure profile continue to grow and warrants **Replacement** of the legacy CIS NOW. The final go-live is mid-2025 with full costs and benefits recognition in year 2026 which has a risk & pressure profile of 47%.

9.15 Project Risk Assessment

As a part of the Project Risk assessment, TMG and MECL used each of the 8 pressures identified as areas of concern by MECL and designated a current risk percentage. A risk inflation factor was designated for each area based on MECL's perception of the rate of increased risk per year. The result of this exercise was an ability to determine what is the risk of each area of concern per year. This also allowed a view of what the overall risk for MECL will be in 10 years if a new system is not implemented. Below is each risk area, its current risk as well as its inflation factor.

1. AMI / Smart Meters – 0% current risk, 0% risk inflation factor (it was not used in this analysis)
2. IT Support & Retirement – current risk of 10%, 5% increased risk inflation factor annually

3. PowerBuilder Framework - current risk of 10%, 15% increased risk inflation factor annually
4. Custom Development Shop - current risk of 3%, 5% increased risk inflation factor annually
5. Data & Reporting Needs - current risk of 2%, 5% increased risk inflation factor annually
6. Business Operations - current risk of 2%, 6% increased risk inflation factor annually
7. Business Staffing - current risk of 2%, 5% increased risk inflation factor annually
8. Electrification - current risk of 2%, 5% increased risk inflation factor annually

The total risk inflation factor is 47% in 2026 (a year after the 2nd CIS go-live). This has been identified as the "Realize Benefits Year" it provides MECL a full year of productive use of the CIS system prior to 100% realization of benefits.

To translate the calculated risk percentage to dollars and paint a full picture of the financial costs of these risks, TMG used current legacy operating costs and compared these costs to new system operating costs (with COTS On-Premise solution).

The total risk % for each year is applied to the Annual Legacy CIS Operating Costs (Sum of ITOps + BusOps) for each year and then compared to the Annual New System Operating Costs.

A detailed view of the annual comparison between Current Legacy CIS and New System Operation Costs can be found in the business value-case workbook.

Findings of the Total Cost of Ownership Analysis

The TCO analysis indicates that operating the legacy system becomes more expensive then implementing and operating a new CIS solution in benefit year 14 (2039).

9.16 Business Value Case

To establish a Business Value Case TMG's comprehensive approach uses 4 methods:

1. **Payback Period** – The payback period measures the length of time required to recover the amount of initial investment. It is computed by dividing the initial investment by the cash inflows through increased revenues or cost savings.
2. **Cost Per Customer** – TMG calculates the cost per customer to implement a new CIS. The total cost divided by the number of customers served (CA$).
3. **Cost Benefit** – The new CIS solution one-time implementation costs and the recurring maintenance costs are compared to the identified recuring benefits.
4. **Total Cost of Ownership** – Total Cost of Ownership analysis compares the cumulative ongoing costs of operating the legacy CIS against operating the new CIS solution.

1. Payback Period Findings

1. The MECL implementation cost minus the MECL maintenance costs attributed to the project = $18,990,263
2. Using the TMG Benefits Model for MECL which assumes that MECL benefits are 10% of the MECL implementation costs = $1,899,026
3. MECL payback period is 10 years for its initial investment.
4. In comparison, utilities that do not achieve this level of benefits find their payback periods as high as 20+ years.

2. Cost Per Customer Findings

1. TMG calculates the cost per customer to implement a new CIS. The total cost divided by the number of customers served. (CA$)
2. The MECL cost per customer is calculated at $232.
3. With use of the TMG InSight Database, TMG estimated the value of $203 cost per customer for a comprehensive CIS for MECL.
4. When calculating the cost of a comprehensive CIS and Edge Systems, TMG estimated a value of $240 cost per customer.
5. The total cost of the MECL project at $232/PC is within TMG's project profile for a project of this nature at $240/PC.

3. Cost Benefit Findings

1. Comparison of New Implementation Costs to New System Benefits shows the benefits will outweigh the cost of the project 16 years after Go-live.
2. The period analyzed is a 20-year Benefit period from year 1 (2026) to year 20 (2045).
3. Benefit year 16 (2041) is the year in which the cumulative benefits outweigh the cumulative costs associated with the new system.
4. This is based on realization of $1,899,026 in benefits annually.
5. Replacement of a Legacy CIS system using Cost/Benefit analysis typically results in a 10 to 20+ year NPV justification.
6. Replacement of Legacy CIS systems are not usually justified on hard benefit dollars. MECL is within the range of 10 to 20+ years which TMG has experienced with other utilities for a Cost/Benefit NPV return period.

4. Total Cost of Ownership Benefit Findings

1. Total Cost of Ownership analysis compares the cumulative ongoing costs of operating the legacy CIS against operating the new CIS solution.
2. The period analyzed is a 20-year Cost period from year 1 (2026) to year 20 (2045).
3. This TCO analysis reveals that continuing to operate the legacy system compared to purchasing and operating a new CIS solution equalizes in benefit year 14 (2039).
4. MECL is within the range of 5 to 15 years which TMG has experienced with other utilities for a TCO timeframe.

- **Note1:** it takes 10 years to overcome the initial implementation costs.
- **Note2:** Current IT Ops costs are low which is an issue in the first 5 years of the analysis

9.17 Current CIS Limitations

The current system has several limitations which are driving MECL to replace it with a new solution.

Not Agile

1. MECL must keep pace with the changing customer technology landscape and customer expectations at a reasonable cost.
2. Accommodation of new features, programs, and needs which are becoming more costly and time consuming to create.
3. Data access, reporting, and customer analytics is a bottleneck and limited. Preparing for rate cases and implementing of new rates.

Not Efficient

1. Lack of enforcement of standardization or common processes for customer contacts.
2. It is not intuitive and difficult to learn, this is a problem given the turnover in staff.
3. There is no documentation which makes training more difficult.

Not Viable

1. Utilization of an older system with many issues including application, technology, support, and documentation.
2. The current system poses a risk that over time due to resourcing issues, lack of documentation, aging programming language, etc. it will be more risky and costly to maintain that it will no longer be a viable system.

3. The current system is low satisfactory (C-) in achieving current and future requirements of MECL.

Not Capable

1. Difficult to provide capabilities such as TOU Billing and the need to integrate with the AMI/Smart Meter initiative.

2. Assisting customers with understanding their bills, and information regarding the optimum time to plug-in their electrical equipment.

9.18 Business Justification

Implement a modern COTS CIS Integrated Suite Solution replacing the legacy CIS system with a flexible solution enabling MECL to mitigate risk, deliver on customer expectations, and operate with greater efficiency and extensibility for future programs, products, and services.

1. **Ongoing Operations** – Legacy technologies and skillsets are unsupported and difficult to find in the current market. Developing a single skilled resource in these technologies takes over 2 years (and 4 years to proficiency). Complex functions and integrations make the core CIS susceptible to increased error and downtime.

2. **Deliver On Requirements** – The legacy CIS cannot deliver efficiently on complex regulatory program expectations such as the AMI/Smart Meter initiative. The current system scored a low satisfactory against a set of CIS requirements indicating the system requires significant work to enable it for the future.

3. **New / Enhanced Customer Programs** – Adapting legacy systems to new, complex, digital customer channels and programs, and progressive rate design like TOU Interval Rates is extremely difficult, time-consuming, and costly.

4. **Cost To Serve** – Significant inefficiency operating and maintaining this older system with undocumented and unstructured processes. Projected high legacy CIS support and maintenance “RTB” costs. Growing cost of delivery for both mandated and value-add programs.

9.19 Business Objectives

The new CIS solution will deliver upon and enforce the following primary business objectives.

1. **Customer** – Customer-based model, capabilities, processes, and personalized service.

2. **New Technology** – Support for evolving industry technology and products.

3. **Utility Operations** – Ease of navigation and integration to improve operational efficiency.

4. **Business & Regulatory** – Improved "time to market" for new rates, programs, and regulatory needs.

5. **Products & Services** – New MECL products & services more easily marketed, managed, billed, and understood.

9.20 A New CIS = Significant Benefits

A new CIS will provide MECL with significant benefits as summarized below.

1. **Customer Satisfaction** – Ability to provide superior customer experience and service in the way customers expect including initiative-taking outreach and multiple communication channels.

2. **New Products & Services** – Ability and agility to accommodate future products, programs, and services that MECL customers may come to expect and are receiving from other service providers in their daily lives.

3. **Business Efficiency** – 1) Reduced training time for call center employees 2) Provides the opportunity to optimize processes, structure, methods, and rules across departments, workgroups, and staff.

4. **Business Configurable Solution** - Increases agility and efficiency through business-side configuration changes, as opposed to IT-side programming changes.

5. **Employee Satisfaction** – Employees will be attracted to learn and work on a state-of-the-art system it is more fulfilling and enjoyable from a personal and professional perspective.

6. **Availability of Support Resources** – Available labor pool for vendor provided CIS is broad and deep, with support from multiple vendors and technology that is current and utilized across multiple industries and many utilities.

7. **"Productized" Solution** - CIS becomes "future proof" through regular base product upgrades that leverage the collective needs of many utilities that utilize the COTS system. As the industry evolves, so too will MECL's CIS.

9.21 Why Defer Now?

Why should MECL embark on the replacement of its legacy CIS system now rather than wait 5 years? There are five primary reasons why MECL should not defer this CIS replacement decision.

1. MECL continues to invest in a system and a technology with a growing risk profile. It takes 44 months (4 yrs.) to replace as risks grow each year. In 4 years, risks are estimated to grow by almost 10%.

2. Analysis of a 5-year defer option scored -6,525 points positioning it as the 12th option out of 13 options to be pursued. It is estimated to cost an additional $2m to defer the project by 5 years.

3. A strategic requirement to support and align with the proposed AMI/Smart Meter Initiative which is in the planning phase with the potential rollout in mid-2023 for 3 years until 2026.

4. Internal implementation knowledge is an asset that will diminish over time.

5. The industry is well positioned at this time to staff an implementation of this nature.

10. Top 10 Reasons for Project Failure

TMG offers MECL the following top reasons for project failure. If MECL decides to conduct a solution procurement, TMG will work to ensure that MECL mitigates the following risks and works toward a successful procurement and production implementation of the selected solution.

1. Award work and develop contracts based on RFP responses and initial diligence and pricing work without conducting significant due diligence, scope, confirmation, best & final, and implementation planning work leading up to final negotiation and contracting work with the vendor(s). Mitigated during the procurement phase adhering to TMG's proven methodology and successful track record.

2. Selecting solutions which are not proven, complete and/or not installed at another relevant location. Trying to do custom development. Mitigated during the procurement phase adhering to TMG's proven methodology including vendor reference checks, TMG's knowledge of the industry, etc.

3. Establishing false expectations regarding price, timeframe, and scope of the contracted and delivered solution. To be successful expectations must be realistic. Mitigated during the procurement phase adhering to TMG's proven methodology including extensive scope and confirmation activities.

4. MECL goes live before the system and the business is ready for production. Mitigated during the implementation phase adhering to TMG's proven Quality Assurance function with Go-Live Readiness criteria.

5. The lack of strong executive involvement, commitment, and project sponsorship, especially if multiple utilities and departments are involved. Mitigated during the procurement phase adhering to TMG's proven methodology including development of the implementation blueprint/plan to commit MECL resources and organization.

6. Lack of user involvement, commitment, and a comprehensive and ongoing training and education program. See #5.

7. Lack project management to administer and control the entire project/program. The lack of a solid integrated project work program managing the work for all activities and coordinating all resources. Mitigated during the procurement phase adhering to TMG's proven methodology including contracting and committing the vendor to maintaining a Master Work Program.

8. Customization(enhancement) of the new product to existing business operations versus configuration to new product driven business operations with a goal toward a

Minimal Viable Product or Optimal Viable Product. Mitigated during the procurement phase and continues into implementation adhering to TMG's proven methodology and QA program.

9. A moving target and constantly changing equation of vision, objectives, business, technology, platform, budget, scope, capabilities, regulatory, initiatives, timeframe, resources, roll-out strategy, etc. Any or all these considerations. Mitigated during the procurement phase and continues into implementation adhering to TMG's proven methodology and QA program.

10. Utilizing implementers and consultants who have limited knowledge of the software product. Mitigated during the procurement phase and continues into implementation adhering to TMG's proven methodology and QA program.

TMG recommends that MECL continues to adhere to TMG's proven procurement approach which has been successfully conducted 185 times. This will ensure MECL is positioned for success through adherence to a sound and proven project approach.

Attachment – 7. Solution Option Analysis

Below is a summary of each of the 13 Solution Options in ranking order.

7.1 1st Place – 6. COTS On Prem

Solution Description: Purchase a product bundled suite with integrated add-ons as necessary and implement within the MECL data center. Implement so all products are live at the same time in a single stream, however, it is not possible to flip the switch, so products are live at the same time, the OCM/training, and the impact is too great. As a result, mini go-lives of products are required within the single stream so that everything is live by the single stream date. This requires a syncing effort between the legacy CIS and the new products as they "go-live" until all products are placed into production and the legacy system is removed from the desktop, this represents complex integration work between systems.

Ranking per category:

1. Implementation Costs	2. Operational Costs	3. Implementation Timeframe	4. Solution Risk & Viability	5. Resource Utilization	6. Business Considerations	7. Technology Considerations	8. Benefits & Improvements
4th	4th	6th	1st	8th	1st	1st	1st

Solution Option Positives

The COTS on Prem Solution was ranked 4th in Implementation Costs and requires $20 million or $217 per customer.

The COTS on Prem Solution also ranked 4th in operational costs with an estimate of $937,000 a year or $0.95 per customer per month.

The COTS on Prem Solution ranks 1st place in Solution Risk and Viability for the following reasons:

- Addresses Application Risk, by quickly moving off the legacy CIS.
- Addresses Business Risk supports quickly moving off the application because the business environment poses a risk to the utility including limited business resources - lack business knowledge, resourcing issues.
- Adheres to the implementation and operation of a COTS product suite which is proven, it is the direction of the industry.

The COTS on Prem option is very strong in Business Considerations and ranked 1st in this category because of the following:

- Data Democratization. This solution will consist of internal standard and additional modules for reporting and analytics.
- Best Practices Aligned with Product. Provides a new CIS and out-of-the-box processes and procedures tied to the modern customer lifecycle and both customer and user journeys.
- Product vs Custom Solution. This option enables a product solution with an emphasis on a product roadmap and user group versus customization and an internal development shop, it relies heavily on configuration vs customization.
- The COTS On Prem option will Enable Staff to Work Smarter.
- The COTS On Prem option will bring vast Improvements to the Customer Lifecycle and Electrification.
- The COTS On Prem option will provide a system with Standardized and Updated Documentation.
- This option will provide a system with Automated & Standardized Workflows.
- This option will implement Cost Effective Strategic Capabilities.

This option is very strong in supporting technology and technical considerations and ranked 1st of all solutions options due to the following:

- Componentized System Solution. With this option, although some vendors offer integrated suites, they are separate modules, can be purchased, and implemented separately.
- This option Mitigates the Cost of Implementing New Functions. This option incorporates the scope and costs to implement a new CIS, MDM, with

integration to smart meters, setup of TOU Complex Rates, access to Interval data, consumption, and billing, and real-time interaction.

- This option relies on Product Configuration vs Custom Code Development and Customization.
- This option addresses Modern Industry Application Alignment, which is replacement of the troublesome end of life, PowerBuilder framework with a new COTS solution. New COTS code cannot be touched and changed.
- Addresses the CIS Application Support issue by replacing the PowerBuilder framework with a new COTS solution.

Finally, the COTS On Prem option ranked 1st in the Benefits and Improvement category due to the following support and viewpoints:

- Executives and Board members should view this as the optimum solution as it is retained within MECL's data center. Benefits will be quickly realized and accommodates MECL's strategies and fits with the AMI/Smart Meter initiative.
- Technical personnel will quickly realize benefits as it will address technical issues and make life better for the technicians.

Solution Option Negatives

Areas with the lowest score for the COTS On Prem options were:

- The COTS On Prem option was ranked 6th in Implementation Timeline and requires a total implementation timeframe of 42 months (including a 30-month implementation).
- The COTS On Prem option was ranked 8th overall for the category of Resource Utilization. This was due to its internal labor costs of $2.7 million and third-party consulting fees of $1.5 million.
- Project Risk. Implementation of these COTS solutions have a positive track record. However, MECL has a legacy CIS which combines multiple systems which must be broken apart and then re-implemented into a COTS product suite. There is a sync component that also increases project risk.

7.2 2nd Place – 8. COTS MPaaS

Solution Description: Purchase a product bundled suite with integrated add-ons as necessary and implement on a cloud platform by the same vendor offering the application (behind the scenes they may contract out). Implement so the products are all live at the same time in a single stream, however, it is not possible to flip the switch, so products are live at the same time, the OCM/training, and the impact is too great. As a result, mini go-lives of products are required within the single stream so that everything is live by the single stream date. This requires a syncing

effort between the legacy CIS and the new products as they "go-live" until all products are placed into production and the legacy system is removed from the desktop, this represents complex integration work between systems.

Ranking per category:

1. Implementation Costs	2. Operational Costs	3. Implementation Timeframe	4. Solution Risk & Viability	5. Resource Utilization	6. Business Considerations	7. Technology Considerations	8. Benefits & Improvements
4th	6th	6th	2nd	8th	1st	1st	2nd

Solution Option Positives

The COTS MPaaS Solution was ranked 4th in Implementation Costs and requires $17.6 million or $214 per customer.

The COTS MPaaS Solution ranks 2nd place in Solution Risk and Viability for the following reasons:

- Addresses all aspects of application risk. The single stream requires all components of the system to go-live by the single date.
- Mitigates Platform Risk: This option supports rapid movement to the same platform offered by the software vendor. The software vendor will bundle the platform, the application, and some operational services into a single fee to be paid
- Addresses all aspects of business risk. This project includes OCM/Process/Training and system fully documented.
- Addresses Viability. COTS product suite is proven, and Managed Services are bundled to assist with the platform and the application, it approximates SaaS without some restrictions.

This option is very strong in supporting Business Considerations and ranked 1st of all solutions options due to the following:

- Data Democratization. The solution is delivered with internal standard and additional modules for reporting and analytics.
- Best Practices Aligned with Product. Provides a new CIS and out-of-the-box processes and procedures tied to the modern customer lifecycle and both customer and user journeys.
- Product vs Custom Solution. MECL needs to consider moving to a product solution rather than the current custom CIS solution. This option enables a product solution with an emphasis on a product roadmap and user group versus customization and an internal development shop, it relies heavily on configuration vs customization
- The COTS On Prem option will Enable Staff to Work Smarter.

- Improved Customer Lifecycle. Improvements to the MECL Customer Lifecycle.
- Standardized and Updated Documentation.
- Automated & Standardized Workflows.
- Cost Effective Strategic Capabilities.

The COTS MPaaS option ranked 1st in the Technology Considerations category due to the following support and viewpoints:

- Componentized System Solution. With this option, although some vendors offer integrated suites, they are separate modules, can be purchased, and implemented separately.
- This option Mitigates the Cost of Implementing New Functions. This option incorporates the scope and costs to implement a new CIS, MDM, (position integration to AMI smart meters), setup of TOU Complex Rates, access to Interval data, consumption, and billing, and real-time interaction.
- This option relies on Product Configuration vs Custom Code Development and Customization.
- This option addresses Modern Industry Application Alignment, which is replacement of the troublesome end of life, PowerBuilder framework with a new COTS solution. New COTS code cannot be touched and changed.
- Addresses the CIS Application Support issue by replacing the PowerBuilder framework with a new COTS solution.

The COTS MPaaS option ranked 2nd in the Benefits & Improvements category due to the following support and viewpoints:

- Technical personnel will quickly realize benefits as it will address technical issues and make life better for the technicians.
- Business Users - Benefits will be quickly realized by business users (enhanced access to reports / queries /analytics, new functionality, quick turnaround on application maintenance and development, enhanced user interface, efficient use of staff and makes life better for the users, it fits with business strategy, direction, and considerations).
- Customers - Benefits will be quickly realized by customers including improvement in levels of customer service and the customer experience,

Solution Option Negatives

Areas with the lowest score for the COTS MPaaS options were:

- The COTS MPaaS option was ranked 6th in Operational Costs of $1 million or $1.06 per customer per month
- The COTS MPaaS option was ranked 6th in Implementation Timeline and requires a total implementation timeframe of 42 months (including a 30-month implementation
- Project Risk. Implementation of these COTS solutions have a positive record. However, MECL has a legacy CIS which combines multiple systems which must be broken apart and then re-implemented into a COTS product suite. There is a sync component that also increases project risk.
- The COTS MPaaS option was ranked 8th overall for the category of Resource Utilization. This was due to its internal labor costs of $2.7 million and third-party consulting fees of $1.5 million.

7.3 3rd Place – 7. COTS IaaS (Hosted)

Solution Description: Purchase a product bundled suite with integrated add-ons as necessary and implement on a cloud platform by the same vendor offering the application (behind the scenes they may contract out). Implement so the products are all live at the same time in a single stream, however, it is not possible to flip the switch, so products are live at the same time, the OCM/training, and the impact is too great. As a result, mini go-lives of products are required within the single stream so that everything is live by the single stream date. This requires a syncing effort between the legacy CIS and the new products as they “go-live” until all products are placed into production and the legacy system is removed from the desktop, this represents complex integration work between products.

Ranking per category:

1. Implementation Costs	2. Operational Costs	3. Implementation Timeframe	4. Solution Risk & Viability	5. Resource Utilization	6. Business Considerations	7. Technology Considerations	8. Benefits & Improvements
4th	6th	6th	3rd	8th	1st	1st	2nd

Solution Option Positives

COTS IaaS (Hosted) ranked 4th overall for the category of Implementation Costs totaling $17.7 million or $215 per customer.

The solution ranked 3rd in Solution Risk & Viability due to the following factors:

- Addresses all aspects of application risk. The single stream requires all components of the system to go-live by the single date.
- Addresses all aspects of business risk. This project includes OCM/Process/Training, the system will be fully documented.

- Platform Risk. Although it is not the preferred platform, this option supports rapid movement to a Hosted Platform.

- Viability. COTS IaaS (Hosted) product suite is proven, many utilities are currently running a hosted environment.

