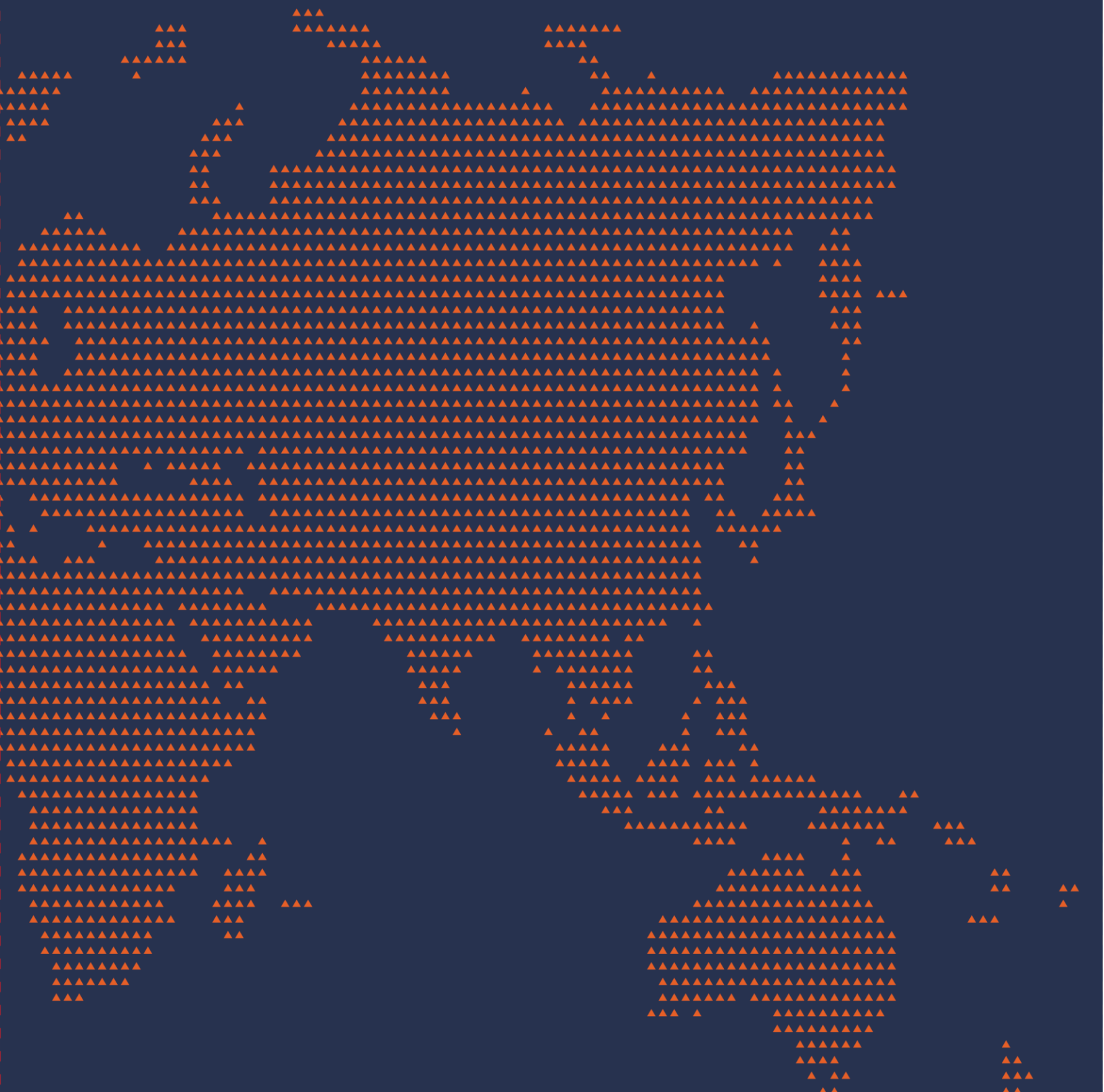
METSCO

MAKING IT POSSIBLE



Review of Centra Gas Manitoba's Capital Planning Evidence filed in the 2019/20 General Rate Application.

Report

Prepared For:

DDL West LLP on behalf of the Consumers Association of Canada
Winnipeg, MB

Prepared By:

METSCO Energy Solutions Inc.
215-2550 Matheson Blvd E,
Mississauga, ON
L4W 4Z1

Review of Centra Gas Manitoba's Capital Sustainment and Planning Evidence filed in the 2019/20 General Rate Application.