The solution ranked 1st in Business Considerations due to the following factors:

- Data Democratization. The solution is delivered with internal standard and additional modules for reporting and analytics.

- Best Practices Aligned with Product. Provides a new CIS and out-of-the-box processes and procedures tied to the modern customer lifecycle and both customer and user journeys.

- Product vs Custom Solution. MECL needs to consider moving to a product solution rather than the current custom CIS solution. This option enables a product solution with an emphasis on a product roadmap and user group versus customization and an internal development shop, it relies heavily on configuration vs customization.

- Enable Staff to Work Smarter. Significant effort associated with a COTS Optimum Viable Product or OVP approach is OCM / Process / Training work.

- Improved Customer Lifecycle. Improvements to the MECL Customer Lifecycle such as introduction of customer service appointment times, pay deposits by billing deposits, automated interface to financials, integrate with AMI/MDM, offer TOU Rates, create new rates, proration, riders, taxes, Flexible Due Dates, and automate Low-Income Assistance Program.

- Standardized and Updated Documentation. The COTS IaaS (Hosted) solution is delivered with a complete set of application, processes, training, operation, etc. It is kept updated with new releases and synchronized with MECL specific documentation.

- Automated & Standardized Workflows. The COTS IaaS (Hosted) solution will allow for automated workflows to standardize, route, and track work.

- Cost Effective Strategic Capabilities. This option addresses the cost-effective implementation of over 100 strategic capabilities not provided for in the current CIS through the product roadmap.

The COTS IaaS (Hosted) solution ranked 1st in Technology Considerations due to the following factors:

- This option addresses the Componentized System Solution. This option will unbundle the current CIS and provide a more componentized CIS, MWM, EAM/WAM, and OMS solution.

- Mitigate New Function Cost. This option incorporates the scope and costs to implement a new CIS, MDM, position integration to AMI smart meters, setup of TOU Complex Rates, access to Interval data, consumption, and billing, and real-time interaction.

- Configuration vs Customization and IT Ownership. COTS rely heavily on configuration vs customization.

- Modern Industry Application Alignment. This solution offers structure preventing code from being touched and changed.

- CIS Application Support. This solution replaces the PowerBuilder framework with a new COTS solution.

The COTS IaaS (Hosted) solution ranked 2nd in Benefits & Improvements due to the following factors:

- Technical Personnel. Benefits will be quickly realized by technical personnel - addresses technical issues and makes life better for the technicians.

- Business Users. Benefits will be quickly realized by business users -enhances access to reports / queries /analytics, new functionality, resulting in quick turnaround on application maintenance and development.

- Customers. Benefits will be quickly realized by customers including improvement in levels of customer service and the customer experience, new communication channels, self-service, exceeds the customer value package, timely response to customer needs and issues, emphasis on the customer journey rather than user processes.

Solution Option Negatives

Areas with the lowest score for the COTS IaaS (Hosted) options were:

- The COTS IaaS (Hosted) option was ranked 6th in Operational Costs of $1 million or $1.07 per customer per month

- The COTS IaaS (Hosted) option was ranked 6th in Implementation Timeline and requires a total implementation timeframe of 42 months (including a 30-month implementation).

- Project Risk. Implementation of these COTS solutions have a positive record. However, MECL has a legacy CIS which combines multiple systems which must be broken apart and then re-implemented into a COTS product suite. There is a sync component that also increases project risk.

- The COTS IaaS (Hosted) option was ranked 8th overall for the category of Resource Utilization. This was due to its internal labor costs of $2.7 million and third-party consulting fees of $1.5 million.

7.4 4th Place – 9. COTS Phased On-Premise

Solution Description: Purchase a product bundled suite with integrated add-ons as necessary and implement within the MECL data center. Implement only key products at go-live CIS, MDM, Portal which can be accommodated, and the other products will be phased in over a longer 4-year timeframe where they will be kept in sync with the legacy CIS source system. This results in slightly less dependence on third party resources, however, the need for synchronization in either scenario remains.

Ranking per category:

1. Implementation Costs	2. Operational Costs	3. Implementation Timeframe	4. Solution Risk & Viability	5. Resource Utilization	6. Business Considerations	7. Technology Considerations	8. Benefits & Improvements
11th	4th	9th	4th	5th	1st	1st	4th

Solution Option Positives

The COTS Phased On-Premise Solution ranked 4th overall for the category of Solution Risk & Viability for the following reasons:

- The COTS Phased On-Premise solution addresses all aspects of application risk. The phased process over multiple years requires the legacy CIS to be retained for a longer timeframe, managed, and synchronized to with the various products and legacy CIS source system.

- The Solution addresses all aspects of business risk. This project includes OCM/Process/Training, and the System will be fully documented.

The COTS Phased On-Premise Solution ranked 1st overall for the category of Business Considerations for the following reasons:

- Data Democratization. The solution is delivered with internal standards and additional modules for reporting and analytics.

- Best Practices Aligned with Product. The Solution provides a new CIS and out-of-the-box processes and procedures tied to the modern customer lifecycle as well as customer and user journeys.

- Product vs Custom Solution. This option enables a product solution with an emphasis on a product roadmap and user group and it relies heavily on configuration vs customization.

- The Solution enables Staff to Work Smarter. Significant effort associated with a COTS Optimum Viable Product or OVP approach is OCM / Process / Training work.

- Improved Customer Lifecycle. Improvements to the MECL Customer Lifecycle such as introduction of customer service appointment times, pay deposits by billing deposits, automated interface to financials, integrate with AMI/MDM, offer TOU Rates, create new rates, proration, riders, taxes, Flexible Due Dates, and automate Low-Income Assistance Program.

- Standardized and Updated Documentation. The COTS is delivered with a complete set of application, processes, training, operation, etc. It is kept updated with new releases and synchronized with MECL specific documentation.

- Automated & Standardized Workflows. This option provides many features including automated workflows to standardize, route, and track work.

- Cost Effective Strategic Capabilities. This option addresses the cost-effective implementation of over 100 strategic capabilities not provided for in the current CIS through the product roadmap.

- Componentized System Solution. With this option, although some vendors offer integrated suites, they are separate modules, can be purchased, and implemented separately.

- Mitigate New Function Cost. This option incorporates the scope and costs to implement a new CIS, MDM, position integration to AMI smart meters, setup of TOU Complex Rates, access to Interval data, consumption, and billing, and real-time interaction.

- Configuration vs Customization and IT Ownership. COTS rely heavily on configuration vs customization. Trend to move control to individuals/group within business unit(s).

- Modern Industry Application Alignment. Code cannot be touched and changed.

- CIS Application Support. Replaces the PowerBuilder framework with a new COTS solution provided by a vendor specific to the Utility Industry.

- Technical Personnel. Technical personnel will realize benefits, produce higher efficiencies, improves work environment, efficient use of staff, quicker turnaround on application maintenance and development, and it fits with technology strategy, direction, and considerations.

The COTS Phased On-Premise Solution ranked 4th overall for the category of Benefits & Improvements for the following reasons:

- Business Users - Benefits will be realized by business users (enhanced access to reports / queries /analytics, new functionality, quick turnaround on application maintenance and development, enhanced user interface, efficient use of staff and

makes life better for the users, it fits with business strategy, direction, and considerations).

- Customers - Benefits will be realized by customers including improvement in levels of customer service and the customer experience.

Solution Option Negatives

Areas with the lowest score for the COTS Phased On-Premise Solution options were:

- The solution ranked 11th overall in Implementation Costs of $20 million or $248 per customer.
- The solution ranked 9th overall total Implementation Timeframe of 60 months (8-month procurement, 48-month implementation, 4-month stabilization).
- The phasing and 60-month timeframe pushed the solution out by 4 years into final deployment of the smart meters in the year 2026
- The COTS Phased On-Premise solution ranked 4th in Solution Risk & Viability below are contributing factors towards this score:
- Project Risk. Implementation of these COTS solutions have a positive record. However, MECL has a legacy CIS that combines multiple systems which must be broken apart and then re-implemented into a COTS product suite. There is a sync component that also increases project risk. The same complex integration must be built for either approach. There is more overhead and management. required with this longer project timeframe.
- Viability. COTS product suite is proven, it is the direction of the industry and is viable, however, the implementation of a single source into multiple products with syncing, over time, is not.
- The solution ranked 5th for Resource Utilization. This is because the COTS Phased On-Premise solution requires internal labor costs of $3.7 million and third-party consulting fees of $1.2 million.
- The solution ranked 4th in the category of Benefits & Improvements. A factor in this score was that regulators will view this solution as expensive, time consuming and risky.

7.5 5th Place – 12. Co-Sourced

Solution Description: Participate in a procurement process with another utility to select a CIS solution. OR piggyback on a selection that has already been made by another utility and become part of it, become part of the contract, the platform, implement the solution and share in some of the interfaces and any common extensions. Cost sharing: this option has recognized 10% cost savings across the board. Where it usually falters, is in the planning and the procurement with

long timeframes where 8-month procurements turn into 1.5 years as multiple utilities cannot agree or deals fall apart. So, while cost savings can be realized with this option it tends to fail in other areas.

Ranking per category:

1. Implementation Costs	2. Operational Costs	3. Implementation Timeframe	4. Solution Risk & Viability	5. Resource Utilization	6. Business Considerations	7. Technology Considerations	8. Benefits & Improvements
4th	6th	3rd	10th	8th	7th	1st	9th

Solution Option Positives

The Co-Sourced solution ranked 4th overall for the category of Implementation Costs and had a total of $16 million or $193 per customer.

The Co-Sourced solution ranked 3rd in Implementation Timeframe.

The solution ranked 10th in Solution Risk & Viability. Below are the solution attributes associated to this option

- It Addresses all aspects of application risk. The phased process over multiple years requires the legacy CIS to be retained for a longer timeframe, managed, and synchronized to with the various products and legacy CIS source system.
- Addresses all aspects of business risk. This project includes OCM/Process/Training. System will be fully documented, new customer communication channels, system features for contact management, scripting, on-line help, work queues, etc.

The solution ranked 10th in Solution Risk & Viability. Below positive attributes for this category associated to this option.

- Data Democratization. The solution is delivered with internal standard and additional modules for reporting and analytics.

The solution ranked 7th in the evaluation category of Business Considerations. Below were positives identified under this category:

- Enable Staff to Work Smarter. Using the system as a transformation tool or enabler of change across the organization.
- Best Practices Aligned with Product. In addition to adhering to an OVP approach MECL will need to align with another utility to develop how both utilities are going to do business with the product in a singular way which will impact MECL's processes. It depends on how the deal is structured and what is agreed to.
- Product vs Custom Solution. MECL becomes part of a user group and lives by the product roadmap losing that one-on-one touch it currently has with IT. This option enables a product solution with an emphasis on a product roadmap and user group

versus customization and an internal development shop, it relies heavily on configuration vs customization.

- Standardized and Updated Documentation. The COTS Co-Sourced solution will be delivered with a complete set of application, processes, training, operation, etc. It is kept updated with new releases and synchronized with MECL specific documentation.

- Improved Customer Lifecycle. Improvements to the MECL Customer Lifecycle such as introduction of customer service appointment times, pay deposits by billing deposits, automated interface to financials, integrate with AMI/MDM, offer TOU Rates, create new rates, proration, riders, taxes, Flexible Due Dates, and automate Low-Income Assistance Program.

- Automated & Standardized Workflows. This option provides many features including automated workflows to standardize, route, and track work.

- Cost Effective Strategic Capabilities. This option addresses the cost-effective implementation of over 100 strategic capabilities not provided for in the current CIS through the product roadmap.

The Co-Sourced solution option ranked 1st in Technology Considerations due to the following attributes:

- Componentized System Solution. With this option, although some vendors offer integrated suites, they are separate modules, can be purchased, and implemented separately.

- Mitigate New Function Cost. This option incorporates the scope and costs to implement a new CIS, MDM, position integration to AMI smart meters, setup of TOU Complex Rates, access to Interval data, consumption, and billing, and real-time interaction.

- Configuration vs Customization and IT Ownership. COTS rely heavily on configuration vs customization. Trend to move control to individuals/group within business unit(s).

- Modern Industry Application Alignment. Code cannot be touched and changed.

- CIS Application Support. Replaces the PowerBuilder framework with a new COTS solution provided by a vendor specific to the Utility Industry.

- Regulators view this as positive to save money doing this with another utility, they overlook the negative aspects of front-end activities of trying to bring two utilities together to form the relationship.

The Co-Sourced solution option ranked 9th in Benefits & Improvements. The following attribute was identified as a positive item:

- Executives / Board - Executives and Board members are interested in pursuing this option if they can figure identify a partner and figure out a solution.

Solution Option Negatives

Areas with the lowest score for the Co-Sourced solution options were:

- The solution ranked 6th in the Operating Costs category with an annual total of $1.2 million or $1.18 per customer.
- The solution ranked 10th in Solution Risk & Viability. The following items negatively impacted this categories score:
- Platform Risk. MECL would operate in a shared services cloud platform at a reduced subscription fee sharing in volume-based transaction levels. It is not the preferred platform as MECL prefers an On-Premise Data Center. There is risk that MECL will not reach agreement regarding this platform agreement.
- Project Risk. The other utility will not face a legacy CIS that combines multiple systems which must be broken apart and then re-implemented into a COTS product suite. There is a sync component that also increases project risk. How will this be addressed with another utility or utilities?
- Viability. There are examples of shared services organizations established within a Holding Company or Group where services are shared across OPCO's or Utilities. However, these are rare. These are tough solutions to setup and to execute, a single utility has a tough time with its own CIS, let alone trying to do so with another utility or multiple utilities.
- The solution ranked 8th in Resource Utilization. This solution option Requires internal labor costs of $2.5 million and third-party consulting fees of $1.3 million.
- The solution ranked 9th Benefits & Improvements– Business Users view this option as being limited as having to work with another utility, design, processes, and business rules. Also competing for resources in a shared services environment.

7.6 6th Place – 11. COTS Phased MPaaS

Solution Description: Purchase a product bundled suite with integrated add-ons as necessary and implement within the MECL data center. Implement only key products at go-live CIS, MDM, Portal which can be accommodated, and the others will be phased in over a longer 4-year timeframe where they will need to be kept in sync with the legacy CIS source system. This results in slightly less dependence on third party resources, however, the need for synchronization in either scenario remains.

Ranking per category:

1. Implementation Costs	2. Operational Costs	3. Implementation Timeframe	4. Solution Risk & Viability	5. Resource Utilization	6. Business Considerations	7. Technology Considerations	8. Benefits & Improvements
9th	6th	9th	6th	5th	1st	1st	4th

Solution Option Positives

The COTS Phased MPaaS solution ranked 9th overall for the category of Implementation Costs and had a total of $20 million or $245 per customer.

The COTS Phased MPaaS solution ranked 6th in the Solution Risk & Viability category and had the following positive details:

- Addresses all aspects of application risk. Addresses all aspects of application risk. The phased process over multiple years requires the legacy CIS to be retained for a longer period, with overhead, management, synchronization to the source system and complexities.
- Platform Risk. This option supports rapid movement to the same platform offered by the software vendor. It is not the MECL preferred platform of On-Premise Data Center. However, the software vendor will bundle the platform, the application, and some operational services into a single fee to be paid. MECL may find this convenient, competitive and, open to consideration.
- Addresses all aspects of business risk. This project includes OCM/Process/Training. System will be fully documented.

The COTS Phased MPaaS solution ranked 1st in the Business Consideration category and had the following positive details:

- Data Democratization. The solution is delivered with internal standard and additional modules for reporting and analytics.
- Best Practices Aligned with Product. Provides a new CIS and out-of-the-box processes and procedures tied to the modern customer lifecycle as well as customer and user journeys.
- Product vs Custom Solution. This option enables a product solution with an emphasis on a product roadmap and user group, it relies heavily on configuration vs customization
- Enable Staff to Work Smarter. Using the system as a transformation tool or enabler of change across the organization.
- Improved Customer Lifecycle. Improvements to the MECL Customer Lifecycle such as introduction of customer service appointment times, pay deposits by billing deposits, automated interface to financials, integrate with AMI/MDM, offer TOU Rates, create new rates, proration, riders, taxes, Flexible Due Dates, and automate Low-Income Assistance Program.

- Standardized and Updated Documentation. The solution is delivered with a complete set of application, processes, training, operation, etc. It is kept updated with new releases and synchronized with MECL specific documentation.

- Automated & Standardized Workflows. This option provides many features including automated workflows to standardize.

- Cost Effective Strategic Capabilities. This option addresses the cost-effective implementation of over 100 strategic capabilities not provided for in the current CIS through the product roadmap.

The COTS Phased MPaaS solution ranked 1st in Technology Considerations. Below are some of the factors contributing to its raking:

- Componentized System Solution. With this option, although some vendors offer integrated suites, they are separate modules, can be purchased, and implemented separately.

- Mitigate New Function Cost. This option incorporates the scope and costs to implement a new CIS, MDM, position integration to AMI smart meters, setup of TOU Complex Rates, access to Interval data, consumption, and billing, and real-time interaction.

- Configuration vs Customization and IT Ownership. COTS rely heavily on configuration vs customization. Trend to move control to individuals/group within business unit(s).

- Modern Industry Application Alignment. Code cannot be touched and changed.

- CIS Application Support. Replaces the PowerBuilder framework with a new COTS solution provided by a vendor specific to the Utility Industry.

The COTS Phased MPaaS solution ranked 4th in Benefits & Improvements. Below are some of the factors contributing to its raking:

- Technical Personnel – Takes longer to address their technical issues.

- Business Users – Takes longer to address their issues.

- Customers - Benefits will be realized by customers including improvement in levels of customer service and the customer experience, new communication channels, self-service, exceeds the customer value package, timely response to customer needs and issues, emphasis on the customer journey rather than user processes.

Solution Option Negatives

Areas with the lowest score for the COTS Phased MPaaS solution options were:

- The solution ranked 6th in the Operating Costs category with an annual total of $1 million or $1.06 per customer.

- The solution ranked 6th in the Implementation Timeframe category and estimated 60 months (8-month procurement, 48-month implementation, 4-month stabilization)

The phasing and 60-month timeframe pushed the solution out by 4 years into final deployment of the smart meters in the year 2026

- The solution ranked 6th in the Solution Risk & Viability category. Implementation of these COTS solutions have a positive record. However, MECL has a legacy CIS which combines multiple systems which must be broken apart and then re-implemented into a COTS product suite. There is a sync component that also increases project risk. This gets more complicated with oversight and management over an extended period.

The solution ranked 6th in the Resource Utilization category. Below are the areas in this category that struggled:

- The solution requires internal labor costs of $3.7 million.

- Viability. COTS product suite is proven, it is the direction of the industry and either PaaS or SaaS. Implementing a product suite does not typically extend across multiple years if coming from a single source system. It is common to purchase a CIS solution from a vendor offering a complete suite of products, to implement the CIS, then to later purchase other products and to implement. However, this approach is not the most viable, as it is backwards.

- The solution ranked 4th in Benefits & Improvement but struggled because the perception is that Regulators will view this solution option as too expensive and time consuming.

7.7 7th Place – 1. Status Quo

Solution Description: Continue current operations with no significant changes. Used as a baseline.

Ranking per category:

1. Implementation Costs	2. Operational Costs	3. Implementation Timeframe	4. Solution Risk & Viability	5. Resource Utilization	6. Business Considerations	7. Technology Considerations	8. Benefits & Improvements
1st	1st	1st	8th	1st	13th	13th	12th

Solution Option Positives

The Status Quo solution Option ranked 1st in the Implementation Costs category and was estimated to be a cost of $0 or $0 per customer.

The Status Quo solution Option ranked 1st in the Operating Costs category with an estimate of $400,000 or $0.41 per customer annually.

The solution ranked 1st in the category of Implementation Timeframe with an estimate of 0 months.

The solution ranked 8th in Solution Risk & Viability. The following are areas that were positives:

- Platform Risk. There is no platform issue, the preferred platform is an On-Premise Data Center which the current legacy CIS resides.
- Project Risk. There is no project associated with this option – so no associated risk
- Resource utilization is $0

The solution ranked 4th in Benefits & Improvements. Would like this option, do nothing spend no money and do nothing, put it off for as long as possible.

Solution Option Negatives

Areas with the lowest score for the Status Quo solution option were:

- Does not address positioning for AMI Smart Meter.

The Status Quo solution ranked 8th in Solution Risk & Viability. Below are some areas of this category this solution struggled with.

- Application Risk. Does not address the current risk of PowerBuilder. Does not address positioning for AMI and the need for Smart Meters and Interval Data.
- Business Risk. Does not address quickly moving off the application because the business environment poses a risk to the utility (limited business resources - lack business knowledge, resourcing issues (key users have left/retired or are planning to), integration issues, impact to customer lifecycle, limited ability, and obstacles to improving customer experience).
- Viability. It is a viable option as the system is in production and operating today, however, the question is future viability and the ability for this system to accommodate business needs and to continue to be supported without significant cost, time, complexity, and risk. For this reason, it receives less that a positive grade.

The Status Quo solution ranked 13th (last) in Business Considerations. Below are some areas of this category this solution struggled with.

- Data Democratization. Does not support a solution which is delivered with internal standard and additional modules for reporting and analytics.

- Cost Effective Strategic Capabilities. Does not address the cost-effective implementation of over 100 strategic capabilities identified in the MECL workshops.

- Enable Staff to Work Smarter. Does not promote a COTS Optimum Viable Product or OVP approach for OCM / Process / Training work.

- Improved Customer Lifecycle. Does not promote improvements to the MECL Customer Lifecycle such as introduction of customer service appointment times, pay deposits by billing deposits, automated interface to financials, integrate with AMI/MDM, offer TOU Rates, create new rates, proration, riders, taxes, Flexible Due Dates, and automate Low-Income Assistance Program.

- Does not provide a perpetual license with regular releases against the product roadmap.

- Standardized and Updated Documentation. This option does not support a product which is delivered with a complete set of application, processes, training, operation, documentation that is kept updated with new releases and synchronized with MECL specific documentation.

- Automated & Standardized Workflows. This option does not provide features including automated workflows to standardize, route, and track work.

The Status Quo solution ranked 13th (last) in Technology Considerations. Below are some areas of this category this solution struggled with.

- Componentized System Solution. This option does not address that MECL has embedded CIS with Outage, Work Management, and Survey based information and activities which are not readily found within the scope of a modern CIS product.