METSCO Report # 19-138

June 21, 2019

Authors: **Alex Bakulev, PhD**
Chief Executive Officer

Dmitry Balashov, MBA, MPA
Director, Utility Strategy and Economic Regulation

Disclaimer

This report has been prepared by METSCO Energy Solutions Inc. ("METSCO") for DDL West LLP on behalf of the Consumers Association ("CAC"). Neither METSCO, nor any other person acting on its behalf makes any warranty, express or implied, or assumes any legal responsibility for the accuracy of any information or for the completeness or usefulness of any process disclosed or results presented, or accepts liability for the use, or damages resulting from the use, thereof. Any reference in this report to any specific process or service by trade name, trademark, manufacturer or otherwise does not necessarily constitute or imply its endorsement or recommendation by METSCO.

Background

METSCO Energy Solutions Inc. ("METSCO") is a utility management consultancy and engineering services firm with offices in Toronto and Calgary. METSCO provides utilities, regulators, investment funds, and industry associations with a range of professional services in the areas of advanced asset management analytics, system planning, operational efficiency, capital lifecycle cost optimization, and competitive and regulatory strategy, among others.

We have been retained by DDL West LLP on behalf of the Consumers Association of Canada ("CAC") to provide external technical analysis in Centra Gas Manitoba's ("Centra", "the Applicant", or "the Utility") 2019/20 General Rate Application ("GRA").

The scope of METSCO's activities in the context of this engagement entails the following:

- Reviewing the Applicant's evidence covering the areas of capital asset management, investment planning, and operating activities that support the sustainment of capital assets;

- Evaluating – based on the evidentiary record and our professional knowledge in the area of utility asset management – whether Centra's evidence supports its forecasted capital expenditures;

- Opining on the scope, nature and pace of the Applicant's ongoing initiatives to enhance its asset management and capital planning functions.

Our evaluation of Centra's capital planning and asset management practices relies on the information provided by the Utility in the pre-filed evidence, Completeness Filing Disclosures, and subsequent Information Request ("IR") responses. Accordingly, our observations and recommendations are a function of the data that the Applicant elected to make available. As such they are subject to any additional insights that may emerge in the subsequent stages of the proceeding.

This is METSCO's first occasion of participating in a Centra Gas rates proceeding. However, we acted on behalf of the CAC as an external asset management and sustainment capital planning expert in Manitoba

Hydro's 2017/18 and 2018/18 GRA, providing the PUB with a comprehensive report and oral testimony, delivered in part by this report's authors.[1]

At the outset of this document, METSCO notes that the core of our business and the ensuing area of expertise concerns planning, management and operation of electricity systems. Accordingly, no part of our evidence should be seen as the testimony of a natural gas system *engineering expert*. However, the fundamental tools, processes and objectives of the discipline of asset management (in which METSCO is an expert) span assets of various types and functionalities. This is evidenced by the fact that industry leading asset management standards such as the ISO 5500x apply to both electricity and natural gas assets, along with numerous other types of investments.[2]

Underlying any asset management ("AM") standard are transparent and evidence-based tools and principles that seek to maximize the expected value of capital investments over their lifetimes. METSCO's role in this proceeding is to explore whether and how Centra considered and applied such tools and principles in developing its plans and justifying them in evidence.

By way or prior experience with PUB proceedings, we understand that the PUB does not explicitly approve specific capital investments, but rather determines the appropriateness of the total funding envelopes. We hope that our insights (including those concerning specific projects) will enable the Regulator to assess the overall reasonableness of the Applicant's forecasts and take the steps that it deems necessary to advance its statutory objectives, and the public interest more generally.

[1] Manitoba Public Utilities Board, Manitoba Hydro 2017/18 and 2018/19 GRA. http://www.pubmanitoba.ca/v1/proceedings-decisions/appl-current/pubs/2017%20mh%20gra/intervener%20evidence/metsco_gra_2017-19_manitoba%20hydro_final%20report.pdf.
[2] International Organization for Standardization, "ISO 5500: 2014, Asset Management – Overview, Principles and Terminology." https://www.iso.org/standard/55088.html. Accessed June 17, 2019.

Executive Summary

This report relays the findings and observations of METSCO Energy Solutions Inc. ("METSCO"), engaged to examine the capital expenditure forecasts and supporting asset management evidence presented by Centra Gas Manitoba ("Centra") in its 2019/20 General Rate Application.