- Mitigate New Function Cost. While CIS has performed diligently over the years, the need to accommodate AMI, Smart Meters, TOU Billing etc., and update the current CIS is extensive. This solution option does not do this.

- This option does not address Configuration vs Customization and IT Ownership.

- Modern Industry Application Alignment. This option does not accommodate the PowerBuilder foundation being replaced with a new COTS solution

- This solution does not address the lack of CIS Application Support. This solution continues with the PowerBuilder framework rather than a new COTS solution provided by a vendor specific to the Utility Industry.

The Status Quo solution ranked 12th in Benefits & Improvements. Below are some areas of this category this solution struggled with.

- Technical Personnel – Does not address their application or technology issues with PowerBuilder.
- Business Users – Does not address their business needs or support issues.
- Customers – No benefits or services will accrue to them which enhance the customer lifecycle.

7.8 8th Place – 10. COTS Phased IaaS (Hosted)

Solution Description: Purchase a product bundled suite with integrated add-ons as necessary and implement on a cloud platform by the same vendor offering the application (behind the scenes they may contract out). Implement so the products are all live at the same time in a single stream, however, it is not possible to flip the switch, so products are live at the same time, the OCM/training, and the impact is too great. As a result, mini-go-lives of products are required within the single stream so that everything is live by the single stream date. This requires a syncing effort between the legacy CIS and the new products as they "go-live" until all products are placed into production and the legacy system is removed from the desktop, this represents complex integration work between products.

Ranking per category:

1. Implementation Costs	2. Operational Costs	3. Implementation Timeframe	4. Solution Risk & Viability	5. Resource Utilization	6. Business Considerations	7. Technology Considerations	8. Benefits & Improvements
11th	6th	9th	5th	5th	1st	1st	4th

Solution Option Positives

The COTS Phased IaaS (Hosted) ranked 5th in Solution Risk and Viability. Below are some of the qualities about the solution and this category that were appreciated:

- Addresses all aspects of application risk. The phased process over multiple years requires the legacy CIS to be retained for a longer period, with overhead, management, synchronization to the source system and complexities.
- Addresses all aspects of business risk. This project includes OCM/Process/Training. System will be fully documented.
- Platform Risk. Although it is not the preferred platform, this option supports rapid movement to a Hosted Platform.
- Viability. COTS product suite is proven, many utilities are currently running a Hosted environment. Some are using AWS/GCP/AZURE and the IaaS Cloud Platform as the Hosted environment for these new product platforms. Implementing within the proposed timeframe is viable, and the future for this option is viable.

The COTS Phased IaaS (Hosted) ranked 1st in Business Considerations. Below are some of the qualities about the solution and this category that were appreciated

- Data Democratization. The solution is delivered with internal standard and additional modules for reporting and analytics.

- Best Practices Aligned with Product. Provides a new CIS and out-of-the-box processes and procedures tied to the modern customer lifecycle and both customer and user journeys.

- Product vs Custom Solution. For a product solution, every $1 spent results in releases containing new functionality on a regular basis and product roadmap $$$ returned.

- Enable Staff to Work Smarter. Using the system as a transformation tool or enabler of change across the organization.

- Improved Customer Lifecycle. Improvements to the MECL Customer Lifecycle such as introduction of customer service appointment times, pay deposits by billing deposits, automated interface to financials, integrate with AMI/MDM, offer TOU Rates, create new rates, proration, riders, taxes, Flexible Due Dates, and automate Low-Income Assistance Program.

- Standardized and Updated Documentation. The COTS is delivered with a complete set of application, processes, training, operation, etc. It is kept updated with new releases and synchronized with MECL specific documentation.

- Automated & Standardized Workflows. This option provides many features including automated workflows to standardize.

- Cost Effective Strategic Capabilities. This option addresses the cost-effective implementation of over 100 strategic capabilities not provided for in the current CIS through the product roadmap.

The COTS Phased IaaS (Hosted) ranked 1st in Technology Considerations. Below are some of the qualities about the solution and this category that were appreciated:

- Componentized System Solution. MECL has embedded CIS with Outage, Work Management, and Survey based information and activities which are not readily found within the scope of a modern CIS product. With this option, although some vendors offer integrated suites, they are separate modules, can be purchased, and implemented separately.

- Mitigate New Function Cost. While CIS has performed diligently over the years, the need to accommodate AMI, Smart Meters, TOU Billing etc., and update the current CIS is extensive. This option incorporates the scope and costs to implement a new CIS, MDM, position integration to AMI smart meters, setup of TOU Complex Rates, access to Interval data, consumption, and billing, and real-time interaction

- Configuration vs Customization and IT Ownership. COTS rely heavily on configuration vs customization. Trend to move control to individuals/group within business unit(s).

- Modern Industry Application Alignment. Code cannot be touched and changed.

- CIS Application Support. Replaces the PowerBuilder framework with a new COTS solution provided by a vendor specific to the Utility Industry.

The COTS Phased IaaS (Hosted) ranked 4th in Benefits & Improvements. Below are some of the qualities about the solution and this category that were appreciated:

- Technical Personnel – Takes longer to address their technical issues.

- Business Users – Takes longer to address their issues.

- Customers - Benefits will be realized by customers including improvement in levels of customer service and the customer experience, new communication channels, self-service, exceeds the customer value package, timely response to customer needs and issues, emphasis on the customer journey rather than user processes

Solution Option Negatives

Areas with the lowest score for the COTS Phased IaaS (Hosted) solution option were:

- This solution was ranked 11th for the category of Implementation Costs with a total annual cost of $20.2 million or $246 per customer.

- This solution was ranked 6th for the Operating Costs category and had a total of $1 million or $1.07 per customer annually.

- This solution was ranked 6th for Total Implementation Timeframe of 60 months (8-month procurement, 48-month implementation, 4-month stabilization)

- The phasing and 60-month timeframe pushed the solution out by 4 years into final deployment of the smart meters in the year 2026

- This solution was ranked 5th for Solution Risk & Viability. Implementation of these COTS solutions have a positive record. However, MECL has a legacy CIS which combines multiple systems which must be broken apart and then re-implemented into a COTS product suite. There is a sync component that also increases project risk.

7.9 9th Place – 2. Complex Billing

Solution Description: Assume purchase a complex billing software engine from the market and install it within the MECL application portfolio and operate in the data center. Position integration

to the AMI Head-end for up to 12 months for monthly billing. SHORT TERM SOLUTION, no long-term MDM to integrate to legacy. Or to another MDM inside the AMI project for interval billing. This work would be done as part of the AMI initiative.

Ranking per category:

1. Implementation Costs	2. Operational Costs	3. Implementation Timeframe	4. Solution Risk & Viability	5. Resource Utilization	6. Business Considerations	7. Technology Considerations	8. Benefits & Improvements
1st	1st	4th	13th	3rd	10th	12th	8th

Solution Option Positives

The Complex Billing solution ranked 1st in Implementation Costs with a total of $4 million or $48 per customer.

The solution ranked 1st in Operational Costs with an annual operating cost of $98k or $0.10 per customer per month.

The Complex Billing solution ranked 4th in Implementation Timeframe of 19 months (4-month procurement, 12-month implementation, 3-month stabilization)

The solution ranked 13th in Solution Risk but, from a Platform Risk perspective there was no issue. This is because the preferred platform is an On-Premise Data Center which the current legacy CIS resides.

The solution ranked 3rd overall in the category of Resource Utilization. The totals for this solution in this category are $688k for labor and $656 for Third-Party Fees.

The Complex Billing solution ranked 10th in the Business Considerations category. Below are some of the qualities about the solution and this category that were appreciated:

- Cost Effective Strategic Capabilities. Focused on Complex Billing for TOU Only. This option addresses the cost-effective implementation of over 100 strategic capabilities not provided for in the current CIS through the product roadmap.

- Improved Customer Lifecycle. Focused on Complex Billing for TOU Only. Improvements to the MECL Customer Lifecycle such as introduction of customer service appointment times, pay deposits by billing deposits, automated interface to financials, integrate with AMI/MDM, offer TOU Rates, create new rates, proration, riders, taxes, Flexible Due Dates, and automate Low-Income Assistance Program.

The solution ranked 8th overall in the category of Business & Improvements. This is due to the assumed sentiments of regulators. The regulators may still prefer this option due to low costs.

Solution Option Negatives

Areas with the lowest score for the Complex Billing solution option were:

- The solution ranked 4th overall for Implementation Timeframe. This option provides the ability to bill for TOU rates thru a new Complex Billing engine. However, it still

needs to be positioned to the AMI Head-End system or integration with an AMI MDM – not included.

- The Complex Billing solution ranked 13th (last) for the category of Solution Risk and Viability. Some areas of concern for this solution in this category are:

- Application Risk. This option builds upon a cracked foundation. It is throwing good money after bad.

- Viability. Few utilities have implemented a complex billing solution with a new CIS in several years, and nothing with PowerBuilder.

- Business Risk. Does not address quickly moving off the application because the business environment poses a risk to the utility. In addition, this option does not provide a new business environment which supports the utility direction regarding business operations and mitigates ongoing business risk.

- Project Risk. Implementing Add-On solutions like this onto Legacy Systems have a lot of unknowns regarding projects. This has a lot of Project Risk in terms of complete failure, delivery of something that may not work, cost more money, require more resources.

- The Complex Billing solution ranked 10th for the category of Business Considerations. Some areas of concern for this solution in this category are:

    - Best Practices Aligned with Product. LIMITED TO COMPLEX BILLING SOFTWARE FOR TOU. Provides a new CIS and out-of-the-box processes and procedures tied to the modern customer lifecycle and both customer and user journeys.

    - Product vs Custom Solution. Purchase Complex Billing Software. MECL needs to consider moving to a product solution rather than the current custom CIS solution. This option enables a product solution with an emphasis on a product roadmap and user group versus customization and an internal development shop, it relies heavily on configuration vs customization.

    - Data Democratization. A portion focused on Complex Billing. The solution is delivered with internal standard and additional modules for reporting and analytics.

    - Enable Staff to Work Smarter. Significant effort associated with a COTS Optimum Viable Product or OVP approach is OCM / Process / Training work. Using the system as a transformation tool or enabler of change across the organization.

- Automated & Standardized Workflows. This option provides many features including automated workflows to standardize, route, and track work. Scripting to standardize customer conversations and record the type of conversation, statistics, and performance. Automated review and approval and SOX compliance.

- The Complex Billing solution ranked 12th for the category of Technology Considerations. Some areas of concern for this solution in this category are:

  - Componentized System Solution. This solution does not address this fundamental issue, in fact it builds on the foundation and is another system that is now fully integrated.

  - Mitigate New Function Cost. This option does not incorporate the scope and costs to implement a new CIS, MDM, with positioning to AMI smart meters, setup of TOU Complex Rates, access to Interval data, consumption, and billing, and real-time interaction. This solution stops at preparation of the system to receive feeds from AMI/Smart Meters. Time, Money, and Resources are not identified for this integration as no MDM is being purchased as part of this solution. Currently this option is to purchase and implement Complex Billing capabilities. The cost just to do this is high and the timeframe is lengthy.

  - Configuration vs Customization and IT Ownership. This option does not address this and is not structured to accommodate it. The current system relies primarily on customization. The new complex billing engine will be configurable; however, IT will control it since it is fully integrated to the current legacy CIS.

  - Modern Industry Application Alignment. This option does not accommodate the PowerBuilder foundation being replaced with a new COTS solution. In the future, code cannot be touched and changed.

  - CIS Application Support. This option continues with the PowerBuilder framework rather than a new COTS solution provided by a vendor specific to the Utility Industry.

- The Complex Billing solution ranked 8th for the category of Benefits & Improvements. Some areas of concern for this solution in this category are:

  - Executives / Board – Does not address the issues, especially the AMI/Smart Meter initiative and ability to Bill for TOU Rates and Interval Reads and address other issues.

  - Technical Personnel – Does not address their application or technology issues with PowerBuilder.

- Business Users – Does not address their business needs or support issues.
- Customers – No benefits or services will accrue to them which enhance the customer lifecycle, need further work to generate actual TOU bills.

7.10 10th Place – 4. Outsource Support

Solution Description: Address support issues by outsourcing support to external firms. Does not address any actual system functional or technical issues. Assumption is that this would be an AMS team of 3 external resources with overhead signed for an initial 3-year contract. A selection effort to select and contract with an outsourcing firm and then a transition or knowledge transfer effort.

Ranking per category:

1. Implementation Costs	2. Operational Costs	3. Implementation Timeframe	4. Solution Risk & Viability	5. Resource Utilization	6. Business Considerations	7. Technology Considerations	8. Benefits & Improvements
1st	6th	1st	9th	1st	11th	11th	13th

Solution Option Positives

The Outsource Support solution option ranked 1st in the Implementation Costs category with a total of $475,000 or $6 per customer.

This solution option ranked 1st in Implementation Timeframe with a total project length of 7 months (3-month procurement, 0-month implementation, 4-month stabilization/transfer).

The Solution Option of Outsource Support ranked 9th in Solution Viability however, a positive area was Platform Risk. There is no platform issue, the preferred platform is an On-Premise Data Center which the current legacy CIS resides.

The Outsource Support solution option ranked 1st in the Resource Utilization category with costs of $135,000 for labor and $0 for Third-Party Fees.

The Outsource Support solution option ranked 11th in the Technology Considerations category however, sored well in CIS Application Support. This option specifically addresses the following issue: The CIS application support issue includes, a single IT resource retiring within 5-10 years, the PowerBuilder technology not a career advancing platform for IT people, the lack of documentation, the poorly structured code, the backlog, the reporting bottleneck, the lack of configuration, etc.

Solution Option Negatives

Areas with the lowest score for the Outsource Support solution option were:

- 2. Annual operating costs of $1.1m or $1.17/PCPM
- 3. This does not address anything concerning the positioning for the AMI Smart Meter.

The Outsource Support solution option ranked 9th in Solution Risk & Viability. The solution struggled in the following areas of the category:

- Application Risk. This option does address support issues regarding the application.
- Viability. There is a defined User Group for PowerBuilder and a network of consultants and companies who have PowerBuilder skills. Assume while this skillset is available it comes at a higher price. All literature points to this skill as dwindling and companies are migrating PowerBuilder to .NET and JAVA codebase. This is Viable as a short-term solution, less so as a long-term viable solution.
- Business Risk. This solution option focuses on the support issue and does not address any of the business environment related issues regarding documentation of business processes, training, user lifecycle, customer communication channels, etc.
- Project Risk. There is no large project associated with this option, however the knowledge transfer effort must be successful and could extend the timeline.

The Outsource Support solution option ranked 11th in Business Considerations. The solution struggled in the following areas of the category:

- Cost Effective Strategic Capabilities. Not provided with this option. Focused on Complex Billing for TOU Only.
- Improved Customer Lifecycle. Not provided with this option.
- Best Practices Aligned with Product. Not provided with this option.
- Data Democratization. Not provided with this option.
- Product vs Custom Solution. Not provided with this option.
- Enable Staff to Work Smarter. Not provided with this option.
- Automated & Standardized Workflows. Not provided with this option.

The Outsource Support solution option ranked 11th in Technology Considerations. The solution struggled in the following areas of the category:

- Componentized System Solution. Not provided with this option
- Mitigate New Function Cost. Not provided with this option
- Configuration vs Customization and IT Ownership. This option does not address this and is not structured to accommodate it.

- Modern Industry Application Alignment. This option does not accommodate the PowerBuilder foundation being replaced with a new COTS solution.

The Outsource Support solution option ranked 13th in Benefits & Improvements. The solution struggled in the following areas of the category:

- Executives / Board – Only addresses the support issue for the large amount of money spent ongoing.
- Technical Personnel – Only addresses the support issue and may only do an average job at that.
- Business Users – Does not address their business it will take time for new people to learn the system to support it.
- Customers – What real benefits will they see.
- Regulators. Addresses the support issue in the short-term, no direct benefit to them or rate payer for the ongoing money that is spent.

7.11 11th Place – 3. Re-Architect

Solution Description: Move to a different programming language and remove the reliance on PowerBuilder. Continue to use SQL. Following this conversion, implement complex billing and TOU Rates and Billing. There are tools like Visual Expert, SoftSol offers PowerBuild Transformations or Migrations to JAVA or .NET which they claim are 95% to 100% effective. Also, InSpirir, Arkin Software, ResQsoft, Maintrend, they all offer platforms, tools, and services The tools offer an automation-assisted rewrite of the application, which takes a little more effort than a line-by-line translation and yields the benefits of a custom rewrite without the risks. NOTE: There is no available data on the Internet for these projects and these vendors hold the information close to their vest.

Ranking per category:

1. Implementation Costs	2. Operational Costs	3. Implementation Timeframe	4. Solution Risk & Viability	5. Resource Utilization	6. Business Considerations	7. Technology Considerations	8. Benefits & Improvements
4th	1st	5th	11th	4th	1st	10th	11th

Solution Option Positives

The Re-architect solution option ranked 4th in the category of Implementation Costs, its total cost to implement is $10.3 million or $126 per customer.

The Re-architect solution option ranked 1st in the category of Operational Costs with an annual operating cost of $98,000 or $0.10 per customer per month.

The solution option ranked 11th in the category of Solution Risk & Viability however, scored favorably with Application Risk. The solution addresses the foundational issue of the

PowerBuilder technology and positions MECL for future customizations. It addresses TOU Rates and Billing capabilities, does not address MDM as it will significantly increase cost.

The solution option ranked 11th in the category of Solution Risk & Viability however, scored favorably with Platform Risk. There is no platform issue, the preferred platform is an On-Premise Data Center which the current legacy CIS resides.

The solution option ranked 10th in the category of Technology Considerations however, scored favorably with Modern Industry Application Alignment. This is because it eliminates PowerBuilder and replaces with a new code base either .NET or JAVA

The solution option ranked 10th in the category of Technology Considerations however, scored favorably with CIS Application Support. This option specifically addresses the following issue: The CIS application support issue includes, a single IT resource retiring within 5-10 years, the PowerBuilder technology not a career advancing platform for IT people, the lack of documentation, the poorly structured code, the backlog, the reporting bottleneck, the lack of configuration, etc.

Solution Option Negatives

Areas with the lowest score for the Re-architect solution option were:

- The solution option ranked 5th in the category of Implementation Timeframe however, struggled with CIS Application Support. This solution has a total implementation timeframe of 22 months (4-month procurement, 15-month implementation, 3-month stabilization/transfer) plus a project to implement complex billing of another 19 months for a total of 41 months.

- The timeline only addresses providing the ability to bill for TOU rates with a more flexible non-PowerBuilder code base thru a new Complex Billing Engine attached to the legacy CIS. There is still no MDM to capture and integrate with smart meters for billing purposes. This was left for additional analysis was this portion of the project was already rated higher cost, complex and time consuming.

- The solution option ranked 9th in the category of Solution Risk & Viability and struggled with Viability. No case studies were offered. TMG was unable to locate any examples of other utilities or companies who successfully migrated their customer system from PowerBuilder to .NET or JAVA.

- The solution option ranked 9th in the category of Solution Risk & Viability and struggled with Business Risk. This option focuses on the support issue and does not address any of the business environment related issues regarding documentation of business processes, training, user lifecycle, customer communication channels, etc.

- The solution option ranked 4th in the category of Resource Utilization and had a total of $2.8 million for labor ($2.1 for migration and $.7 for complex billing) and $518k for Third-Party Fees.

7.12 12th Place – 13. Defer COTS On-Premise

Solution Description: This option uses Option 6 – COTS On-Premise and defers it for 5 years. It uses the MECL Inflation number currently at 2.2% annually and applies it for 5 years to the total for that solution to show the impact on delaying the COTS On-Premise option for 5 years from a cost perspective.

Ranking per category:

1. Implementation Costs	2. Operational Costs	3. Implementation Timeframe	4. Solution Risk & Viability	5. Resource Utilization	6. Business Considerations	7. Technology Considerations	8. Benefits & Improvements
9th	12th	9th	12th	8th	8th	9th	9th

Solution Option Positives

The Defer COTS On-Premise solution option ranked 12th in the category of Solution Risk & Viability and scored high in Platform Risk. There is no platform issue, the preferred platform is an On-Premise Data Center which the current legacy CIS resides.

The Defer COTS On-Premise solution option ranked 8th in the category of Business Consideration and scored high in the following sub-categories:

- Cost Effective Strategic Capabilities. This option addresses the cost-effective implementation of over 100 strategic capabilities not provided for in the current CIS through the product roadmap.
- Improved Customer Lifecycle. This option addresses these customer lifecycle improvements however, it defers them, and they do not start to be procured for 5 years, and then it takes 38 months to procure and implement.
- Enable Staff to Work Smarter. Using the system as a transformation tool or enabler of change across the organization.
- Automated & Standardized Workflows. This option provides many features including automated workflows to standardize, route, and track work.
- Best Practices Aligned with Product. Provides a new CIS and out-of-the-box processes and procedures tied to the modern customer lifecycle and both customer and user journeys. This allows for utilities to accommodate regulatory and key business rules in the design rather than following a purist and restrictive agile MVP approach.
- Data Democratization. The solution is delivered with internal standard and additional modules for reporting and analytics. Delaying this startup for another 5 years and implementing AMI/Smart meters now will be challenging to the user community.

- Product vs Custom Solution. This option enables a product solution with an emphasis on a product roadmap and user group versus customization and an internal development shop, it relies heavily on configuration vs customization.

The Defer COTS On-Premise solution option ranked 9th in the category of Technology Consideration and scored high in the following sub-categories:

- Componentized System Solution. MECL has embedded CIS with Outage, Work Management, and Survey based information and activities which are not readily found within the scope of a modern CIS product.

- Mitigate New Function Cost. This option and the timing of pushing this out for 5 years to even start the 8-month procurement, then the 2.5 implementation does not position for the AMI / Smart Meter program.

- CIS Application Support. This option specifically addresses the following issue: The CIS application support issue includes, a single IT resource retiring within 5-10 years, the PowerBuilder technology not a career advancing platform for IT people, the lack of documentation, the poorly structured code, the backlog, the reporting bottleneck, the lack of configuration, etc.

- Configuration vs Customization and IT Ownership. COTS rely heavily on configuration vs customization. Trends in the industry are to move control to individuals/group within business unit(s).

- Modern Industry Application Alignment. In the future, code cannot be touched and changed.

The Defer COTS On-Premise solution option ranked 9th in the category of Business Improvements. One of the perceived perspectives are that Regulators will look favorably deferring for 5 years.

Solution Option Negatives

Areas with the lowest score for the Defer COTS On-Premise solution option were:

- The Defer COTS On-Premise solution option ranked 9th in the category of Implementation Costs with a total of $19.6 million or $239 per customer.

- The Defer COTS On-Premise solution option ranked 9th in the category of Operational Costs with a total annual operating cost of $1.35 million or $1.37 per customer per month

- The Defer COTS On-Premise solution option ranked 9th in the category of Implementation Timeframe with a total implementation timeframe of 102 months (60-month delay + 8-month procurement, 30-month implementation, 4-month stabilization/transfer)

- Pushed this new system out by 5 years. A different option will have to be pursued to position for the AMI smart meter interval read captures and interval billing.

- The solution option ranked 12th in the category of Solution Risk & Viability and struggled with Application Risk - This option does not support quickly moving off the current system which pose risks (resourcing issues, documentation, structured programming, system deterioration, support issues, approaching end of life). Also needs to support direction of the utility and mitigate ongoing application risk.

7.13 13th Place – 5. Custom System

Solution Description: Purchase a template or design guide of a CIS and all associated edge systems which are bundled into the CIS. This is a significant effort. Suggest an MECL planning, and design team of 3 core people for 9 months dedicated to this process. Once contracts are awarded, this would be a 5-to-7-year process with teams of up to 30 developers with an avg of 20 across CIS, MDM, WMS, MWM, OMS, Data, CxT in place to implement these new systems at MECL.

Ranking per category:

1. Implementation Costs	2. Operational Costs	3. Implementation Timeframe	4. Solution Risk & Viability	5. Resource Utilization	6. Business Considerations	7. Technology Considerations	8. Benefits & Improvements
13th	12th	9th	7th	13th	9th	8th	7th

Solution Option Positives

The Custom System solution option ranked 7th in the category of Solution Risk & Viability and scored high in the following sub-categories:

- Platform Risk. There is no platform issue, the preferred platform is an On-Premise Data Center which the current legacy CIS resides.

- Business Risk - This option supports moving off the application because the business environment poses a risk to the utility with limited business resources - lack business knowledge, resourcing issues. Also, this option provides a new business environment which supports the utility direction regarding business operations and mitigates ongoing business risk.

- Application Risk - This option supports moving off the current systems because it poses a risk. Also, this option supports the direction of the utility and mitigates ongoing application risk.

- Cost Effective Strategic Capabilities. This option addresses the cost-effective implementation of over 100 strategic capabilities not provided for in the current CIS through the product roadmap.

- Automated & Standardized Workflows. This option provides many features including automated workflows to standardize.

- Product vs Custom Solution. Hope in a new system emphasis will be given to configuration rather than customization.

- Enable Staff to Work Smarter. Using the system as a transformation tool or enabler of change across the organization.

- Improved Customer Lifecycle. There is no product roadmap to keep coordinated to accommodate and implement future capabilities. May not have a published release schedule, or a very long release schedule.

The Custom System solution option ranked 8th in the category of Technology Considerations and scored high in the following sub-categories:

- Mitigate New Function Cost. While CIS has performed diligently over the years, the need to accommodate AMI, Smart Meters, TOU Billing etc., and update the current CIS is extensive. This option addresses the issue.

- Configuration vs Customization and IT Ownership. Hope in a new system emphasis will be given to configuration rather than customization. There is always risk that logic is hard coded into programs and control stays with the IT group.

- Modern Industry Application Alignment. Hopefully, base code cannot be touched and changed. It will only be viewed and then accessed by key programmers maintaining and developing the custom code.

- CIS Application Support. Replaces the PowerBuilder framework with a new system developed in a different code base and development framework.

The Custom System solution option ranked 9th in the category of Benefits & Improvements due to it being expensive and risky with a lot of custom developed capabilities.

Solution Option Negatives

Areas with the lowest score for the Custom System solution option were:

- The Custom System solution ranked 9th in the Implementation Costs category with total implementation costs of $93 million or $1,136 per customer.

- The Custom System solution ranked 12th in the Operational Costs category with annual operational cost of $2 million or $2.12 per customer per month.

- The Custom System solution ranked 9th in the Implementation Timeframe category with a projected timeframe of 105 months (9-month procurement, 84-month implementation, 12-month stabilization/transfer).

The Custom System solution ranked 12th in the Solution Risk & Viability category and scored low for the following sub-categories:

- Project Risk. Tremendous risk associated with failure to custom develop a CIS solution consisting of all edge system components.

- Viability. There is no record of any utility attempting to custom develop a CIS in recent history. TMG is aware of consortiums who developed and attempted to sell CIS solutions to the market in the late 1990's and early 2000's. Since than some design guides and templates have been offered as starting points, however, TMG is unaware of any utility that has attempted to develop their own CIS using such guides. Given the cost, time, and resource requirements it is doubtful MECL can support this project.

The Custom System solution ranked 8th in the Resource Utilization category and estimated the cost of $17.8 million for labor and $13.6 million for Third-Party Fees.

The Custom System solution ranked 9th in the Business Considerations category and scored low for the following sub-categories:

- Regulators. The tremendous cost, long timeframe, and risk are non-starters for this option.

- Executives / Board – too expensive and risky.

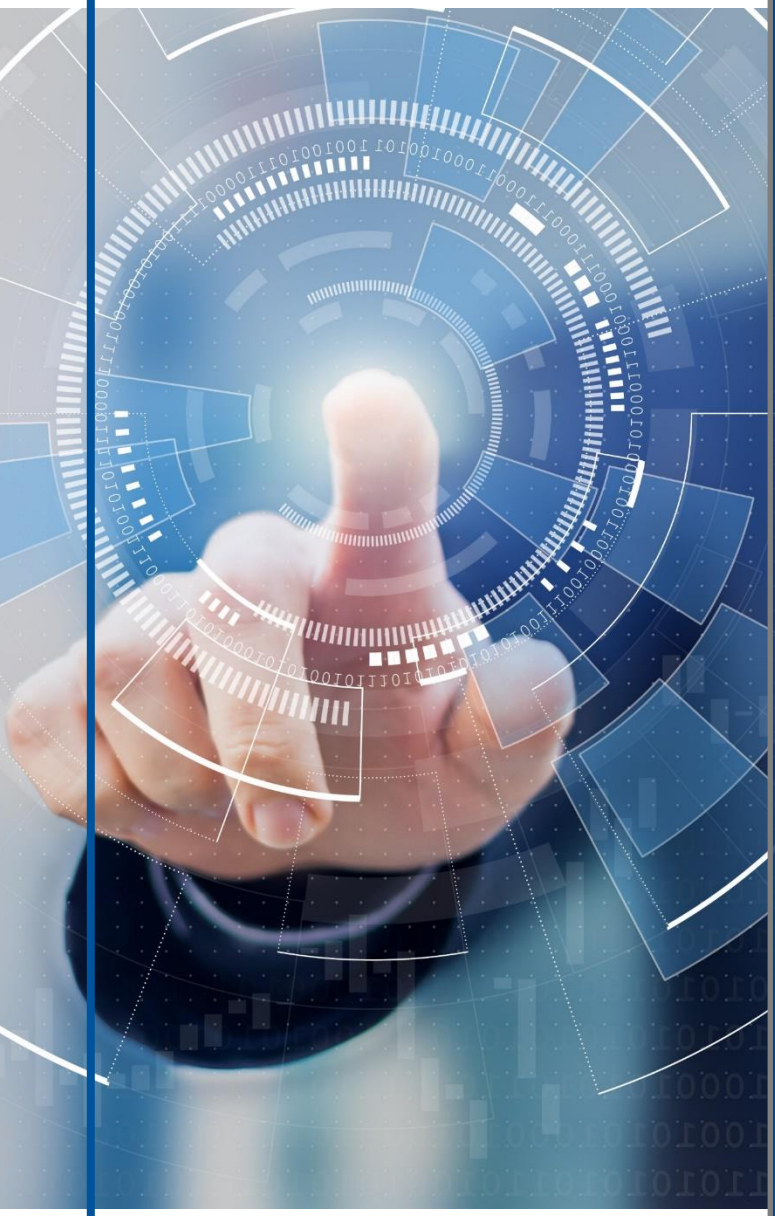
- Technical Personnel – too expensive and risky.

End of Report Summary

APPENDIX B

Util-Assist Report
Business Case for Advanced Metering Infrastructure
for Maritime Electric Company, Limited

util-assist | Solutions. Simplified.



Business Case for Advanced Metering Infrastructure (AMI) for Maritime Electric Company, Limited (MECL)

August 2021

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Table of Contents

Table of Tables

Table of Figures

Section 1: Executive Summary

Maritime Electric (MECL) is assessing the viability and benefits of Advanced Metering Infrastructure (AMI) as a key enabler for modernizing MECL's electric business. AMI has the potential to enhance safety and reliability, deliver expanded data to provide customers with enhanced service and choice, and improve productivity and efficiency in meter services. This business case delineates key considerations and justifications to proceed with AMI and details both the financial and non-financial drivers and benefits of implementing AMI technology.

This report and its appendices also outline AMI background information, the scope of a potential AMI project design, risks and mitigation strategies, financial analysis, and an AMI deployment strategy. Additionally, this document is supplemented by the MECL Business Case Model (an Excel spreadsheet) that estimates the capital and operating costs of an AMI system against the anticipated business benefits and savings to be gained.

1.1 AMI Delivers Broad Benefits

AMI will deliver broad benefits to MECL and its customers as further described, both quantitatively and qualitatively, within this report. Key benefits include:

- **Safety and reliability:**
  - By eliminating the need to manually reconnect and disconnect meters and all associated tasks, MECL will reduce safety risks including driving, traversing personal property, as well as entering homes and businesses.
  - The ability to see each meter's health and status will vastly improve MECL's awareness of reliability issues at the customer level instead of a feeder level. Issues that occur on the distribution line that are not currently visible today will be flagged and thus addressed faster with an AMI system.
- **Customer benefits:**
  - AMI will provide information to better enable MECL to respond to customers resulting from the ability to see each account's status and ping meters, if necessary.
  - AMI will enhance the customer experience by providing data that will feed a customer web portal, delivering customers the ability to review their usage and the results of their conservation efforts on a much more granular level than today. This data will empower customers to better understand their consumption profile which can lead to more educated—and satisfied—consumers.
  - AMI is an enabler for "self service." Statistics show that customers desire the option to use data and data analytics tools to better understand their usage and provide flexibility, such as choosing the bill period or billing date. This can help customers on fixed incomes better manage their funds. In today's environment, where more advanced technology is becoming the accepted practice, lacking technology tools can become a source of discontent and frustration for those customers looking to self-serve.
- **Business efficiency:**
  - By collecting meter reads automatically and having the ability to reconnect/disconnect remotely, the volume of field tasks performed by the metering team can be optimized.

- The AMI meter data will be time synced and include data beyond just the standard kWh. Voltage, kW and kVAR data would be available at the residential level and could be delivered to programs like Conservation Voltage Reduction (CVR), enhanced load profiling, and distribution network losses.
- AMI Field Area Network (FAN) and Wide Area Network (WAN) solutions can also be made available for other distribution and substation sensors and devices.

Additional benefits, as provided in more detail, below, could include, but are not limited to:

- **Savings on meter replacement costs**
  - This benefit captures the net impacts of avoided meter replacement costs of existing AMR meters as they reach end of life.
- **Reduced drive by meter reading system costs.**
  - Once AMI is in place, drive-by reading equipment and replacement costs will be reduced.
- **Reduced Meter Reading Vehicles**
  - MECL will realize a reduction of vehicle costs currently used to perform drive-by reads and disconnect/reconnect tasks.
- **Avoided Costs of Net Metering**
  - AMI meters will provide net metering functionality allowing MECL to avoid the costs of net meters and associated installation, labour, and software licensing. This benefit will also position MECL to be prepared in case of any unforeseen growth in distributed energy resources.

1.2 Summary of the Business Case

As described herein, the overall AMI project as structured for MECL is not cost effective. AMI deployments are the most cost-effective when the utility is transitioning from manual meter reading, as the avoided costs of meter reading is one of the highest benefits. As MECL is transitioning from automated meter reading (AMR), the meter reading-related benefits are incremental. The net present value (NPV) of the investment over a 20-year period covering network deployment, system acceptance testing (SAT), and full deployment is forecasted at -$3.9M. The NPV of the full 20-year business case is $31M in costs with benefits of $28.1M. While the lifecycle of the AMI system is 20 years, the investment will be paid back in 18 years.

1.3 Deployment Strategy Designed to Maximize Benefits

Through its financial analysis, Util-Assist has determined that a 3-year implementation (1-year SAT and 2-year meter deployment) is ideal, balancing capital spend opportunities to realize the business case benefits. If a deployment is stretched out over too long a period, the benefits may not be realized, effectively eliminating the value proposition. The project request for proposals (RFPs) would examine variable deployment timelines, solutions, and costs.

Following industry best practices, Util-Assist would recommend that Phase I consist of 1,000 meters to test the placement of meters, collectors, and repeaters to ensure proper network saturation as well as to inform and refine the AMI strategy. The customer approach, back-office system integration, and associated processes would then be refined before starting the full rollout of meters (Phase II). This phased approach would enable MECL to maximize successful broad deployment and customer acceptance.

Section 2: Introduction and Background

2.1 MECL's Drivers for AMI

MECL currently uses AMR, specifically the Itron AMR drive-by system to read meters; this allows MECL to optimize their workforce but does not allow MECL to capture the greater benefits of AMI. The implementation of AMI will address many high-level challenges by:

- Improving productivity and efficiency in meter services.
- Managing the electrification of the grid as adoption of roof top solar generation, expanded wind farm generation, and electric vehicles increases.
- Providing customers with enhanced service and choice.
- Optimizing grid operations and planning by enabling decision-making for system and asset management.
- Enhancing the safety of staff and customers by automating processes such as disconnects.

2.2 Overview of AMI

AMI is infrastructure that collects meter read data remotely from radio-enabled or "smart" meters. AMI meters are two-way communication devices that record and report how much consumption is used and when—and automatically sends that information to the utility. By comparison, AMR devices measure only how much electricity is used in total from one reading to the next reading, and they have to be read through a drive-by system or other one-way system.

AMI is a more modern metering system capable of two-way, automated communication between the customer's meter and the utility. The new meters are equipped with modules that enable communication with the collection infrastructure and head-end system, so they can be read remotely and at frequent intervals. AMI meters are also capable of sending other information like alerts and alarms to the utility and are capable of receiving commands or data, like remote shut-off commands, or over-the-air updates.

At a high level, advanced metering infrastructure works as follows:

1. The meter tracks electricity use by hour (or by a more granular unit of time, if required) and provides this information in a daily meter read. The meter also sends health status (e.g., memory errors), alarms (e.g., tamper, high voltage), and read errors, providing real-time data to the utility.
2. Each day this information is sent by radio signal to a data collector located in the neighborhood.
3. The collectors relay the data to an advanced metering control computer, known as the head-end system.
4. The head-end system sends the data to a meter data management (MDM) to validate the data.
5. The data is sent to a customer information system (CIS) and/or billing system to prepare bills.
6. Customers can access near real-time consumption data via a Web presentment solution.

Figure 1: How AMI Works

2.2.1 AMI vs. AMR

AMR offered utilities a cost-effective solution to reduce manual reading activities, to improve the data collection process, and reduce high volumes of customer service and billing problems resulting from missed or estimated reads. However, for utilities today, the drivers for their modernization efforts go beyond what can be achieved by AMR. AMI not only provides a solution to meter-to-cash problems but also provides granular data that can be used for other customer service functions—it goes beyond meter reading and billing to enable solutions to many other utility challenges. This flexibility in the way the AMI data can be used has contributed to its prevalence. The figure below shows the functions and benefits available with AMR, compared to what is available with two-way AMI systems.

Customer & Operational Benefit	AMR 1-Way	AMI 2-Way
• More efficient operation • More accurate bills	🟢	🟢
• Avoided truck rolls • Flexible scheduling of service orders • Better visibility of CSRs while taking customer calls	🔴	🟢
• Faster service and after-hours connections • Ability to connect/disconnect service remotely	🔴	🟢
• Customer tools for potential bill savings • Detailed usage data to customer via web portal • Customer notification	🟡	🟢
• Incenting customers to modify consumption habits • Customer options for bill savings	🔴	🟢
• Capture of interval data	🔴	🟢
• Monitoring the net distribution of water from or between neighboring distribution systems	🔴	🟢
• Customer data privacy	🔴	🟢
• Supports increased functionality • Reduces risk of technology obsoleteness	🔴	🟢
• Ability to rotate keys in real-time	🔴	🟢

Table 1: AMI vs. AMR Functionality

2.3 Technology Prevalence and Market Assessment

Utilities have been deploying AMI on a wide scale for well over a decade, and the technology continues to evolve to provide new benefits. AMI technology has now become the new norm and is widespread across North America. Natural Resources Canada has stated that as of December 2018, 82% of electric meters in Canada can be classified as Smart Meters.

2.4 Emerging Trends

The below table describes emerging trends in electric metering.

Emerging Trend	Description
Agile Information Technology (IT)	Companies are undertaking more flexible approaches to IT strategy, with the ability to quickly change direction and reprioritize.
Artificial Intelligence (AI) and Machine Learning (ML)	Companies that invest in analytics are also investing in AI and ML in order to navigate new volumes of data and put the information to good use.
Analytics	Companies that are not investing heavily in analytics by 2020 will quickly fall behind as other businesses leverage analytics to identify problems, opportunities, and solutions.
Augmented intelligence	Augmented intelligence, like artificial intelligence, is being employed to streamline processes and improve decision-making. The difference is that humans process the information and make the decisions.
Blockchain	Utilities are deploying new transactive business models using blockchain, such as support energy exchanges (Transactive Energy Processing).
Customer experience (CX)	A focus on CX is necessary as today's customers, conditioned to the digital world, expect rich, personalized, and seamless customer experiences, creating brand loyalty.
Disaggregation	AI technology has paved the way for platforms (e.g., Grid4C) using granular data to break down meter data and determine usage and performance of individual appliances.
Digital twins	Using virtual models of assets is helping utilities gain real-time and predictive insights on performance as well as better integrated distributed energy resources (DERs).
Edge computing	Edge computing is being deployed across industries, placing decision making at the edge (e.g., in meters or network devices) to reduce response time, save bandwidth, and deliver feature-rich applications.

Emerging Trend	Description
Managed services	Utilities are outsourcing data functions of smart metering projects to vendors. Meter suppliers and third parties are predominantly performing services such as data collection, management, and archiving. Utilities seeking flexibility can use this service model and maintain operational involvement as needed for metering projects related to network operation, meter management, and asset ownership, all for a recurring fee.
Network as a Service (NaaS)	Instances where the vendor takes responsibility for the performance of network infrastructure and directs third party personnel to fix infrastructure issues in the field as they arise.
Process automation	This trend kicked off with robotic process automation (RPA) but will see growth with the combination of process intelligence, content intelligence, AI, chatbots, and other innovative technology.
Security	New technologies create new security vulnerabilities, and IT leaders say their highest risk problems revolve around security threats and data privacy, culminating in the trend of proactively protecting infrastructure.
Software as a Service (SaaS)	Applications where the software is licensed on a subscription basis and is centrally hosted.

Table 2: Emerging Trends

Section 3: Typical AMI Scope and Program Design

A standard AMI project consists of automated two-way metering technology, network infrastructure, as well as implementation and integration services. The AMI solution replaces manual or older one-way reading methods, and captures meter reads remotely while supplying other features such as remote disconnect, outage information and detailed meter data management. AMI is also a key enabling technology for data-driven initiatives and use cases. AMI involves the following component technologies:

- **Smart meters with communication modules** (to collect and transmit meter data)
- **Data collectors** (to collect data from meters and transmit it to the head-end system)
- **AMI head-end system and software** (to receive and store data from the collectors)
- **A meter data management (MDM) system** (to store, analyze, validate, and edit meter data)

The new technology is then integrated with the utility's customer information system (CIS), geographic information system (GIS), outage management system (OMS), as well as other current or future systems, which could include an ESB (enterprise service bus) and a WMS (work order management system). A standard AMI network design is shown below.

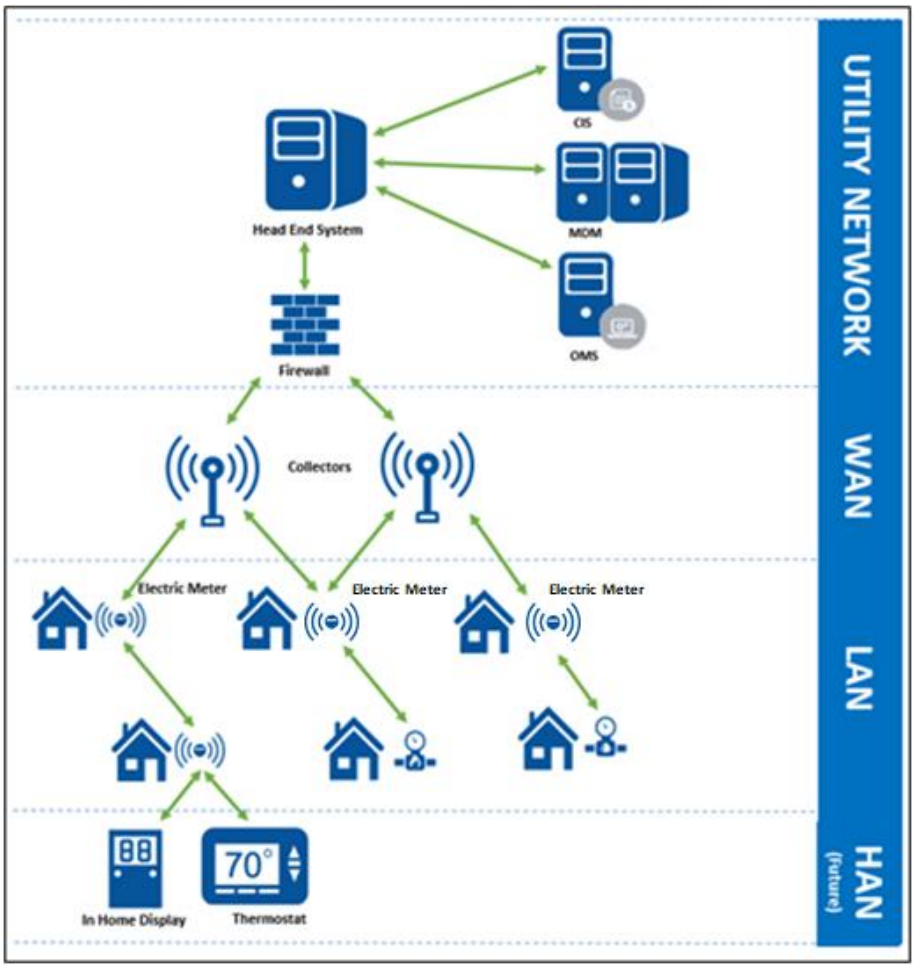

Figure 2: Standard Network Design for an AMI Project

3.1 Phased Approach to AMI Functionality

AMI deployments often work best if deployed in phases. Three typical phases include: Phase I: AMI SAT, Phase II: Full Deployment, and Phase III: Potential Project Initiatives Enabled by AMI (future capabilities that are enabled with AMI).