METSCO's report begins with a background discussion of the key principles and capabilities comprising a modern utility asset management system, followed by a high-level exploration of Centra's asset management journey to date. The report then proceeds to explore the specifics of the application, along three key dimensions:

- reliance on quantitative empirical evidence;
- the degree of discretion underlying the Applicant's forecasts; and
- the evidence of efficiency/productivity efforts to help mitigate the impact on consumer rates.

Across all three dimensions of analysis, it is our general finding that Centra's evidence does not adequately justify the full amount of forecasted capital expenditures. However, in an attempt to offer a balanced perspective, the report consistently highlights the areas of Centra's capabilities that we see as exhibiting positive features and examples of continuous improvement in asset management.

The report concludes with a brief summary of our key findings and a set of 12 recommendations. The recommendations include both the opportunities for the PUB to contemplate potential capital forecast reductions, and advice on Centra's next steps in continuous development of its core asset management capabilities – either independently or with the regulator's assistance.

Table of Contents

1. Core Asset Management and Investment Planning Principles in the Context of Centra's Evidence.

This chapter provides an overview of fundamental principles of capital asset management, as understood and adopted by regulated utilities and competitive enterprises in recent decades. Upon outlining these principles, the concluding section of this chapter reviews, at a high level, the extent to which the evidence provided by Centra reflects these principles. Our overview assessment acknowledges the areas where progress is evident, but also highlights the areas that may signal certain value gaps from the perspective of the utility and its ratepayers.

1.1. Asset Management Fundamentals

At its core, the discipline of asset management helps organizations derive the optimal economic value from their existing and contemplated capital investments – in a financially sound and responsible manner. Like other organizations, regulated gas utilities face many pressures and opportunities to invest their (invariably scarce) resources into projects that generate the greatest amount of value for its shareholders and customers.

Same AM principles apply to competitive and regulated environments

For competitive sector firms, investment decisions involve determining whether and how a given set of projects can generate monetary returns, which their shareholders would value above the firm's other potential options of allocating capital – such as returning it to shareholders through dividends or share repurchases. This is no different for the regulated utilities, whose investment decisions should contemplate whether, how and when to proceed with certain undertakings, or otherwise effectively "return" the funds they would need to their key stakeholders in the form of lower rates.

Both competitive and regulated firms can usually find *some* incremental projects into which to channel the resources. Yet, doing so without considering the opportunity cost to all stakeholders would undermine the firms' purpose as stewards of value creation. In short, asset management for a utility is as much about justifying and selecting *among* potential investment opportunities, as it is about selecting *between* taking on incremental investments or returning the underlying funds to customers.

AM decision-making inputs

Since it involves allocation of inherently scarce funds, modern utility asset management is about making informed and explicit tradeoffs, supported by data that objectively evaluates the necessity and urgency of

an investment – be it in and of itself, relative to other investments, or no investment taking place at all. Key sources of supporting data for a natural gas utility can take many forms, and typically include:

- *Information on current state of the assets* and operational areas where investments are contemplated:
  - Physical condition of equipment (e.g. wear/tear, natural degradation, etc.);
  - Equipment demographic data (age, manufacturer, material, location);
  - Manner and extent of equipment's utilization (e.g. average loading vs. top capacity).

- *Data on the likelihood (probability) of events* which an investment seeks to prevent, or bring about:
  - Information on past failures (how, when, where, and why) – own or comparable operations;
  - Records of past locate requests, construction or soil types in the vicinity of an asset;
  - Past trends of actualized demand growth and known future construction plans.

- *Data on impact (value gains or losses)* of events that an investment seeks to prevent or facilitate:
  - Cost of potential repairs if an asset fails unexpectedly;
  - Costs sustained by customers due to loss of supply (loss of heat, interrupted production etc.);
  - Safety costs of potential injuries to employees and public, or environmental costs (leaks);
  - Presence of redundancies and other capabilities to mitigate any negative impact.

Asset Management Systems and Strategies

The group of activities that integrate the collection of asset information and its application to asset planning and investment decision-making process is collectively known as an Asset Management System. Asset Management Systems enable utilities to prolong the operating lives and good performance of their assets, in a manner that optimizes both short- and long-term costs, and maximizes other *objectives* valued by the organization and its key stakeholders, including safety, environment, reputation, affordability, and others.

An effective Asset Management System entails a constant feedback loop, where results of operations are analyzed against the original planning assumptions and past results, enabling adjustments to strategy and analytical tools. This feedback loop provides organizations with inputs for the development of near-term, and longer-term Asset Management Plans, Policies or Strategies. These formal (and usually ever-green) documents articulate the manner in which a utility will utilize its AM Systems to achieve the *Objectives* of its asset portfolio, such as liquidation of known equipment deficiencies, compliance with new requirements, improvement of performance levels, integration of new load, and many others.