Phase	Definition
Phase I: AMI SAT	Phase I consists of system acceptance testing of the head-end system based on a deployment of 1,000 meters. The utility will also test meter-to-bill integration and network saturation.
Phase II: Full Deployment	Phase II is the full meter rollout to MECL's total meter population (in MECL's case this would be 79,000+ AMI meters) over a two-year period.
Phase III: Potential Project Initiatives Enabled by AMI	Phase III represents future capabilities that may be achieved outside of the AMI project and/or in the future after full AMI meter deployment. These benefits/capabilities are enabled by AMI functionality but are typically out of scope for the core AMI project.

Table 3: Phase Definitions for MECL

3.2 AMI Program Design: Best Practices

The following are best practices that are critical for a successful AMI program design:

- **Customer engagement**
  - The most successful AMI deployments place a high priority on customer communication and engagement.
- **Customer safety**
  - The utility should follow best practices for safety, including ensuring that smart meters meet current safety standards, and following rigorous installation procedures.
  - The utility should communicate proactively with customers regarding the AMI deployment and safety.
- **Security and privacy**
  - The utility should strive to be a good steward of its customer data, with strong policies in place to protect customer data privacy. The utility should implement additional policies and procedures as needed to ensure the privacy of customer data.
  - All data sent over the network should be encrypted.
  - No identifying customer data (name, address, etc.) should be transmitted over the network.
- **Vendor contracts**
  - The utility should ensure that key clauses are included in the contracts to protect the utility.
- **Asset management**
  - The utility should follow best practices to ensure optimal asset management.

- **Technology standards**
  - The utility should ensure that procured solutions comply with current technology standards to enable interoperability. This means that the solution should be positioned to support open standards as they are ratified, such as Wi-SUN. As well, potentially establishing an IPV6 network as part of the AMI deployment should ensure that the solution can support future technology as it becomes available.
- **Governance and oversight**
  - Because the AMI interfaces with many other key utility systems, the utility should establish clear ownership of systems and define the authoritative source for each set of data.
- **Project management**
  - The utility project managers will be leveraged at each stage of the AMI project: to provide oversight throughout the procurement process, to ensure due diligence in vendor selection and scope definition, to prepare the proof of concept, and to oversee the AMI implementation and mass deployment.
- **Change management**
  - To achieve the full benefits of AMI, the utility should revisit and redesign business processes and policies as well as make updates to integrated systems to support AMI. The utility should build a dedicated change management team to prepare for AMI and begin to identify potential areas of the business that will be affected by any changes. Work should also be done to update business processes.
  - As AMI is introduced, the utility should continue to follow best practices in updating and re-engineering business processes and should consider how business processes cross department boundaries.
  - Training and business readiness activities should be given a high priority.
- **Integration**
  - For many projects, the integration of systems can be the most difficult. An enterprise service bus (ESB) can mitigate risk that is associated with integration work.
- **Testing**
  - The utility should perform rigorous end-to-end testing before deploying AMI to customers and to minimize operational impacts. To mitigate risks, the testing model should include test criteria that is signed off by all parties and tests that must pass before proceeding to the next milestone.
- **Performance measurement**
  - Service level agreement (SLA) / key performance indicators (KPIs) should be defined to measure the performance of the AMI system.

For further details on best practices, see *Appendix C: Best Practices for Success*.

Section 4: Risks and Risk Mitigation Strategy

Risk assessment and mitigation planning is a critical initiative that must be undertaken in detail once a utility begins project planning. However, for the purposes of this report, the information below is provided as a guide to risk identification and mitigation strategies. Should AMI be pursued, a dedicated AMI team should further develop risk management strategies and mitigations that take into account the utility's unique challenges and environment.

	Potential Risk	Mitigation Strategy
Constraints		
Resource availability	Dedicated resources are required to successfully develop the RFPs, complete procurement, and execute the installation and implementation of AMI. Lack of appropriate and qualified resources and/or competing routine or non-routine projects can lead to project delays.	MECL should identify and commit adequate subject matter expertise to be available when required to mitigate the risk of delays. MECL should backfill temporary resources that will be required for the development and deployment stages. This business case includes funds to allocate resources to complete the RFP, SAT, and full deployment requirements of the AMI project.
Meter supply	MECL is dependent on having enough inventory available for the installation service provider.	Including liquidated damages associated with late meter deliveries in the AMI vendor contract will mitigate this potential risk.
Dependencies		
AMI Infrastructure: head-end system	The head-end software must be deployed to manage data collection schedules and any exceptions that result through the data collection process. MECL IT resources will be required to implement the new system on the MECL network and ensure adherence to pre-existing security requirements.	IT should supply a dedicated resource for the deployment of the head-end system, and unless unforeseen circumstances arise, this is not expected to create risk with respect to realizing AMI benefits.
AMI infrastructure: network	The network (i.e., collectors and WAN solution) must be deployed to enable the data collection process.	The MECL network operations department will assist installing collectors, and IT will be involved in WAN connectivity. Unless unforeseen circumstances arise, deployment of the network is not expected to create risk with respect to realizing AMI benefits.

	Potential Risk	Mitigation Strategy
Meter deployment	There is a dependency on 100% saturation of AMI to realize some benefits and not incur increased costs. For example, without saturation, the meter-to-cash process cannot be completely streamlined.	The business case considers the deployment timeline in the calculation of both costs and benefits to ensure accuracy and to not over-promise on benefits.
Business process development	The implementation of AMI will result in modifications to many of the utility's business processes. The requirement to properly re-engineer processes can create a dependency.	Once procurement is complete and the vendors have been identified, MECL can review and finalize business processes. Development will need to include process mapping, change management, and continuous improvement.
Organizational change management: new skillsets	Operation of the AMI system requires new skillsets. The requirement for organizational change management can create a dependency.	Planning for organizational change should begin and be concluded prior to the implementation and testing of the new systems, which will greatly mitigate potential risks associated with delayed organization change management.
Organizational change management: new business processes	With any new technology implementation, there is resistance to change. However, achieving MECL's AMI business case is dependent on re-engineered business processes and employee buy-in to adopt these business processes.	Dedicated AMI project employees should be educated to understand the "why" behind business process changes. Training should be given a high priority. Project sponsors should be expected to set the tone and provide leadership throughout the period of the business process change.
Data quality	As the system of record for many pieces of data is a different system, existing data quality and data cleansing issues will be magnified by AMI. The AMI and other future initiatives require accurate data.	MECL should leverage lessons learned from previous implementations. A dedicated IT resource is budgeted in the business case to lead this effort.
Operational engagement	To fully capitalize on the potential of the new systems, operational engagement is key.	Operations should be engaged to optimize the systems, extract meaningful data through data analytics, and streamline operational workflows. The dedicated AMI project team budgeted for in the business case will help guide and determine these workflows.

	Potential Risk	Mitigation Strategy
Risks		
Competing projects	Key resources will be involved in many different aspects of the AMI project, potentially creating time constraints that can add risk to the project. Often in utility AMI projects, there is also the potential that other initiatives require time from these same resources.	Anticipating this risk, planning to ensure all key resources are made available or seconded to the project, as required. Where possible, redundancy should be created by cross-training multiple resources. MECL will need to bring in backfilled resources during planning, deployment, and stabilization stages.
Department silos	Proper planning and execution of the AMI project will result in a more horizontal approach to data management. However, existing operational silos can present challenges as the need for business process modification is managed.	MECL should deploy cross-functional teams with well-defined roles and responsibilities and clear communication and escalation processes. A cross-functional project plan will consolidate all key milestones, metrics will be shared, and tools will be implemented to foster collaboration.
Service Level Agreements (SLAs)	Vendor SLAs relate to network performance and reliability.	SLAs should be clearly specified through the procurement exercise and will become contractual obligations. Internally the AMI project team will need ensure SLAs are tracked and achieved and contractors are held accountable for meeting theses performance levels.

	Potential Risk	Mitigation Strategy
Mass deployment	There are many potential risks associated with a mass deployment of AMI. Touching every meter creates billing, financial, and customer engagement risks. For example, inaccurate data, errors that impact the customer bill, or disconnecting the wrong meter. Mitigation of safety risks, procedural issues, and work assignment scheduling will all need to be considered.	The business case budgets for an AMI installation service company to reduce this risk. The procurement process for these services should be specific regarding requirements and include potential contract hurdles so that installation service providers will understand all requirements prior to contract negotiations including the use of MECL resources supplemented by new hires from the local area. MECL should manage with precision, and implement a plan where each installation is validated, end-to-end, from installation to billing. Barcoding meters will help to eliminate human errors. All business processes affected by AMI will be reviewed and re-designed as required. Finally, end-to-end testing prior to moving into production with a customer is another key mitigation strategy.
Integration	Integration of utility applications is complicated and there is risk related to accuracy and success of the interfaces as well as troubleshooting and continued maintenance. Integration is also time-consuming. If the integration efforts are not clearly scoped, delays will add risk to the project.	With AMI affecting many systems, integration is a significant risk, the business case has budgeted for and developed several strategies to mitigate this risk: Leverage a third-party System Integrator with extensive knowledge in AMI deployments Perform true end-to-end testing to the extent possible with granular test cases to uncover integration issues. Mass deployment should not begin until the required systems are integrated.
Data management	The volume of data collected with AMI is significant.	MECL's strategy should be to develop the ability to transform raw "data" into "information" to drive business decisions and capitalize on opportunities presented by the additional data. MECL should also define a system of record for each piece of data and define system "owners" (data governance).

	Potential Risk	Mitigation Strategy
Budget	Any multifaceted complex project can have unexpected changes that impact budgets and introduce risk of cost overruns.	The business case is considered conservative in that some contingency has been planned into the budget. To mitigate the risks of budget overruns, the business case is built to follow best practices by releasing RFPs to the market, ensuring robust contracts and negotiations, and conducting SAT as the first phase of the implementation. The key is for the budget of the project to ensure the right people and skillsets (internal, vendors, consultants) are available at the appropriate times.
Cybersecurity	The complexity associated with cybersecurity continues to increase. The industry has responded in kind by performing audits and implementing the required remediation to improve the security inherent within the platform.	A best practices approach to data management will address practices such as third-party audits, encryption, and design which precludes private information leaving the De-Militarized Zone (DMZ) (a local network configuration designed to improve security by segregating computers on each side of a firewall). No customer-identifying information is transmitted by the meters, reducing the risk of private information being exposed.
Customer engagement	AMI ultimately affects every customer, and whether its effect is perceived as positive or negative from customer-to-customer will depend largely on the success of the outreach strategy.	MECL's customer strategy should be designed to educate customers and maximize customer engagement. Customer communications will work towards increasing customer confidence in four main areas: safety, privacy, meter accuracy, and value. MECL will reap lessons learned from other North American utilities to encourage engagement.

	Potential Risk	Mitigation Strategy
Customer resistance	It is expected that some customers will resist the installation of next generation ("Smart") meters (e.g., due to radio frequency or privacy concerns that arise largely from inaccurate information on the Internet).	MECL should plan to engage with customers and address individual concerns; many opt-out requests can be reversed with proper information and customer service. For customers that refuse an installation, MECL should delay their installations until the end of the deployment stage. This allows the customers time to become more familiar with the program and become exposed to educational materials that may address their concerns. MECL should consider a fee structure for customers who wish to opt-out. Other jurisdictions that have implemented similar opt-out programs have managed to keep customer refusals at a minimum—typically 1% or less.
Deployment timelines	To maximize the realization of benefits, a 3-year project (3-year implementation schedule with 1-year SAT and 2-year full deployment) has been planned.	Util-Assist has analyzed the business case using different time horizons to both balance the risk associated with capital and achieve the maximum benefits. Proper project planning and risk management will help ensure the right pace for deployment.

Table 4: Potential Risks and Mitigation Strategies

Section 5: Financial Analysis

Util-Assist performed a financial analysis on a full-scale 22-year AMI deployment with the provided inputs listed in *Appendix B: Financial Analysis Assumptions and Cashflow Per Year.* A proper procurement process, contract negotiations, and system integrations take about two years, so it is not foreseeable for meters to be deployed until about 2022, hence the 2020 to 2042 timeframe.

Parameter	Value
Timeline (2021-2043)	22 years
Base Year (discounting to)	Present day
Meter Deployment (2024)	22,727 meters (30%)
Meter Deployment (2025)	55,362 meters (70%)

Table 5: Parameters of the AMI Analysis

Note: This document accompanies a comprehensive financial model in MS Excel format. For presentment, figures in this document have been rounded to the nearest dollar. For the complete analysis, please see the MS Excel spreadsheet.

5.1 Benefits-to-Cost Ratio

As expected, Maritime Electric's business case is not cost-effective, with benefits of $28.1M and a cost of $31.0M, yielding an after tax NPV of -$3.9M. The NPV does not equal the difference between the costs and benefits as it is the NPV of the after-cash flows to the utility, taking into account capitalization, depreciation, and a tax rate of 31%.

Negative project NPVs are becoming more common as the majority of utilities today are looking to upgrade AMR systems, or even replace first-generation AMI systems. AMI deployments yield the highest financial benefits when replacing manual meter reading, as the avoided costs of meter reading labour and processes tends to be the highest financial benefit. As MECL would be transitioning from AMR, the manually-read meter reading reductions are incremental. It is worth noting that some AMI business cases never achieve a breakeven ROI; however, they are pursued as part of an all-encompassing strategic technology and enhanced customer service initiative. The utility can work with regulators to help position the project as an infrastructure project to allow it to handle electrification and all other quantified and non-quantified benefits outlined in the business case. AMI has many successors that rely on the AMI meter data as well as the field area network that it provides.

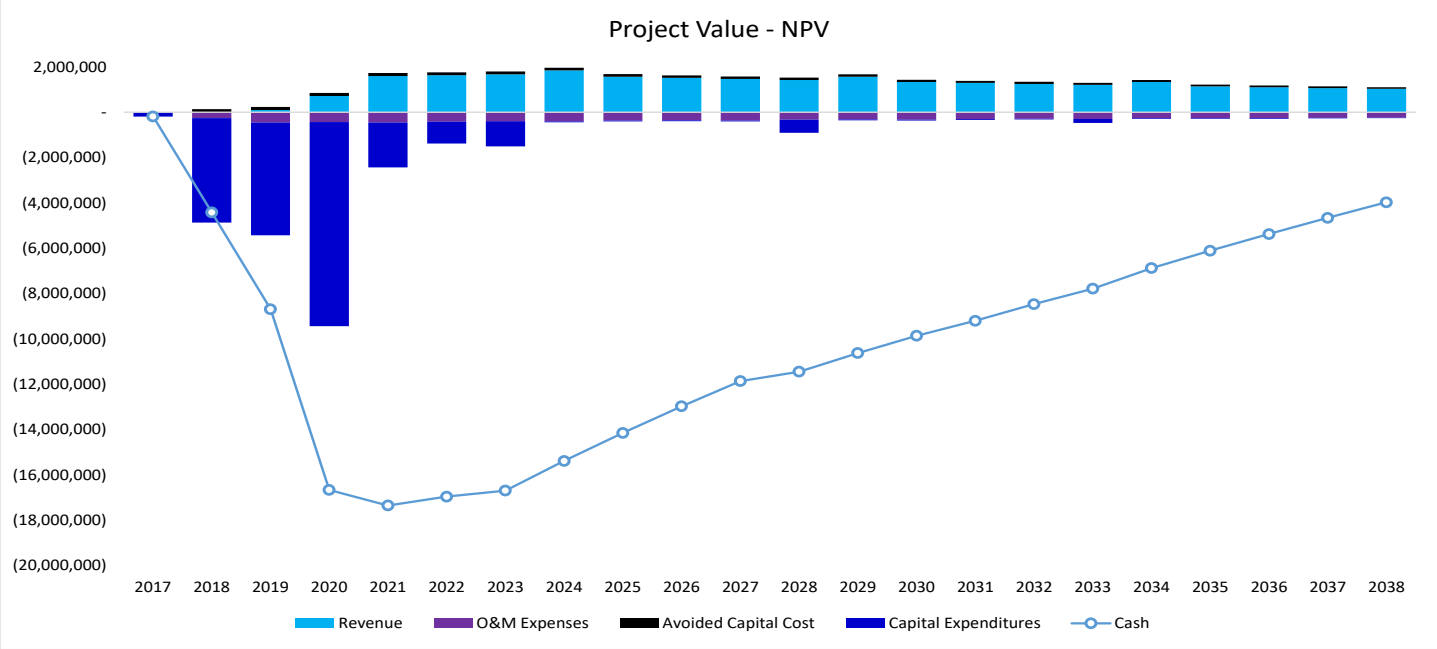

Figure 3: Project Value by Year

AMI Network 20-Year Financial Summary	
Total Benefits	$28.1M
Total Costs	$31.0M
Total NPV	-$3.9M
Payback Period	18.41 years
Internal Rate of Return (IRR)	3.87%

Table 6: AMI Financial Summary

AMI Network Capital Spend – 3-year Deployment		
Project Year	**Present Value**	**Gross Value**
2023	-$ 4,613,029	-$5,296,964
2024	-$ 4,984,578	-$6,067,014
2025	-$ 9,007,478	-$11,621,326

Table 7: AMI Network Capital Spend

5.2 Comparison to Other Business Cases

Util-Assist has made use of existing data from a Navigant Report that compares benefits in MECL's AMI business case with benefits included in six other publicly available AMI business cases. This comparison includes business cases from three Canadian utilities—NB Power (2019), Nova Scotia Power (2018) and BC NB Hydro (2011)—and two US utilities: Con Edison (2015) and National Grid (2018). Twelve quantified benefits were normalized on a per-meter basis for

comparison between utilities. Table 8 shows a summary of key project, financial, and benefit metrics, which are described in the following sections.

Comparison of AMI Business Cases*						
	Maritime Electric	NB Power[2]	Nova Scotia Power[3]	BC Hydro[4]	Con Edison[5] ($ in CAD)	National Grid[6] ($ in CAD)
Year of AMI Application	TBD	2019	2018	2011	2015	2018
Number of Meters	79,000	360,000	495,000	1,930,000	4,700,000	2,330,000
Meter Type	Electric	Electric	Electric	Electric	Electric & Gas	Electric & Gas
Successful Application	TBD	TBD	YES	YES	YES	NO
Financial Metrics						
All-In Cost Per Meter	$392	$304	$269	$404	$353	$282
All-In Savings Per Meter	$356	$372	$385	$844	$590	$358
Discount Rate Used	6%	5.25%	6.96%	8.00%	6.10%	6.45%
Opt-Out Rates	1%	N/A	1-2%	N/A	<1%	1%
Notable Financial Differences						
Net Savings Per Meter [npv divided by meters]	-$50	$86	$116	$440	$237	$50
BCA Ratio	0.91	1.28	1.43	2.09	1.67	1.27
NPV Forecast (years)	20	15	20	20	20	20
Top Five ME Benefit Streams						
Reduced Manual Meter Reading	$131	$111	$117	$115	$147	$21
Avoided Cost of Meter Replacements	$28	$61	$49	$32	$116	$145
Conservation Voltage Reduction	$62	$45	$0	$108	$98	$9
Outage Restoration (Crew Management)	$26	$4	$33	$5	$24	$3
Distribution Network Losses	$48	$42	$20	$379	$110	$29
Notable Differences						
Unbilled / Uncollectable Accounts	$8	$3	$15	$0	$21	$17
Reduced Overtime for Meter Service Orders	$1	$2	$0	$24	$67	$47
Net Metering	$5	$13	$9	$0	$10	$6
Voluntary Time of Use Rates	$0	$0	$55	$57	$25	$78
High Bill Alert	$0	$43	$27	$114	$0	$70
Avoided Cost of Meter Reading Vehicles	$18	$5	$0	$0	$0	$0
Meter Accuracy Losses	$0	$32	$0	$0	$139	$0
Load Research Meters	$0	$14	$0	$3	$0	$0
Remaining Benefit Streams						
Avoided Cost of Handheld System	$16	$4	$0	$0	$0	$0
Reduced Customer Inquiries	$13	$4	$9	-$1	$16	$6

Table 8: Comparison of AMI Business Cases

[2] Independent Review and Assessment of NB Power's AMI Business Case (Navigant, 2019)

[3] Nova Scotia Utility and Review Board. Decision 2018 NSUARB 120 M08349 (June 2018). Link: https://nsuarb.novascotia.ca/sites/default/files/M08349%20Decision.pdf

[4] BC Hydro. 2010. *Smart Metering & Infrastructure Program Business Case*. Link: https://app.bchydro.com/content/dam/BCHydro/customer-portal/documents/projects/smart-metering/smi-program-business-case.pdf

[5] Con Edison. October 2015. *Advanced Metering Infrastructure Business Plan.*

[6] State of New York Public Service Commission. Case 17-E-0238, Case 17-G-0239 (November 2018).

[7] Dollar values for Con Edison and National Grid are adjusted from USD to CDN at a rate of 1.3280.

5.3 Benefits Summary

The AMI program would provide broad benefits across the utility and extend to MECL's customers. The scope of the business case extends beyond just the meter-to-bill process to include benefits like customer-focused programs and services, enhanced data analytics, and improved safety. Benefits are classified as quantifiable and non-quantifiable.

5.3.1 Quantifiable Benefits

The table below shows the quantifiable benefits on an NPV basis in order of greatest to smallest benefit. The greatest benefits that MECL will reap are due a reduced meter reading workload.

Quantifiable Benefit	Description	Benefit	% of total
Meter Reading and Field Services	Reduce meter reading costs through a reduced meter reading workload such as turn off and meter rereads.	$10,363,300	36%
Conservation Voltage Reduction	Reduce energy consumption and demand by dynamically optimizing voltage levels through conservation voltage reduction.	$4,913,364	17%
Distribution Network Losses	The cost savings from a reduction in system losses—including technical and non-technical losses—from programs such as theft detection and improved asset management. This reduction in losses leads to reduced wholesale energy purchases.	$3,754,526	13%
Avoided Meter Replacement Costs	The avoided costs of existing meter replacement, repair costs from failures associated with those meter replacements, and avoided meter seal costs.	$2,203,741	8%
Outage Restoration (Crew Management)	Savings from reduced costs associated with avoiding service crews responding to false outage reporting as AMI provides visibility to meters where power has been restored.	$2,092,672	7%
Avoided Cost of Meter Reading Vehicles	The cost savings for vehicle expenses related to meter reading routes.	$1,429,421	5%
Handheld System	Benefit produced from reduced handheld meter reading system costs, as replacements can be reduced as a result of AMI deployment.	$1,252,614	4%
Customer Care Billing Complaints Related to Estimated or Wrong Reads and Meter Data Validation	Reduced customer calls from estimated or wrong readings and incorrect billing by automated meter data validation processes.	$1,021,295	4%

Quantifiable Benefit	Description	Benefit	% of total
Unbilled/Uncollectable Accounts	Benefit generated from reduced write-offs from electricity delivered but remaining unpaid due to customers defaulting on bill payment.	$614,292	2%
Avoided Cost of Net Metering Program	Benefit assumes that AMI meters will provide net metering functionality and reflects avoided costs of net meters and associated installation, labour, and software licensing.	$431,679	2%
Reduced Overtime for Meter Service Orders	This benefit is associated with the reduced overtime hours needed for reconnects, which will now be done remotely.	$72,947	0%

Table 9: Quantifiable Benefits

For details on each of the above benefits, see *Appendix A: AMI Benefit Details*.

5.3.2 Benefits Distribution Table

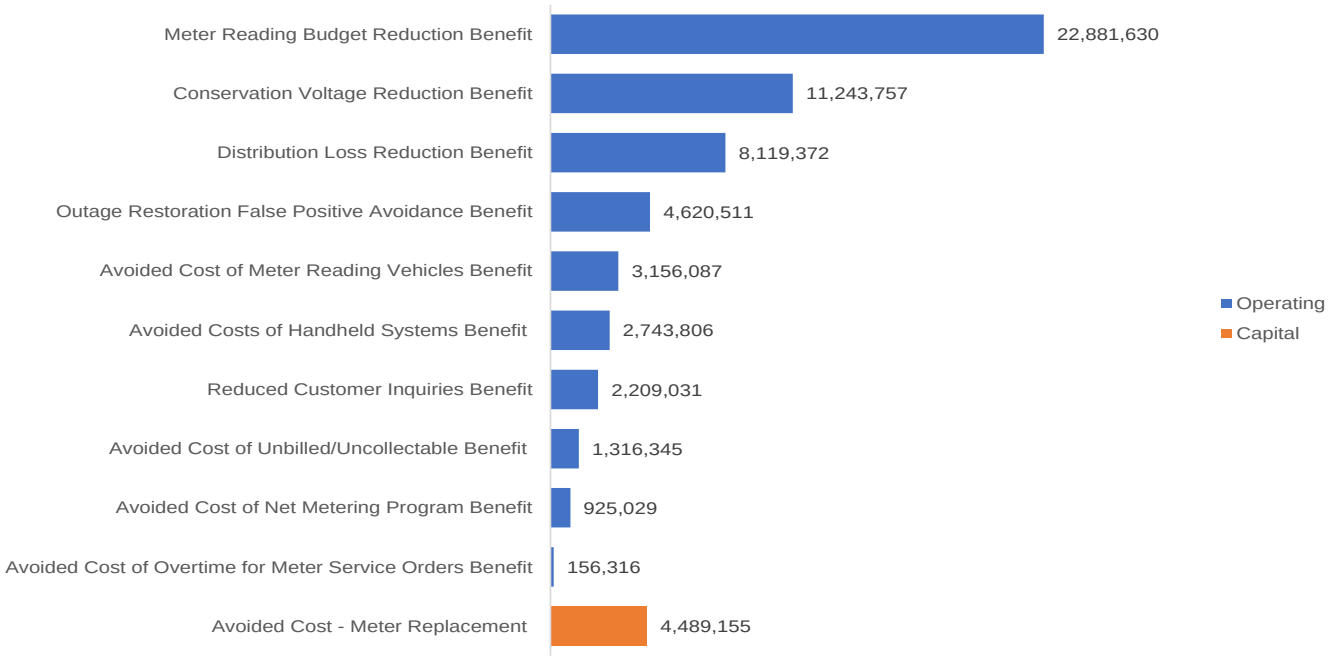

Figure 4: Benefits Distribution

5.3.3 Customer Engagement Benefits

With AMI, MECL would have the data to engage customers with enhanced customer service. These potential customer facing outcomes and benefits are grouped into two phases: Phase II: Full Deployment and Phase III: Potential Project Initiatives Enabled by AMI per *Section 3.1: Phased Approach to AMI Functionality*.

Timing	Customer Benefit / Feature	Customer Engagement Strategy
Phase II (Full Deployment)	**Service Outage/Meter Status –** Instant reply from a meter ping to determine if energized - if so, offer suggestions to resolve (reset breaker, electrician, etc.). Meter status should be available, but it may take time to build business processes and intelligence around new functionality.	Maximize Quality, Minimize Effort
	Remote start, stop, disconnect, and reconnect services and off-cycle read – Leveraging near real-time technology for daily meter reads with starting and stopping services, and remote disconnect and reconnect, will provide customers more timely services related to core customer operations. Note: Functionality may be built but "dormant" until controls are in place, business is ready, and customers are ready. Solution and business readiness will be determined by the number of critical defects and preparation to handle exceptions/production issues of multiple pathways for AMI and non-AMI customers.	Maximize Quality, Minimize Effort
	Analytical Tools for Call Center and Billing team members – By accessing daily interval consumption data details, front and back-office team members will be able to troubleshoot high bills, billing questions, and exceptions.	Maximize Quality, Minimize Effort
	Pick a Due Date – Giving customers the flexibility to choose their due date or payment date increases customer satisfaction. With meter reads no longer dependent on a meter cycle, this customer choice now becomes an option - deliveringmore flexibility for customers and increased on-time payment.	Deliver Options
	Enhanced Outage Communications – Data provided by AMI meters will enable enhanced outage communication such as proactive alerts and timely restoration notifications to customer based on real-time meter status. Note that communication should be based on the customer's communication preferences (e.g., how and when the customer wants to be notified) that they set in the Preference Management Center.	Maximize Quality, Minimize Effort Build Partnerships

Timing	Customer Benefit / Feature	Customer Engagement Strategy
	Consumption/Usage Data is Available via Customer Portal – Access to various features online to help better understand and manage energy usage. Features could include: • Current and Historical Usage – note, likely to be more immediate term than near term. • Projected Monthly Usage and Bill Amount • Load Disaggregation • Neighbor Comparison • Personalized Energy Savings Tips	Maximize Quality, Minimize Effort Deliver Options
	Alerts & Notifications – Leveraging remote start, stop, disconnect, and reconnect automation, as well as Customer Preference Center deployed pre-AMI, will increase near real-time customer alerts and notifications related to this new functionality. **Usage Alert –** Customers can elect to be alerted via email or text about their real-time energy usage (e.g., high bill, exceed prepay,) and can then make changes to save electricity and lower their bill.	Deliver Options Build Partnerships
Phase III (Potential Project Initiatives Enabled by AMI)	**Rate Plans –** Provide customers with a choice in rate plans to help save them money, such as a new time-of-use plan or dynamic rates plan. This can help EV owners better manage their charging time and use.	Deliver Options
	Online Rate Comparison – Estimates cost of plans based on actual usage. Could be used to compare plans (basic vs. time of use) or compare companies.	Deliver Options
	New Demand Side Management Programs – Offer new DSM incentives to reduce customers' energy consumption during specific events, such as peak demand hours. Reduces the strain on power generation plants, while also generating savings on customers' bills. 1) In Home Displays / Programmable Thermostats - tied in with rate plan so may be coupled. 2) Home Area Networks (HAN) - HAN is an extension of Smart Meter deployment, dedicated to Demand Side Management (DSM) and energy efficiency improvement. Appliances can be connected so that energy usage is monitored and optimized.	Maximize Quality, Minimize Effort Deliver Options Build Partnerships
	New Timeof-Use (TOU) program could be offered (without additional equipment for demand response). Offer incentives to reduce their energy consumption during specific events, such as peak demand hours.	Deliver Options Build Partnerships

Timing	Customer Benefit / Feature	Customer Engagement Strategy
	Prepay – Develop a new customer program that allows customers to prepay their energy usage. Help customers that are on a budget manage electricity expenses, eliminates reconnection fees, deposits, and credit checks. This can also be considered an energy efficiency program as consumption typically declines 3 – 6%.	Delivery Options

Table 10: Customer Benefit Features

5.3.4 Non-Quantifiable Operational Benefits

AMI will also deliver non-quantifiable operational benefits. Although these benefits are sometimes thought of as "utility benefits," they ultimately benefit consumers as well in terms of improved efficiency, reliability, and safety. See *Appendix A: AMI Benefit Details* for more information. Utility non-quantifiable benefits include:

- Improve safety and reliability
  - Eliminates the need for monthly meter reading services. This includes scheduling and entering the customer's property and home/ business.
  - Improve safety record for meter reading field personnel by drastically reducing the potential of slips, trips, and falls as well as preventable vehicle accidents.
  - Provides enhanced data analytics by combining time-stamped data from previously disparate sources.
  - Proactively identifies potential meter safety concerns (e.g., hot sockets and tampers).
- Improve business efficiencies
  - Eliminates the logistical workload to read meters (i.e., no longer need to drive trucks out for meter reads).
  - Improves the ability of customer service representatives to answer customer questions, such as verify customer power and provide remote customer features, such as turn on/off.
  - Provides visual representation of system performance at the meter level.
- Provide enhanced customer engagement
  - Reduces time to respond to all outages including those at the customer level.
  - Provides the platform for enhanced customer billing options.
  - Provides granular meter data for use in a customer-facing web portal.
  - Enables future communication with customer home area network devices through a FAN.
  - Underscores MECL's commitment to reducing its impact on the environment and reducing its carbon footprint.

Section 6: Opportunities for Future Benefits

Although not quantified in this business case, AMI sets the foundation for many other benefits.

6.1 Leverage Communications Infrastructure

While the AMI network infrastructure will not necessarily meet the requirements for operational technology (OT) where there may be a requirement for low latency for real-time communications, the AMI system does provide an opportunity to act as a communication medium for other utility initiatives. For example, in a demand response program the AMI network can provide the infrastructure to communicate with in-home display devices and in-home control devices such as thermostats, water heater controls, and pool pumps. The AMI, therefore, provides opportunity to save future costs by making use of the infrastructure that is installed for this project to save costs in future projects.

6.2 Reduce Lost Consumption during the Account Change Process

MECL plans to install remote disconnect meters to reduce repeated truck rolls for disconnects due to non-payment or account change as allowed by regulations. The current business case document has quantified the anticipated cost savings for truck rolls, but it does not capture the lost consumption or improved efficiencies resulting from the automation. During any account change process that requires a manual process to disconnect meters where there is no registered account holder, there is some latency between the account change and the disconnection. This latency can be days depending on the timing and the process, and there is always risk that there is consumption during this transition period that cannot be billed due to the absence of an account holder. With AMI and remote disconnect meters, the process is streamlined, and lost consumption is significantly reduced, or even eliminated, by alarming the utility based on predetermined consumption thresholds.

6.3 Reduce Write-Offs through Improved Disconnect Process

Generally, utilities schedule their “disconnect for non-payment” process based on the quantity of disconnects and subsequent reconnects that can be managed manually each day. This can result in a backlog of required disconnects, allowing customers' debt to escalate. Automation can address this problem by enabling the utility to disconnect based solely on the amount owing rather than having to also consider the volume of work that can be managed by field staff. This results in smaller bills for customers seeking reconnection which makes it easier for the customer to stay out of arrears or get out of arrears. The write-offs that many utilities experience each year result from customers not able to make arrears payments; by reducing the debt incurred, write-offs are similarly reduced (included as a quantifiable benefit).

6.4 Enhance Data Analytics

Data analytics is a rapidly expanding field that continues to evolve as utilities find creative ways to find value in the increased volume of data that is made available through AMI. While AMI does drive improved data management and data governance as a result of the increased volume of data, utilities that effectively manage "big data" can find value in it by combining data from previously disparate sources. For example, transformer loading reports that are used to improve asset management can be combined with the age of the assets to drive marketing for conservation programs. By targeting customers in areas where assets are approaching end of life with conservation programs, it becomes possible to realize incremental kWh reductions which can prolong asset life and delay capital projects.

6.5 Enable Service Order Integration

It will become increasingly important to manage the performance of meters not just for the billing process, but also for the other benefits that require granular AMI data. A new exception management process will monitor meters that have ceased communication and result in service orders for investigation. But in some cases—for example re-verification processes—meters are changed that are functioning properly. When the meter is removed, the same exception report will be actioned, and unless processes are in place to prevent it, a service order for investigation will be assigned to troubleshoot a meter that was removed for good reason. MECL can benefit from the integration of systems and proper data management to prevent this; however, this benefit has not been quantified in the current business case document.

6.6 Enhance Load Profile Models

The granular data provided by the AMI will provide significant insight into the load profile of the customer base—both at the aggregate level and for individual consumers where required. More granular data provides value by contributing to load research programs that can lead to new rate structures and also enable the development of weather-normalized predictive load management models to contribute to multiple benefits across the organization, including capacity planning, improved forecasting and settlement, load management, demographic studies, and demand analysis.

6.7 Better Manage Assets through Transformer Loading

By loading the connectivity model into the MDM system, the system will aggregate granular AMI data to provide improved insight into transformer loading which can prolong the life of these expensive assets. The MDM reports can be used "out-of-the-box," or the MDM can be integrated to a third-party asset management system. This benefit is significant for many utilities but has not been captured within this business case. Despite not quantifying the benefit, MECL can make use of this functionality to contribute to an improved asset management process.

6.8 Improve Safety

Several safety benefits result from a mass deployment of AMI. During mass deployment, installation vendors are required to perform a site inspection both before the meter is removed from the socket, and after removal when the interior of the socket can be inspected. The meter replacement exercise and site inspection allow utilities to visually identify corrosion that may lead to electrical problems or wiring issues that exist which may potentially lead to safety issues. Most utilities find meter bases of certain vintages that present issues, and the mass deployment presents an opportunity to locate and repair these potential safety concerns. Legacy meters did not have alarms to notify the utility when work was done within the meter base, so to some degree, utilities do not have great insight into possible modifications being done that are not managed by the utility themselves.

Once the AMI meter is in place, additional safety features become available. Essentially all AMI systems generate alarms when meters are removed from the meter base, so any future work will be accompanied by an alarm providing visibility into repairs or other modifications. Some technologies will also provide warnings based on rising temperatures in the meter base so that the utility can visit the site prior to temperatures escalating to the point of failure or fire. Often these warnings point to problematic wiring, allowing repair and an improved safety condition.

There can also be safety implications to the improved data management and analytics that are made possible through management of the interval data within the MDM system. It is common for utilities to implement reporting based on demand; for example, an alarm can be generated when 40 kW are consumed within an hour, which represents 80% of the

maximum energy that can pass through a 200amp/240V service. Warnings like this allow the utility to proactively discuss service conditions with the consumer.

In addition to the technology benefits of AMI as they relate to safety (e.g., hot socket detection, tamper alarms), the elimination of drive-by meter reading can significantly improve the safety record for the utility by drastically reducing the number of slips and falls or injuries resulting from animals (e.g., dog bites) that occur each year through the manual meter reading process. Slips and falls generally make up the majority of lost time incidents, and this is essentially resolved through the automation of the data collection process. In addition, the frequency of working in confined spaces is reduced by installing AMI in hard-to-access areas, where the safety requirements may require the involvement of multiple field services staff in the data collection process.

6.9 Improve Customer Service

AMI provides many customer service benefits, some quantified, while others are not. In some cases, the difference is subtle; for example, there are customer service benefits associated with the improved data quality and integrity that automated meter reading provides. In the case of MECL, the quantified benefit is the reduction in work effort required to manage data exceptions and to manage phone calls and inquiries into billing errors. To be specific, quantifying the reduction in staffing is capturing the utility benefit that comes with reduced costs; it does not capture the benefit associated with improved customer satisfaction that comes from not having to make the inquiry at all. Without surveying customers prior to AMI and after AMI to measure the improved customer service, it is hard to quantify the incremental benefit of improved service levels. In today's environment, where more advanced technology is becoming the accepted practice, lacking technology tools can become a source of discontent and frustration for those customers looking to self-serve. There is a subtle difference between labor savings that result from improved data management and the perception of improved customer service that results from accurate data and tools that allow customers to better understand their consumption profile which can lead to more educated—and satisfied—consumers.

These same tools—more data, and data analytics tools—can help the consumer in other ways as well. Many utilities that implement AMI begin to offer their customers more flexibility, such as choosing their bill period or billing date which can help customers on fixed incomes to manage their funds. By having data available each day, the utility is no longer restricted to a billing process that is largely dependent on the manual meter reading process. Bills can (conceivably) be generated any day that is preferred by the customer. In fact, some utilities that offer AMI as an opt-in program, use this flexibility as a benefit to entice customers to elect the AMI process.

6.10 Introduce New Rate Structures

The AMI network enables time-of-use (TOU) metering to shift electric consumption to other parts of the day. For billing purposes, interval data or usage is grouped into rating periods, in accordance with the rate structure, to enable the recording of consumption at certain times of the day, week, or year. During periods of the day when more customers are consuming more, customers are charged more than lower consumption periods of the day. . Normally TOU is divided into three segments: off-peak (little demand), mid-peak (moderate demand), on-peak (high demand).

With granular data available for downstream tools such as Web presentment systems, customers can proactively analyze the impact of new rate structures which will benefit MECL (and its customers) by improving the customer's understanding of any new programs being offered which will result in reduced call centre traffic (that would otherwise be required to explain the new program). Utilities have even gone so far as to provide customers with hard copy statements that compare new rate structures to existing plans to demonstrate that the new structure has minimal impact when considering their current behavior while providing opportunities for savings through minor behavioral changes.

6.11 Increase Participation in E-Services

While AMI does enable many programs and initiatives, it is not a requirement for e-services. Utilities invest in e-services to provide options for customers, for example by making invoices available electronically, customers can more efficiently receive bills and make payments. The savings are easily captured through a reduction in postage and paper required to distribute physical, printed invoices. The benefit is mentioned because AMI and the granular data that is made available through the utility's website can increase traffic, which can have an ancillary benefit of increasing the uptake of e-services. If the sign-up rate for e-services goes up even 3 - 5%, the savings can be significant, and for this reason, some utilities go so far as to include this benefit in their justification for AMI.

6.12 Provide Consumption Insight via In-Home Displays

Many utilities that implement AMI begin to offer ancillary products such as in-home display (IHD) devices as another form of technology to give consumers insight into their consumption behavior. Some customers find IHD devices to be very helpful in understanding how different appliances contribute to their energy bill, and IHDs can help customers manage their costs. Some IHDs, including smart thermostats, can interact with the AMI meters to deliver current rate tiers and current consumption. Some utilities deploy these devices as part of a demand response program, but the devices do not need to be part of a demand response initiative; they can more simply provide another educational tool for the customer's benefit.

6.13 Enhance Environmental Stewardship

Experience shows that it is difficult to truly quantify all the benefits that are associated with the implementation of smart metering. Many benefits related to smart metering are rooted in customer service and environmental stewardship, values upon which MECL is already focused. Moving to smart metering will underscore MECL's commitment to reducing its impact on the environment and reducing its carbon footprint.

6.14 Potential for Utilization of Existing RF Meter Assets

MECL has fully deployed Itron's RF ERT technology across the province and is currently remotely reading those meters via Itron's Mobile Collector Lite (MC Lite). This process involves meter reading routes being downloaded to the MC Lite and a vehicle driving the routes with the device to collect monthly meter reads. In November of 2012, Itron recognized the need to provide customers like MECL a pathway to AMI. As such, they struck an agreement with Tantalus to create a joint solution to utilize the Tantalus AMI network infrastructure to read the Itron Radio Frequency (RF) Encoder Receiver Transmitter (ERT) technology, like what is deployed throughout the MECL service territory. This solution involves the deployment of Tantalus' communication infrastructure throughout the service territory coupled with strategically placed AMI meters (typically 15%-20% of the meter population) that have the Tantalus Network Interface Card (NIC) installed in the meter. These AMI meters have the capability to read the existing RF ERT fleet, negating the need to send a MC Lite-equipped vehicle out to read meters. See Figure 5 below for an illustration of this solution.