As the Figure 1-1 illustrates, Asset Management Strategies must balance multiple forms of Inputs (performance data, stakeholder preferences) and Constraints (funding availability, regulatory requirements) to achieve their stated objectives.

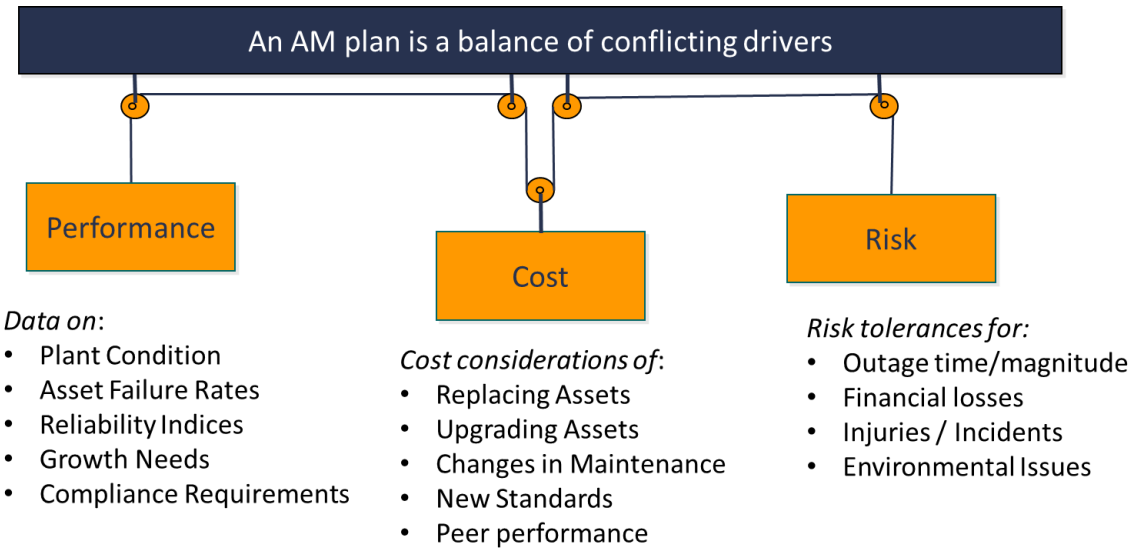


Figure 1-1: Key AM Plan Inputs and Considerations

While most of these inputs, drivers, and constraints have existed for as long as utilities have been in business, the way in which utilities articulate, analyze, and reconcile these factors has undergone significant changes in line with continued development of engineering and economic science. The knowledge and experience of utility subject matter experts continues to play an important role in the development and of AM plans. However, technology is is changing the customer and regulator expectations as to how (the inevitably subjective) *judgment* of experts can be supported by objective *assessment and prediction* of the likelihood, impact and cost of events that AM plans seek to prevent or bring about.

Risk Assessments are a key part of an asset manager's toolbox

Among the specific tools that aid modern utilities in objective evaluation and prediction are Asset Risk Assessments. These analytical studies quantify the probability and impact of potential asset failures under various sets of conditions, using the information sources described on the previous page. Asset Risk Assessments are a key element of an overall Asset Management System. Their overall function is to help

asset planners determine which amount and mix of capital work mitigates the greatest amount of risk. Figure 1-2 provides a conceptual model of an Asset Management System grounded in risk assessment.