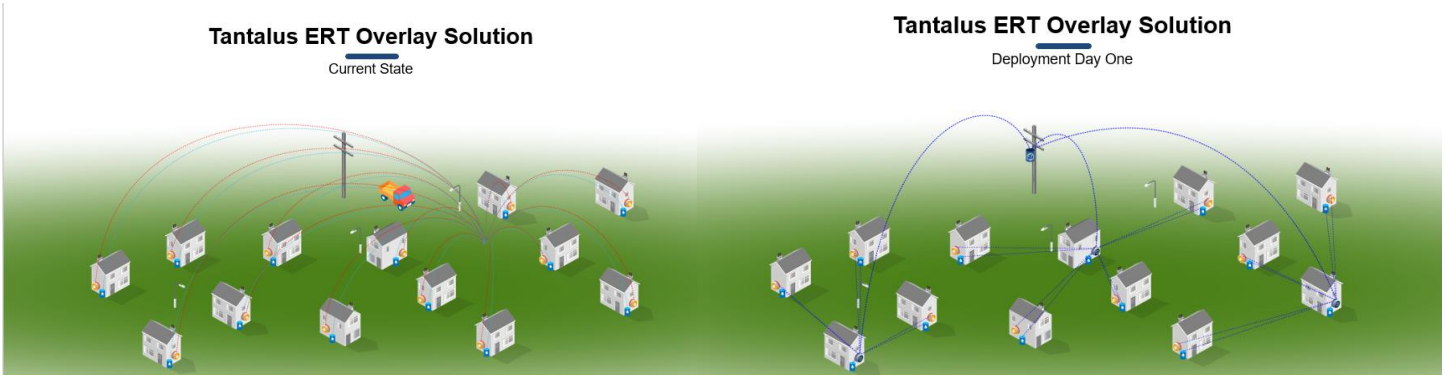

Figure 5: Tantalus ERT Overlay Solution

This solution is available to MECL because of the fully deployed RF ERT population in their service territory. The intent of this system design is to enable utilities to capture some of the benefits of AMI (e.g., removal of field meter reading, limited remote disconnect/reconnect, limited voltage capture) with a relatively low up-front investment and the opportunity to defer the bulk of the AMI investment (which would include replacing all meters with Tantalus NIC-equipped smart meters) to a point in the future where the business case makes sense.

Understanding that a key driver for MECL is the ability for the solution to support Time-of-Use (TOU) rate structures, and that the Tantalus/Itron strategically placed smart meter deployment strategy would not support TOU, it is recommended that the utility not pursue that option. However, a fully-deployed Tantalus solution could be considered. Util-Assist recommends a full investigation of this option through a proper procurement process where Tantalus can provide a complete solution so that information can be fed into the MECL procurement evaluation methodology as an available option along with the other submitting vendors.

Section 7: Costs

The following tables demonstrates the costs to implement, maintain, and operate an AMI system. In today's dollars, $18.8M or roughly 78% of the capital costs are spent in the first 4 years. Forty-two percent of the total operation and maintenance (O&M) costs are related to the labour required to manage the head end system. It is important that all manual tasks currently performed that will be captured under the AMI project are accounted for in the benefits to avoid double counting of resources.

7.1 Capital Investments

7.1.1 AMI Capital Investments

Item	Definition	Cost	% of Total Capital
Meter and Module Costs	Capital costs associated with the metering endpoints: the meter and the communication module that enables communication with the collection infrastructure and head-end system. Costs are concentrated for the years when mass deployment occurs; however, inventory is maintained over the life of the project for ongoing replacements of failed metering assets.	$ 10,185,702	42%
Installation Costs	Capital costs associated with the outsourced service provider to manage the initial mass deployment. After the initial deployment, costs associated with maintenance (i.e., field services) are tracked separately.	$2,443,374	10%
Network Infrastructure Costs	Capital costs associated with the infrastructure required to communicate with endpoints (e.g., collectors, repeaters).	$1,062,194	5%
Head-End System Infrastructure Costs	Capital costs associated with the server infrastructure required to manage the head-end system software, which is used to manage communications with the endpoints.	$1,500,038	6%
Additional Professional Services	Capital costs paid to the vendor during the deployment process for integration items, such as professional services and API integration. Costs required to implement CVR infrastructure to achieve the forecasted savings.	$5,145,762	22%

Item	Definition	Cost	% of Total Capital
Utility Staff Charged to the Project	Utility project team tasked with mass deployment and implementation.	$996,352	4%
Total		**$21,333,422**	**89%**

Table 11: AMI Capital Investments

7.2 ESB/Customer Marketing and Education Investments

Item	Definition	Cost	% of Total Capital
System Upgrade Costs	Capital costs associated with enabling integration capabilities, as well as the upfront work to build the interfaces required to facilitate the benefits.	$1,986,913	8%
Customer Education/Marketing	Costs associated with educating consumers on the initiative.	$201,250	1%
Total		**$2,188,163**	**9%**

Table 12: Customer Marketing and Education Investments

7.3 External Professional Resources

Item	Definition	Cost	% of Total Capital
Consulting	Capital costs associated with consultants to assist with the organization and management of the deployment, such as procurement, contract negotiation, and change management.	$356,221	1%
Legal	Capital costs associated with external legal to assist with the organization and management of the deployment, such as procurement, contract negotiation, and change management.	$188,350	1%
Total		**$544,571**	**2%**

Table 13: External Professional Resources

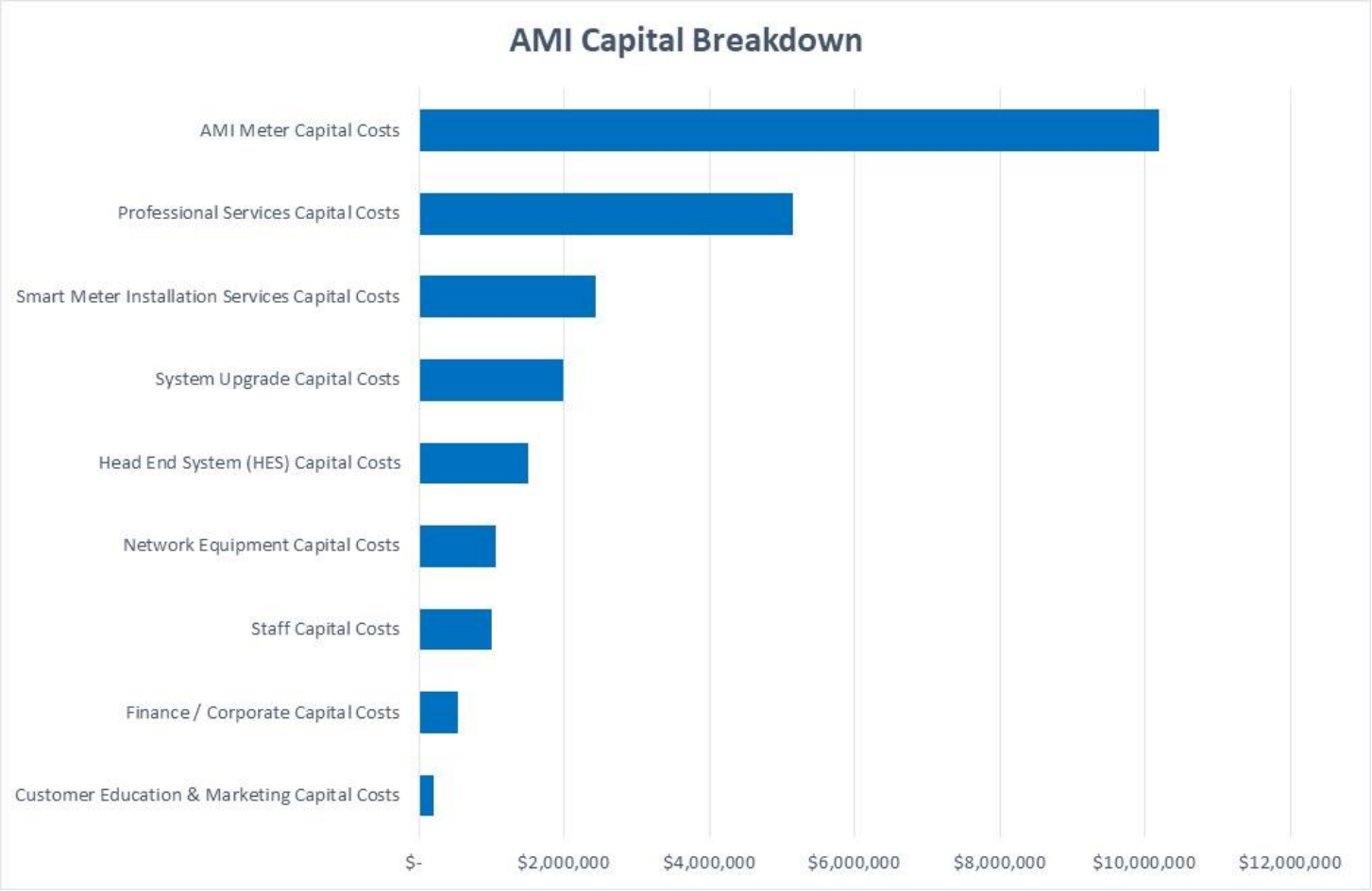

Figure 6: Capital Cost NPV Breakdown

7.4 Operation and Maintenance (O&M) Costs

Item	Definition	Cost	% Of total O&M Costs
AMI O&M	O&M costs represent the combination of ongoing licensing fees for the software and required training to manage and maintain the system.	**Maintenance:** $3,914,364	56%
Labour to Run System:	All Labour required to run the AMI HES and system interfaces	**Maintenance:** $2,934,767	42%

External Professional Resources O&M	O&M costs associated with AMI security audits.	**AMI Security Audits:** $114,077	2%
Total		**$6,963,207**	**100%**

Table 14: Operation and Maintenance (O&M) Costs

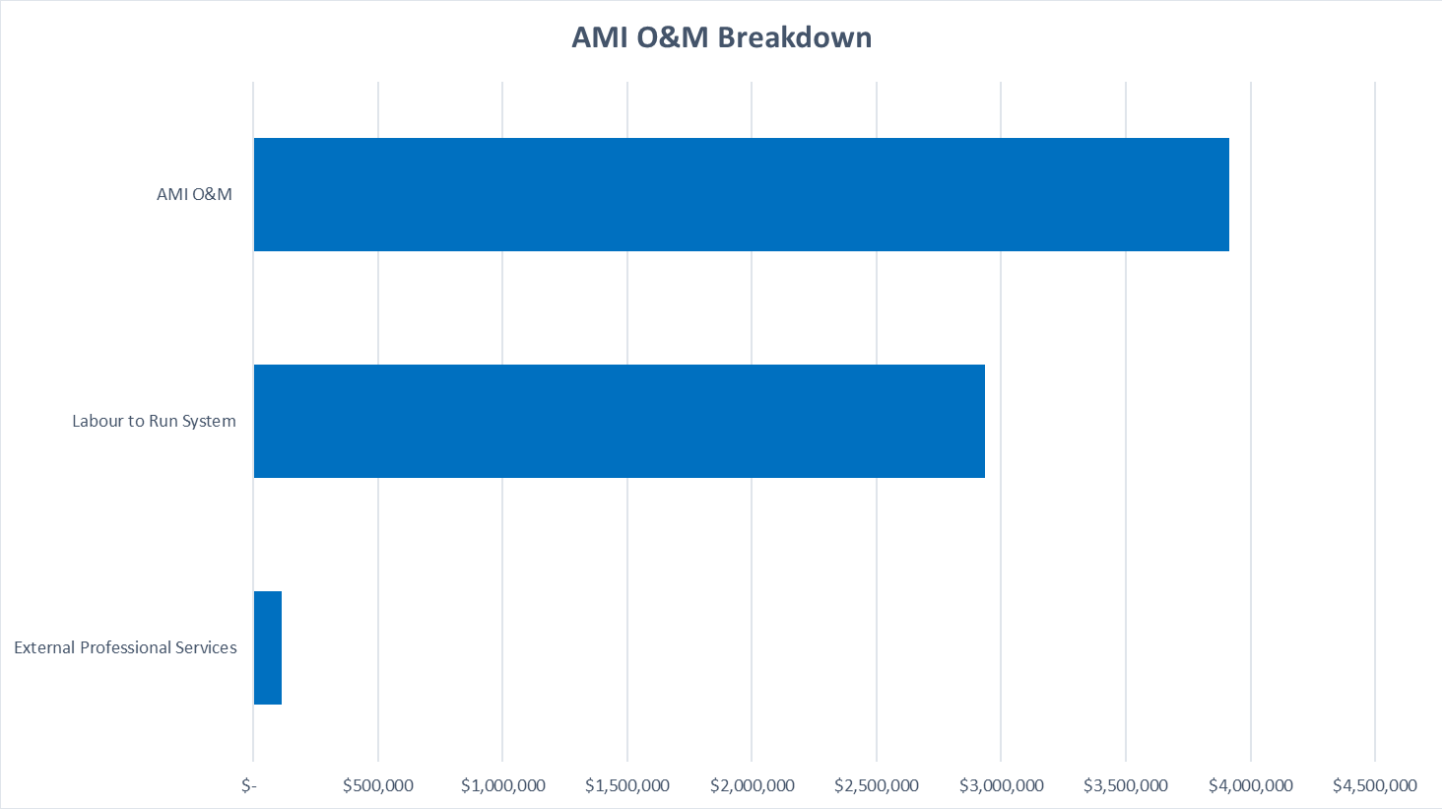

Figure 7: O&M Costs

Appendix A: AMI Benefit Details

This Appendix defines each benefit, explains the calculation, and provides the total benefit amount by commodity. For more details on the calculation of each benefit and its value per year, see the *E_Benefits Calculation* tab of the AMI Business Case spreadsheet.

Note: For any benefit that shows an increase in consumption or reduction in consumption, only the marginal costs of power (commodity cost) are captured as the benefit. The logic is that fixed costs for recovery of MECL assets and operating costs will be adjusted in future rate filings on the non-commodity portion on the bill, with the commodity portion being the true savings to the customer/utility.

Meter Reading and Field Services

Benefit Component Description			
Description	This benefit is achieved by eliminating the need to manually read meters and perform associated tasks that will be automated with an AMI system. Not all meter-related field work is reduced and therefore is not accounted for in this benefit. Loaded labor rates are used are part of this benefit's calculations.	Present Value Benefit	$10.4M (36% of total benefits)
Benefit Elements	The benefit is calculated by determining how much MECL can save each year by reducing internal meter reading activities. The yearly reduction is calculated by determining the fully burdened wage and multiplying it by the number of hours reduced.		
Timing	Benefit accrual lags meter deployment by one year, assuming a delay in integration and connection of AMI meter with the AMI head-end system and provides time for department process changes and staffing reallocations. The annual available benefit will increase by a Consumer Price Index (CPI) adder each year.		

Table 15: Meter Reading and Field Services Benefit Component Description

Conservation Voltage Reduction

Benefit Component Description			
Description	Conservation Voltage Reduction (CVR) is a proven technology that reduces energy consumption and demand by dynamically optimizing voltage levels using sophisticated smart grid technologies. Recent CVR pilot projects have delivered excellent results, yielding 1% to 3% reductions in Energy (kWh) and Peak Demand (kW). By optimizing existing distribution automation (DA) equipment, smart grid technologies, and communications with AMI meters and switchable devices, capital purchases can be avoided or delayed.	Present Value Benefit	$4.9M (17% of total benefits)
Benefit Elements	The key elements of a CVR system include primary components (automation equipment installed at the substation), secondary components (field equipment such as AMI meters installed beyond the substation and at the edge of the grid), telecommunications nodes (such as modems, radios, routers, and repeaters), and CVR software. Several other enabling or enhancing components help form the overall CVR cost and benefit structure, including smart meters, backbone communications, grid analytics, and load scheduling analysis. MECL has estimated that implementing a CVR program will result in a reduction in kWh of 1.25%. The contribution of the AMI is through the added sensors, particularly for end-of-line metering which can contribute to improved information upon which to operate substation feeder voltage regulators. Because AMI is only one part of the program, MECL claims only 20% of the 1.25% as AMI business case benefits. This estimate is considered to be conservative based on various research findings: • Pacific Northwest National Laboratory prepared a report for the US Department of Energy "Evaluation of Conservation Voltage Reduction (CVR) on a National Level" that finds "CVR provides peak load reduction and annual energy reduction of approximately 0.5%-3% depending on the specific feeder." • Central Lincoln found an annual energy savings of 1.92%. • Glendale Water and Power projected an annual savings of between 2% and 4% and eventually realized a 2.95% savings.		
Timing	Benefit accrual lags CVR deployment by one year, it is assumed that CVR will be a 3-year deployment (50% - 2025, 25% - 2026, 25% - 2027). This benefit is calculated per year by multiplying the year's load forecast by the forecasted energy reduction that AMI will grant as part of CVR (0.25%), and then multiplying this kWh figure by the year's forecasted marginal cost of power. The annual available benefit will increase by a CPI adder each year		

Table 16: Conservation Voltage Reduction Benefit Component Description

Reduced Distribution Network Losses

Benefit Component Description			
Description	This benefit represents opportunities and programs to use the AMI data to reduce overall distribution system losses, including: • Theft detection from meters (removal and reverse energy flow) • Voltage data and alarms combined with connectivity information identifying potential taps or using transformer metering programs to identify high losses • Better asset management (e.g., transformer monitoring to identify over and under sized assets) Other AMI projects have reduced distribution losses (outside of improved meter accuracy) by 0.25% to 0.5%.	Present Value Benefit	$3.8M (13% of total benefits)
Benefit Elements	• MECL will be able to reduce distribution losses (outside of improved accuracy) by 0.25% • Average marginal cost of power per year is supplied by the Utility Long Term Plan Table • Load forecast for residential, industrial, and general services is supplied by Load Forecast		
Timing	This benefit assumes a distribution loss reduction of 0.25% and uses the marginal cost of power in the utility long term plan table and follows the AMI deployment schedule. The annual available benefit will increase by a CPI adder each year		

Table 17: Reduced Distribution Network Losses Benefit Component Description

Avoided Meter Replacement Costs

Benefit Component Description			
Description	Even without the AMI project, MECL must maintain its metering assets in the field. These assets traditionally have a 20-year life span and require replacement based on failures and recommended replacement processes. The business case captures net impacts that the AMI project has on MECL so that the "avoided meter replacement" is captured as a benefit, since it is in the current budgeting and work performed by MECL.	Present Value Benefit	$2.2M (8% of total benefits)
Benefit Elements	The business case assumes a balanced replacement window of 1% of the population being replaced. This takes into account the cost for the new meters required plus the labor costs to perform the field meter change work.		
Timing	This benefit follows the meter deployment schedule. The calculation takes into account the new meters required plus the labor to perform the field meter change work. The annual available benefit will increase by a CPI adder each year		

Table 18: Avoided Meter Replacement Costs Benefit Component Description

Avoided Cost of Meter Reading Vehicles

Benefit Component Description			
Description	The benefit is based on the reduced meter reading vehicles expenses for meter reader and supervisor vehicles. Avoided vehicle purchasing costs are calculated using historic and projected fleet data and a reduction in vehicles required for meter reading as AMI is deployed.	Present Value Benefit	$1.4M (5% of total benefits)
Benefit Elements	This benefit takes into account the net costs per vehicle and overall forecasted reduction.		
Timing	The benefit is calculated by multiplying the net avoided cost per vehicle by the number of vehicles reduced by the percentage of AMI meters installed. The annual available benefit will increase by a CPI adder each year.		

Table 19: Avoided Meter Reading Vehicles Benefit Component Description

Avoided Cost of Handheld System

Benefit Component Description			
Description	This benefit consists of a reduction in existing handheld meter reading system costs. Once AMI is in place, drive by reading equipment and replacement costs will be reduced at the utility. Note that some equipment will be retained to accommodate customers who are not supported by AMI.	Present Value Benefit	$1.3M (4% of total benefits)
Benefit Elements and Timing	The benefit is calculated by multiplying the handheld system costs per year by the percentage of AMI meters installed. The annual available benefit will increase by a CPI adder each year.		

Table 20: Avoided Cost of Handheld System Benefit Component Description

Customer Care Billing Complaints

Benefit Component Description			
Description	Today, customer service representatives handle customer calls concerned about estimated bills, wrong readings producing incorrect high bills, and customers not having access to data. With the deployment of AMI, estimated readings will be drastically reduced, helping to minimize estimated and incorrect billing. Ultimately the goal is to help customers trust their bill and reduce specific call types to the MECL agents. On a daily basis, the meter data validation team addresses manual meter reading exceptions in order to prepare the data for the customer's end bill. When AMI is fully implemented, this process will be replaced by the automated meter-to-cash processes.	Present Value Benefit	$1.0M (4% of total benefits)
Benefit Elements	This benefit takes into account the fully burdened cost of one CSR agent.		
Timing	This benefit is calculated by multiplying the hours of work effort reduced for handling complaints by cost of the labour. The annual available benefit will increase by a CPI adder each year.		

Table 21: Customer Care Billing Complaints Benefit Component Description

Avoided Cost of Net Metering Program

Benefit Component Description			
Description	Benefit assumes that AMI meters will provide net metering functionality and reflects avoided costs of net meters and associated installation, labour, and software licensing.	Present Value Benefit	$0.4M (2% of total benefits)
Benefit Elements	Benefit consists of four sub-components: • Avoided meter cost: The cost of the net meter and meter installation are estimated based on the type of net meter avoided by installing AMI meters • Avoided meter installation cost: Calculated based on an annual forecast of new solar net metering customers • Avoided net metering labour: Net metering back office labour • Licensing cost for software: Avoided costs in software licensing fees scale with growth in net metering customers.		
Timing	A 1-year lag is applied to the accrual of benefits relative to meter deployment. The annual available benefit will increase by a CPI adder each year.		

Table 22: Avoided Cost of Net Metering Program Benefit Component Description

Unbilled/Uncollectable Accounts

Benefit Component Description			
Description	Benefit generated from reduced write-offs from electricity delivered but remaining unpaid due to customers defaulting on bill payment.	Present Value Benefit	$0.6M (2% of total benefits)
Benefit Elements	Benefit assumes that 20% of annual write off can be avoided.		
Timing	A 1-year lag is applied to the accrual of benefits relative to meter deployment. The annual available benefit will increase by a CPI adder each year.		

Table 23: Unbilled/Uncollectable Accounts Benefit Component Description

Outage Restoration (Crew Management)

Benefit Component Description			
Description	This benefit captures the value of service order reduction by reducing the number of truck rolls related to customer-side problems on "no light" calls and load (kVA) problems. AMI meters provide a message when power has been restored to a property and enhanced visibility. The meter also supports two-way communication that provides control room operators and GIS with visibility on the power status of homes in a geographic area. This enhanced visibility enables more effective field crew management. AMI meters offer two-way communication with operators and outage management systems (OMS), which facilitates more effective outage crew management. This benefit reflects the associated reduction in service orders.	Present Value Benefit	$2.1M (7% of total benefits)
Benefit Elements	The benefit assumed a reduction roughly 20 work orders per month.		
Timing	This benefit tracks the AMI meter deployment. The annual available benefit will increase by a CPI adder each year.		