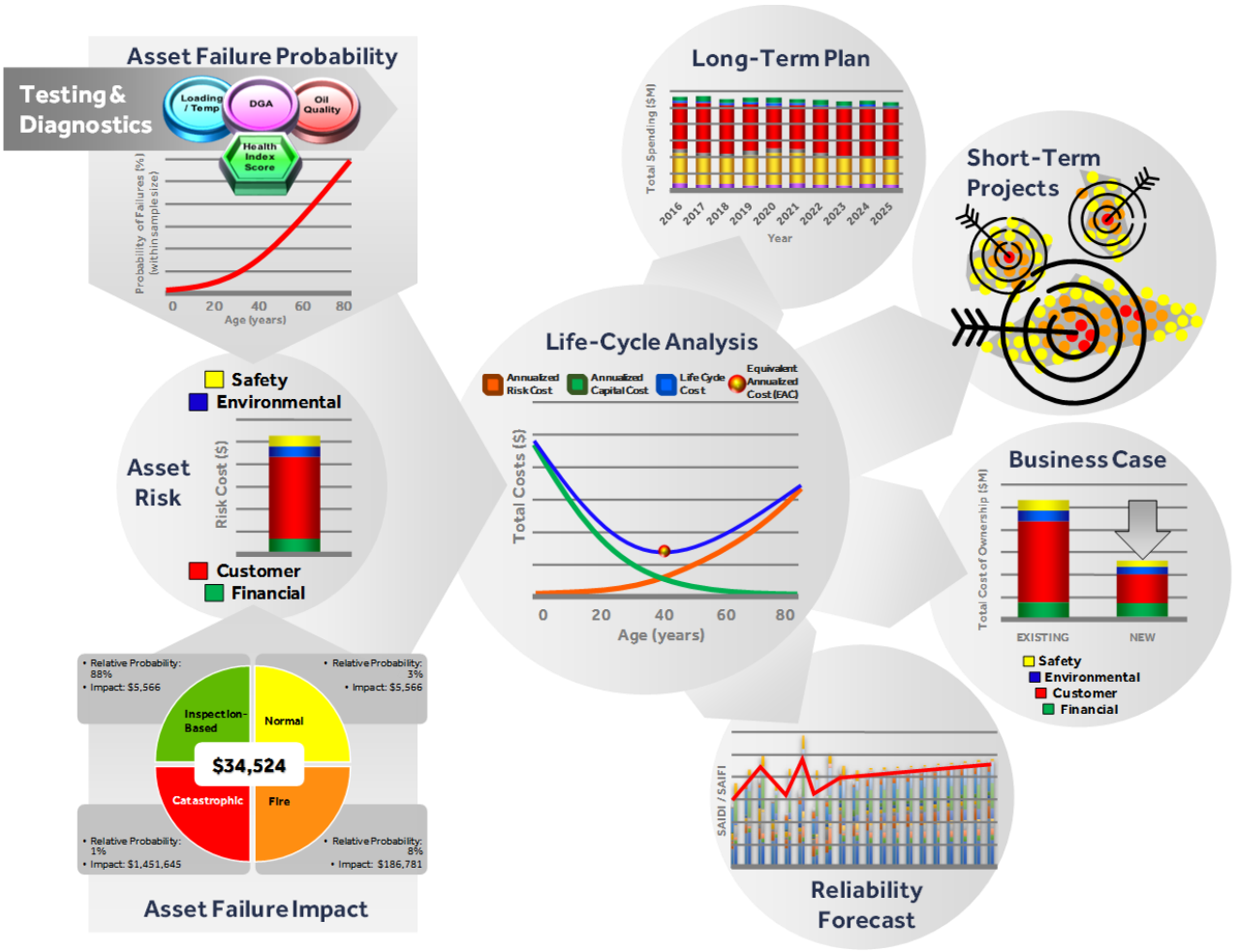


Figure 1-2: A Conceptual Utility Asset Management System

Event Probability

A key objective of a risk-based Asset Management System is derivation of asset class-specific Failure Curves that establish relationships between system performance and factors empirically validated to influence it. These factors include age of assets at failure, the condition of assets, loading, ambient temperature, proximity to other objects, and many more. A similar probabilistic approach that explores failure occurrence can also be applied to defining the probability of certain positive factors occurring within a given set of conditions. The most common example is the likelihood of anticipated load increases materializing at the time and place where it is expected. Load growth likelihood can be established by way

of examining a utility' past data associated with new connections being requested, coming online and requiring the anticipated levels of service.

Event Impact and Asset Risk Costing

Having established the probability of events, asset managers then correlate them with the economic value of the *impact* of these events. Impact can be measured in length of interruptions, numbers and types of customers affected, and the direct and indirect costs of these interruptions (a) to the utility, (b) the affected customers, and (c) the broader society. The aggregation of event probability and event consequence provides utilities with a total quantified value of Asset Risk, which enables planners to select and prioritize the projects across business units and asset types based on consistent and comparable risk scores.

As illustrated in Figure 1-2, the articulation of Asset Risks enables utilities to develop Lifecycle Cost Models for each type of asset, which indicate the optimal time (from the engineering and economic perspectives) where the cost of asset intervention is the lowest across its lifetime. By scheduling interventions (e.g. replacements) to occur when the lifecycle costs of performing them are the lowest, utility planners can provide the highest value for their customers. Importantly, this may mean that certain assets may require replacement before they fail – if the costs of their reactive replacement outweigh the cost of replacement at a given time.

Application of AM Analysis Outputs

The outputs of Lifecycle Cost Analysis feed the development of long-term and short-term Asset Management Plans. AM Plans are themselves comprised of individual business cases that draw on the outputs of lifecycle cost analysis, reliability or load forecasting models, and other factors known and judged to be pertinent by the subject matter experts. Relative to the legacy approach, where business decisions primarily relied on subject matter expert knowledge, the Risk-Based Approach to planning enables consistency of evaluation across the organization and objective consideration of risk tolerances.

Consider an example. While a hypothetical $100,000 investment seeking to prevent a potential outage may seem valuable, its perceived value would likely decrease if objective numerical data suggested that the probability of this outage occurring was less than 5%, and its total economic impact would be $500,000. By multiplying the probability of this hypothetical outage (5%), by its total estimated impact ($500,000), we establish a total Risk Cost of $25,000. This valuation can then be compared with the cost of the investment, and the risk costs/scores of other contemplated projects.

Risk cost scores help planners develop optimized portfolios of investments that mitigate the greatest amount of risk, acknowledge the opportunity costs, and create a transparent mechanism for evaluating investment decisions in any internal or external forums. Supplemented by other managerial considerations, quantification of asset risks creates a robust platform for regulators and utilities to explore the optimal size of investment portfolios – by comparing their risk mitigation value with the ensuing costs for the ratepayers.

The Utility AM Journey: integrating new tools with practical expertise

As we allude to above, the numerically driven AM approach does not replace, but raher supplements the value of human judgment, as exercised by the subject matter experts. By providing a robust quantitative prioritization framework that effectively "predicts" the optimal portfolio of investments, a risk-based framework can reduce the manual effort in preparation of a plan. In doing so, it provides planners with more time to dedicate to higher-value tasks where their judgment is more necessary and impactful. This can include an in-depth examination of local investment-specific factors while developing a Business Case and examining their implications against the results of the risk-based analysis.

We conclude this introductory section by stating that the development and implementation of such a risk-based quantitative framework is a costly, complex, and time-intensive initiative. Most North American electricity and natural gas utilities find themselves many years away from asset management excellence. While the degree of reliance on the types and numbers of quantitative tools varies across utilities, the general principle underlying effective asset management comes down to relying as much as possible on objective data – collected in the field and validated by statistical analysis.

Few, if any, utilities possess all the data and tools they would wish to have at their disposal. Nevertheless, it is possible (and in METSCO's view, necessary) for customers and regulators to expect their service providers to progress towards these objectives, delivering incremental value gains along the way.

1.2. Centra's Asset Management Journey to Date

Centra's capital forecast underlying CEF18 and presented in this current GRA proposes a 19.5% increase to its 10-year Sustainment budget envelope. On a component level, this increase is made up of a 29% increase to System Renewal expenditures and a 90% increase to System Efficiency investments, partially offset by a 4% reduction of forecasted compliance spend.[3] This is a material increase, which the Applicant

[3] PUB/CENTRA-I-68e

substantiates as a function of constantly updated information – developed and approved on an individual project and program basis.[4]

Signs of Progress

As the Applicant's information regarding its stated investment needs matures and becomes updated over time, it is reasonable to expect that the tools it relies on to collect and analyze this data evolve as well. Consistent with this expectation, the application record contains multiple documents that signal Centra's attempts to explore advancements in evidence-based asset management. Among them are:

- The 2014 and 2017/18 iterations of the Pipeline Risk Assessment Reports;[5]
- The 2017 Natural Gas Asset Condition Assessment Report,[6] which estimates condition of the core asset classes and replacement values of equipment in Critical and Fair/Poor condition;[7]
- The interim[8] 2015-2017 Risk Assessment Methodology applied to the 2018-2023 Natural Gas Asset Management Capital Investment Plan;[9]
- The Corporate Value Framework document,[10] and select Capital Investment Justification (CIJ) documents that explore the issue of customer interruption costs;[11]
- The multi-factor Station Condition Assessment Framework that yields quantitative scores for all Centra Gate and Regulator stations.[12]

Equally commendable in principle are Centra's stated plans and efforts to procure and implement several advanced AM tools, such as Reliability Centered Maintenance (RCM) Software,[13] and the Materials Tracking and Traceability System.[14] Centra also demonstrates a genuine and realistic assessment of its data capabilities, by acknowledging in several instances the existence of material gaps in asset condition information.[15] Beyond acknowledging the gaps, Centra is taking steps to rectify them - most notably by