Table 24: Outage Restoration Benefit Component Description

Reduced Overtime for Meter Service Orders

Benefit Component Description			
Description	This benefit is associated with the reduced overtime hours needed for reconnects, which will now be done remotely.	Present Value Benefit	$0.07M (<1% of total benefits)
Benefit Elements	This benefit assumes that 95% of the after hour reconnect costs will be done remotely and overtime labour costs will be avoided.		
Timing	This benefit tracks the AMI meter deployment. The annual available benefit will increase by a CPI adder each year.		

Table 25: Reduced Overtime for Meter Service Orders Benefit Component Description

Appendix B: Financial Analysis Assumptions and Cashflow Per Year

Financial Analysis Assumptions

The financial analysis assumes a meter volume of 79,088 meters and uses the following inputs:

Input Categories	Value
Business Case Evaluation (Years)	20
Base Year (Year)	2021
Mass Deployment Start Date (Year)	2023
Amortization Period AMI (Years)	20
Amortization Period Hardware (Years)	5
Amortization Period Software (Years)	10
Net Present Value (NPV) Discount on Capital	6%
Contingency Percentage Variable	2%
Contingency Percentage Fixed	2%
Meter Base Repair	1.5%
CPI Increase Rate	2.5%
Hourly Rate for Utility Management Staff	$80.50
Hourly Rate for Utility Administrative Staff	$44.00
Benefits Burden Rate	20%
Utility Tax Rate	31%

Table 26: Financial Analysis Assumptions

Appendix C: Best Practices for Success

Customer Safety

To help ensure a positive response from customers, it is best practice to communicate the safety benefits and features of AMI and next generation meters. Effective messaging will address potential customer issues, such as concerns related to health (e.g., radio frequency) and safety (e.g., meter fires). Customer safety issues for electric meters can be mitigated by following these best practices:

- As a form of due diligence, ensure that all next generation meters meet the new UL2735 safety standard. The UL2735 tests cover a full range of conditions, such as temperature, dust, mold, rain, and mechanical.
    - UL is an independent safety science company that offers smart meter testing and certification. In response to the absence of safety standards, UL published the *UL 2735, Standard for Safety for Electric Utility Meters* in May 2013. This standard addresses problems reported from field installations of smart meters, including fires, meters ejecting from meter socket bases, and exposed live parts. When electronic components are overstressed, there is a potential for the components to fail.
- Highlight the benefit of the ability to detect *high temperature and high voltage* events through AMI. Customers can be assured that if an event occurs, the utility can be automatically notified, and the process will trigger an immediate truck roll.
- Inspect each meter socket before and after the old meter is removed to identify and address any potential safety concerns. An inspection can reveal any corrosion or electrical issues that could lead to unsafe conditions.
- To address customer health concerns regarding radio frequency, communicate the safety of the RF emission levels compared to other household devices. Tests results below show that the average radio-frequency exposure level one metre away from a next-generation meter "is negligible compared to radio-frequency exposure from other devices" as shown in Figure 8 below. It can also be pointed out that smart meters fully comply with Federal Communications Commission (FCC) standards and guidelines for environmental exposure to RF and that the World Health Organization has concluded that no adverse health effects have been demonstrated to result from exposure to low-level radio frequency.

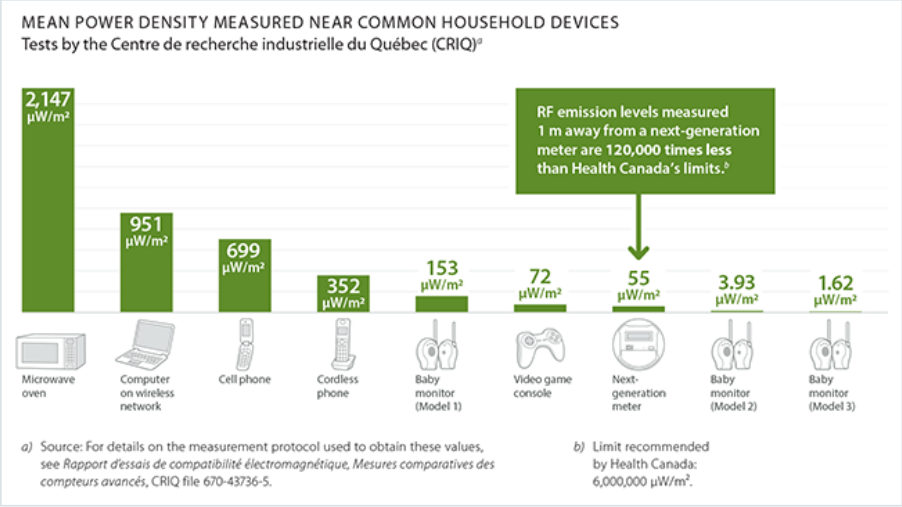

Figure 8: Meter RF Emissions Compared to other Household Devices

Security

There are legal requirements pertaining to the data that the new generation meters will collect: meter data is classified as private. It is best practice to implement policies and procedures to ensure the privacy of information and all data that is sent over the network is encrypted. Note that no identifying customer data (e.g., name, address) is transmitted over an AMI network. Customers should be assured that the utility will have no way of knowing whether a customer is using specific appliances; however, alarms will alert the utility if meter tampering has occurred.

AMI Vendor Contract

A solid contract with the AMI vendor provides protection for the utility. In negotiating with the selected vendor, best practices suggest that key clauses be included in the contract:

- A performance service level agreement ensures performance of the network at a certain threshold for the life of the asset.
- Clauses to protect the utility from:
    - software issues
    - firmware issues
    - safety issues
    - security issues

Asset Management

Best practices to ensure optimal asset management include:

- “Future proofing” the assets through remote firmware upgrades. In this way the utility keeps up to date with security and functional enhancements, ensuring that the investment does not become obsolete.
- Using standard communications protocols: IPv6.
- Following standards published by the American National Standards Institute (ANSI).
- Using existing WAN assets where they are already available

Appendix D: Standards Compliance

One of the current Smart Grid trends is the move to standards and the move away from propriety protocols. To future-proof the AMI network, it is important to buy "right" by considering whether a given solution complies with current standards.

Wi-SUN

AMI vendors are now moving to Wi-SUN standards. The Wi-SUN Alliance was created to provide interoperability standards for smart utility network communications. The alliance consists of more than ninety (90) member companies including utilities, government institutions, product vendors, and software companies.

The alliance's first initiative was to define a standard radio; the second step (Wi-SUN 1.0 (2015) addressed the speed and behaviour of radios, providing a foundation for different vendor devices on the same network. Wi-SUN FAN 2.0 is yet to be ratified, but it is expected to address:

- battery-powered devices
- additional modulations
- modulation negotiation
- multi-PHY abstraction (for PLC, Programmable Logic Controller)
- peer to peer communications

Choosing vendor solutions that comply with the Wi-SUN standards provides open functionality and more flexibility when choosing network devices. An open standard approach helps to mitigate risks.

Common Information Model (CIM)

The industry is transitioning from MultiSpeak to CIM, a set of standards that enable system integration and information exchanges by providing a model and message/file schemas for information exchanges. CIM standards are based on a Unified Modeling Language (UML) information model. As standards change over time, it will be important that AMI vendors keep pace with standards for information exchanges to downstream systems, such as the GIS, CIS, and OMS.

Governance and Oversight

Because the AMI interfaces with many of the other key utility systems, it is important to ensure a clear vision of the corporate objectives, including a comprehensive roadmap that outlines all technology procurements and projects. Without a strategy in place, a utility faces issues related to scalability, systems integration, and enterprise data management. A clear vision for the AMI project is key to making all utility initiatives successful.

With the explosion of data that is collected via AMI, the volume of data makes traditional data management techniques unwieldy. "Big Data" is a term used to describe data sets that have become too large for conventional analysis. A best practice strategy is to develop the ability to transform raw "data" into "information" to drive business decisions. This information must be accurate and easily accessible across the business units.

For example, with hourly interval data, consumption information can be aggregated to the transformer level to assist with engineering analysis, improved asset management, and conservation and demand management programs. Real-time alarms can dramatically improve outage management processes, and voltage monitoring can resolve power quality problems, helping to ensure conditions of service are met.

Prior to smart meters, utility departments commonly existed in “silos”, with each department managing the systems and data that were most relevant to their own specific goals. Decisions were made within departments using the information stored within their systems, often without the need to share information with other teams in the organization. This resulted in a “vertical” model for the way in which data was handled.

Because AMI data is used by multiple utility departments, a formal system of cross-functional governance is required to set the data management rules, ensure that the rules are followed, and resolve issues of non-compliance. A data governance model defines authority and accountability for data management as dictated by agreed-upon policies and procedures for data accuracy and accessibility. Creating this model acknowledges that data is no longer a requirement that is restricted to departments, but rather the data is *information* that is required horizontally across the organization. Information is a “product” that is managed and delivered by custodians to information consumers in other departments.

Establish Ownership of Systems

Establishing ownership of systems is another strategy to ensure effective communication practices across departments. System “owners” should be educated to understand their obligations to their internal customers to provide updates on functionality enhancements and other modifications so that other departments understand the impacts. To overcome the “silo” effect, the owners of the systems and data must acknowledge that other utility departments can benefit from the data.

Define System of Record

In addition to establishing system ownership, it is important to define a system of record for each piece of data. A “system of record” is defined as the authoritative source for a set of data in a system that contains multiple sources of the same set of data. To ensure data integrity, there must be only one system of record for a given piece of information. For example, as a best practice, the OMS is defined as the system of record for AMI operational data, such as alarms, and the MDM is defined as the system of record for time-of-use billing data. The identification of the system of record for each piece of data is a component of information architecture and associated data governance practices.

Project Management Strategy

Managing the AMI rollout consists of three distinct projects: the AMI system setup and endpoint delivery, the MDM system installation and testing, and the installation service provider's deliverables. An “AMI PMO (Project Management Office)” ensures the following:

- proper receipt and inventory of meters
- change out order creation
- change out order completion
- workforce management system to update the CIS when orders are completed
- inventory update to the MDM
- digital image of changed meter to prevent disputes
- ongoing reading of AMI system
- ongoing maintenance of inventory

The AMI PMO should be responsible for scheduling and monitoring all implementation activities and review the vendor project plans to identify any gaps. One of the goals of the implementation plan is to mitigate risks to the utility; for

example, getting the back-office systems and infrastructure (e.g., collectors, head-end) in place well before commencing mass rollouts of meters.

The AMI PMO ensures that the utility team members fully understand their roles and requirements on the project, working with all parties as liaison and will ensure that the project stays on schedule by hosting weekly meetings with the vendors to monitor progress. In these regular meetings, the AMI PMO monitors the status of the supply chain to identify and address any issues with delivery dates. Inventory procedures include periodic audits throughout the installation process to count assets, guaranteeing that meters do not get "misplaced." Regular status reports should be delivered to utility executives to keep all stakeholders fully informed. Project issues should be documented and managed at the single point of contact through the management of action and risk logs.

The AMI PMO also monitors the network health during the system roll-out. It is important to ensure that meters are communicating properly, and that data integrity is maintained. The AMI PMO promptly identifies any bad assets, managing the risk of poor performing assets by using the MDM system to monitor the quality of data and identify faulty assets.

As a best practice, utilities should carefully control competing projects to mitigate risks to the AMI project. A lack of resources due to competing projects and/or priorities creates a huge risk.

Plan for Testing

Testing should take place in a dedicated test environment: a test environment that is completely independent from the production environment and consists of a separate meter farm, collectors, and head-end system. In addition, there should be a feed from the production head-end to perform volume testing. In this way, the AMI can be fully tested prior to loading new versions into production, providing assurance that they will load and operate seamlessly, and mitigating the risk of promoting untested versions. A dedicated test environment controls changes through best practice IT principles, reducing risks, and providing essential information to facilitate planning. Regression testing should occur after each change, such as the deployment of a new firewall, to ensure that the change has not introduced new faults.

Recovery testing should be considered for an AMI system to test back-up and restore procedures. These procedures should be tested thoroughly, with as many simulated failures as possible. Periodically reviewing the backup and restore process is key to ensuring data security. Testing backup strategies also demonstrate how much time is required to restore data.

Change Management Strategy

Re-Engineer Business Processes

Utilities often identify business process redesign as their primary management challenge for moving to smart grid. A utility is not able to achieve the full benefits of AMI without also re-engineering the related processes, with the aim to maximize the value of the product. As AMI is introduced, it is important to follow best practices in updating and re-engineering business processes. Moreover, with an integrated system, utilities need to carefully consider how business processes cross department boundaries.

The high volumes of data ("big data") produced by the next generation meters trigger the need to revise policies and procedures for handling data. For example:

- With meters communicating consumption patterns, privacy concerns will drive new security requirements.
- With the ability to remotely disconnect/reconnect meters, encryption will be required.

- The efficient handling of tamper flags requires more than just the alarm information; service order information is required, illustrating the need for many data elements to be shared across the organization.

It is important that each department understands how to access and how to leverage the data to benefit the department. Business processes should include the following components:

- **Work/data flow diagrams**: diagrams with "swim lanes" to distinguish departmental responsibilities for each process step and milestones to distinguish phases or groups of activities.
- **Supporting documentation:** detailed documentation for each activity in the workflow.
- **Entry criteria and inputs**: criteria and information required to start the process.
- **Exceptions**: variations to the primary path.
- **Business rules**: rules to be followed/enforced when executing a process.

It is best practice to continue with existing business processes until the AMI network achieves stability; in other words, previous meter reading methods should continue to be followed. By moving to new processes too quickly, a utility runs the unnecessary risk of bad press or public outcries. Business processes should be identified and prioritized based on reconciling the benefits. Moreover, as the project progresses, and resources change, business processes need to be reviewed and refresher education sessions should be held.

Communicate with Staff and Customers

The common denominator for any successful AMI deployment is a strategic communications plan. The approach to communications should be based on the following principles:

- Learn from other utilities that have implemented AMI and adopt the best practices from those utilities.
- Inform, educate, and foster a sense of ownership among internal staff.
- Communicate AMI benefits to customers, establish open and frequent communication, proactively address concerns, and build support for implementation.

It is key to secure corporate buy-in by delivering workshops that stress the benefits of the shift to the new technology and re-assure staff that the change is positive. Workshops with individual departments should outline exactly how their roles are affected. Employees need to understand the "why" behind business process changes, for example, new considerations in handling next generation meter data and how to manage exception scenarios. The adoption success of a new system is dependent on ensuring all employees have the required skills and information. It is important that project sponsors are authentically dedicated and knowledgeable to set the tone and provide leadership.

Prior to proceeding with educating customers, the utility should prepare the message to be conveyed. Proper communication and positive press are vital to this project. Customers need to understand when changes will occur, why changes are occurring, and specifically how they (the customer) will benefit. In terms of AMI, communications should further highlight that the new meter reading technology will better serve customers by gathering accurate meter reads without needing to enter the home. A comprehensive communication plan should incorporate schedule, resources and responsibilities, and estimated costs.

Deliver Comprehensive Training

To create subject matter experts within the organization, effective training is not only required when the system or process is initially deployed, but also over the longer-term use of the product/process. Software solutions are rapidly evolving, and it is important that utility resources maintain their level of expertise by engaging with their chosen vendors to understand product roadmaps and how any changes might be integrated into their existing processes. It takes a degree of

organizational discipline to continue budgeting time and effort to improving skill sets, but the risk of not retaining expertise—and therefore the possibility that business processes are being managed less effectively—needs to be considered alongside the costs.

Training should be given a high priority. Refresher training helps ensure that employees remain current on the system, and furthermore, follow consistent procedures for completing system tasks.

Performance Measurement Strategy

AMI technology enables many benefits across the enterprise. Once the system is implemented and the business processes are modified to begin using the data, downstream systems and processes become dependent on the data from the AMI and MDM systems. Performance management of the AMI and MDM becomes important in ensuring internal expectations are met. As a result, service levels should be defined to measure the performance of both the AMI and MDM systems.

As a best practice, service levels should be stated in the AMI RFP to require that vendors agree to the requirements and design the network accordingly. These requirements should be negotiated in the contract, with penalties for non-compliance. During deployment, there should be multiple milestones where system acceptance testing ensures that the system meets performance requirements. Service level tracking and tuning of the network should become daily functions for the system operators. The AMI head-end system reports on performance, and these reports should become an input into the daily tracking function.

In addition, the MDM should be configured to measure the AMI performance levels. An MDM includes out-of-the-box performance reporting for the AMI, and these out-of-the-box reports can be configured to measure performance exactly as contractually agreed to with the AMI vendor. A third-party measurement is considered best practice, as the AMI performance measurement tools generally measure communication success rather than data acquisition.

Service levels should also be stated in the MDM RFP requiring that vendors acknowledge them and size their hardware accordingly to ensure that performance requirements such as VEE (validation, estimation, and editing) processing and the provision of billing determinants are handled within acceptable timeframes. These service levels should form part of the contract, and the system operators should be required to monitor the performance of the system.

In both cases—AMI and MDM—there are daily processes that the operators should be expected to execute to maintain the systems. It is up to the vendors to establish the systems and train the operators correctly, but once sign-off occurs, utility employees are accountable for daily functions that contribute to efficient networks, capable of meeting the required service levels. For example, in the case of the MDM, daily validation exceptions must be managed by the operator, and neglect can lead to diminishing performance. This underscores the importance of business process development and change management.

Appendix E: Potential AMI Deployment

AMI SAT

MECL plans to deploy 1,000 meters in 2020 it should first test the placement of meters, collectors, and repeaters to ensure proper network saturation as well as inform and refine the strategy (Phase I: AMI SAT). The customer strategy, back-office system integration and associated processes should be refined before starting the full rollout of meters. This approach would enable MECL to maximize customer acceptance.

Rollout Period to Realize Benefits

Through the financial analysis, MECL has determined that a three-year implementation would be the ideal deployment period, balancing capital spend opportunities to realize the benefits of the business case.

Project Timelines

Based on Util-Assist's experience, AMI deployments normally follow the high-level timelines in the table below.

Standard High-Level Project Timelines		
Phase	**Timeframe**	**Activities**
Complete RFP process for AMI and field installation services	6 months	• RFP development • RFP evaluation, shortlist, and vendor selection

Obtain project approval	3 months	• Project approval by:
		  ○ Executive Team
		  ○ Board of Directors

Conduct final contract negotiations and sign contracts with AMI and Field Installation vendor(s)	9-12 months	• Contract negotiations • Contract signing
Kick off project	10-12 months	• Collector and head-end system planning and installation • Back-office integration • IT system changes to support AMI integration • Business processes re-engineering

Standard High-Level Project Timelines		
Phase	**Timeframe**	**Activities**
Facilitate AMI Phase I: AMI SAT	2-4 months (included in the 10-12 month timeline for Kick off project)	• 1,000 meters • Head-end system acceptance testing • Testing of meter to bill integration • Network saturation
Facilitate AMI Phase II: Full Deployment	24 months	• Full rollout

Table 27: High Level Project Timelines

Reconciling to the Business Case

It is vital that utilities understand the importance of continuously reconciling back to the business case to recognize the benefits of the AMI investment. Proper planning and budgeting, a solid business case, and a comprehensive future-proof RFP will unlock the full potential of AMI. See Figure 9 below.

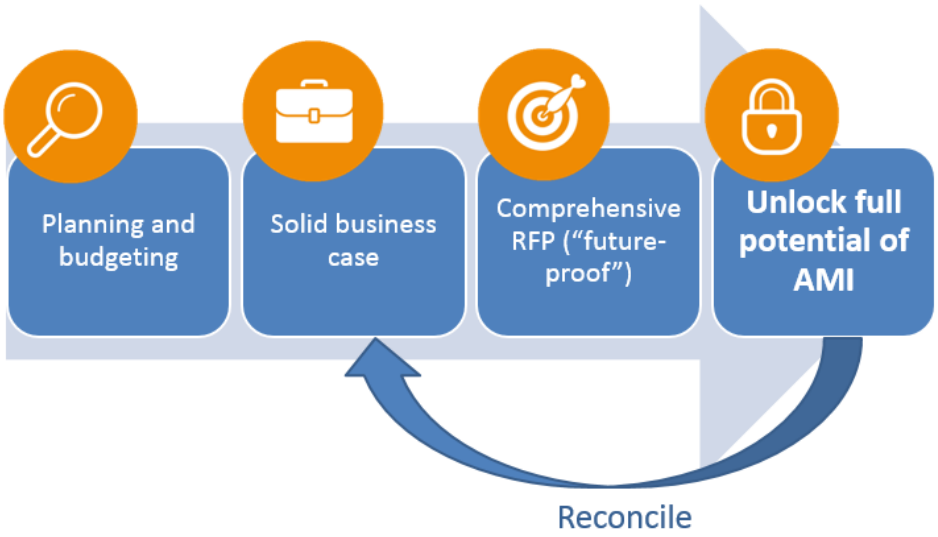

Figure 9: Reconciling to the business case

By reviewing the business case on an annual basis, MECL can ensure that any potential AMI program is on track with expenditures and benefits, ensuring that the program has been a success.

Appendix F: Acronyms

1. AI: means Artificial Intelligence
2. AMI: means advanced metering infrastructure.
3. AMR: means automatic meter reading.
4. ANSI: means the American National Standards Institute.
5. CIM: means Common Information Model
6. CIS: means customer information system.
7. CPI: means consumer price index.
8. CSR: means Customer Service Representative
9. CVR: means conservation voltage reduction.
10. CX: means Customer Experience
11. DA: means distribution automation.
12. DMZ: means de-militarized zone.
13. DR: means demand response.
14. ERT: means Encoder Receiver Transmitter
15. ESB: means enterprise service bus.
16. FAN: means field area network.
17. GIS: means geographic information system.
18. HAN: means home area network.
19. IHD: means in-home display.
20. IT: means Information Technology
21. MDM: means a meter data management system.
22. NaaS: means Network as a Service
23. NIC: means Network Interface Card
24. NPV: means net present value.
25. O&M: means operations and maintenance.
26. OMS: means an outage management system.
27. OT: means operational technology.
28. PLC: means Programmable Logic Controller
29. PMO: means project management office.
30. RF: means radio frequency
31. RFP means request for proposal.
32. RPA: means Robotic Process Automation
33. SaaS: means Software as a Service
34. SAT: means system acceptance testing.
35. SLA: means service level agreement.
36. UML: means Unified Modelling Language
37. VEE: means validation, estimation, and editing.
38. WAN: means wide area network.
39. WMS: means a work order management system.