[4] PUB/CENTRA-I-68d,e
[5] Appendix 2, CAC/CENTRA-I-44d, and Appendix 3, respectively
[6] Appendix 4.4
[7] CAC/CENTRA-I-73d
[8] CAC/CENTRA-I-44c
[9] Appendix 4.3, pp. 60-62 of 64
[10] PUB/CENRA-I-67a-c Attachment, p. 14 of 60
[11] PUB/CENTRA I-73-Attachment, Steinbach CIJ, p. 207 of 370; and Portage La Prairie CIJ, p. 233 of 370
[12] CAC/CENTRA-II-148b
[13] CAC/CENTRA-I-46
[14] CAC/ENTRA-I-45a
[15] For example, Appendix 4.4, p. 3 of 137

deploying the ILI tool, the early results of which appear to be promising. The Applicant reports that the 2016 La Salle system inspection insights gave it confidence to extend their previous estimates of steel pipeline end-of-life "by 20 years or greater."[16]

Centra has also taken a meaningful step in proactively mitigating potential consequence of outages by acquiring the Compressed Natural Gas (CNG) storage and transportation capabilities, which in utility's estimates could reduce the consequence of outages for smaller communities of about 1200 residential customers at the temperature of -10 Celsius.[17] In METSCO's understanding, this capability could provide partial load offsets for larger communities as well.[18]

Overall, the evidentiary record contains multiple examples that suggest that Centra's asset managers understand the industry trends and see the value in adopting the tools of evidence-based asset management. Unfortunately, there is very little evidence to suggest that CEF18 and the individual business cases supporting it rely on any of these tools to a meaningful degree.

AM tools are available, but underutilized in planning

Centra's evidence suggests that system-wide risk assessment and condition assessment reports presented on record had no bearing on the scope, scale or nature of investments proposed in CEF18, other than to increase the expenditures for obtaining condition information.[19] While several CIJs rely on financial estimates of failure consequences, the values used to determine this impact do not appear to be consistent within themselves, or with those prescribed in the Corporate Value Framework guidelines.[20]

Also absent in all CIJs is any effort to estimate the probability of the specific assets' failure, despite the Applicant's efforts to examine the historical failures through two iterations of pipeline risk assessment reports, among other potential data sources. Instead, the investment justifications offered in support of CEF18 rely heavily on the past expenditure levels (in case of programs in particular) and high-level, qualitative descriptions of anticipated benefits that reflect the expectations of Centra's planners. While METSCO has no reasons to doubt the knowledge and experience of the Applicant's professional staff, we

[16] PUB/CENTRA-I-72-Attachment, p. 26
[17] CAC/CENTRA-I-82b
[18] Based on our interpretation of conclusion of Centra's reasoning in the Steinbach Upgrade CIJ (CAC/CENTRA I-73-Attachment p. 208 of 370), which states that trucked CNG could not fully offset the impact of a larger system outage.
[19] CAC/CENTRA-I-38
[20] CAC/CENTRA-I-67a-c-Attachment, p. 14 of 40

believe that the magnitude of the requested program warrants a higher level of justification rigour. This is particularly the case given the fact that Centra has already taken certain steps to develop new AM decision support tools, such as the Asset Condition Assessment or the Risk Assessment methodologies.

Centralized AM strategy remains a future objective

Equally of concern to METSCO is the fact that Centra does not plan to finish defining its asset management systems and formalize them in an overarching Asset Management Plan until 2020/2021.[21] In the absence of such a framework, it is reasonable to expect the observed degree of internally inconsistent decision-making and reliance on subjective criteria to persist.[22] This, in turn, poses challenges for Centra to justify the value of those of its investments that, in our opinion, may be seen as more discretionary. In the absence of a defined AM strategy such investments may be ill-advised since the future strategy could render them less valuable in a few years, depending on its goals and underlying tradeoffs.[23]

METSCO acknowledges the amount of organizational changes underway at Manitoba Hydro and Centra[24] and expects the current lack of a centralized AM Plan to be in part the result of these overarching priorities. However, the delay in the formal entrenchment of AM principles need not delay the ongoing use of their component approaches on the ground level. While time and resources have clearly been spent on developing several frameworks aligned with advanced AM principles, their apparent lack of application points to a slow pace of organizational change and no apparent value returns on the ratepayer-funded enhancements.

As we discuss in the subsequent chapters, it is our overall conclusion that the evidence advanced by Centra Gas has not provided the PUB with adequate justification for the capital spending levels forecasted in CEF18. While the current pace of the Applicant's AM transformation journey discussed in this chapter is a factor in this contention, we believe there are multiple other reasons for the PUB to question whether the nature and magnitude of Centra's capital forecasts provide a meaningful value proposition for the company's ratepayers.

[21] CAC/CENTRA-I-53c
[22] PUB/CENTRA-I73
[23] For example, System Efficiency investments discussed in PUB/CENTRA/I-75
[24] For example, the Asset Performance Management Software discussed in PUB/CENTRA-I-65a

2. Analysis of Centra's Capital Forecasts

2.1. Introduction and Organization

It is METSCO's overall contention that the evidence advanced by Centra in support of its capital expenditure forecasts falls short of providing the PUB with confidence to endorse CEF18 capital plan as filed. We organize our discussion of Centra's evidence around the following three key themes:

- Lack of consistent reliance on the use of quantitative tools and available empirical evidence;
- Absence of appropriate justification for a number of forecasted discretionary expenditures; and
- Lack of evidence demonstrating an effort to manage the rate impact of forecasted investments.

Each of these themes is discussed in a dedicated chapter (Chapters 3-5). Chapter 6 offers our concluding remarks, including brief observations on how these three themes are reflected in specific investment justifications advanced by the Applicant and recommendations for next steps. Our recommendations identify several projects the exploration of which may provide the PUB with reasons to contemplate reductions relative to the proposed CEF18 forecasts. Importantly, however, our recommendations also identify several areas where Centra can make meaningful progress on their current AM tools.

We encourage both Centra and the PUB to explore these enhancement opportunities. METSCO believes that they can be pursued by the Applicant independently but may have significant merit of being pursued in consultation with the regulator on a without prejudice basis, to foster the mutual understanding of the increasingly sophisticated tools and convey the practical challenges of applying them in operations.

To offer a balanced perspective, we also attempt to highlight some of these practical challenges throughout our assessment. While the following chapters contain a number of critical messages, it is our hope that they are sufficiently tempered by the acknowledgment of the practical challenges all utilities encounter on their AM journey. We are confident that the PUB will apply a similarly balanced approach when exploring the evidence in the later stages of this process, and ultimately rendering its decision.

3. Centra's evidence points to the lack of consistent use of quantitative analysis tools.

This proceeding's record contains multiple examples of Centra's efforts to advance its asset management capabilities through the development of new analytical support tools and commissioning of new methods of gathering asset-specific information. The Applicant's work to develop an Asset Condition Assessment, progressively build on successive iterations of the Pipeline Risk Assessment Methodology, and selectively deploy customer interruption cost data in several CIJs, signals the general understanding and appreciation of the of evidence-based asset management. Notwithstanding this evidence of progress in acquiring AM capabilities, few of these tools or their insights, are reflected in the CIJs comprising CEF18.

Accordingly, one of the key reasons underlying our skepticism towards the scope, nature and magnitude of investments forecasted in CEF18 is the Applicant's lack of regard for advanced analytical tools already in its possession, or the available empirical evidence on the current state of its system. We make this observation based on the following three considerations:

- The overall condition and performance of Centra's natural system is very good;
- Individual CIJ documents either ignore or else misapply the quantitative asset management tools;
- The successive iterations of Centra's risk scoring frameworks are becoming less granular and more susceptible to gaming.

3.1. The overall condition and performance of Centra's natural gas system are very good

As we discuss in the following subsections, the condition and performance of Centra's natural gas system appear to be very robust judging by the available evidence. While we note several methodological inconsistencies that Centra can address in the future, the key purpose of this section is to challenge Centra's reliance on largely unsubstantiated drivers of "reliability improvement" throughout their project / program justification documents, by pointing at the actual condition and performance data,

Encouraging Condition Information

The findings of Centra's 2017 Natural Gas System Asset Condition Assessment (ACA) suggest that the system is overall in a good condition based on the available information. As evidenced from the "soccer

field" diagram provided in the ACA Report, and reproduced in Figure 3-1, [25] aside from the Services, more than 90% of Centra's equipment across the major asset classes is estimated to be in an "Acceptable" condition. With respect to Station assets, the estimated condition appears to be consistent with the results of Centra's annual Station Condition Assessments. We make this observation having reviewed the quantitative evidence supplied by the Applicant, which suggests that the average 2018 condition score for Gate Stations is approximately 20%, with a median score of 15% (where 0% indicating an asset requiring no investments and 100% - complete deterioration).[26] Approximately a quarter of Gate Stations have 2018 condition scores equal to or exceeding 30%, with only one (Matlock) exceeding the score of 50%.[27]

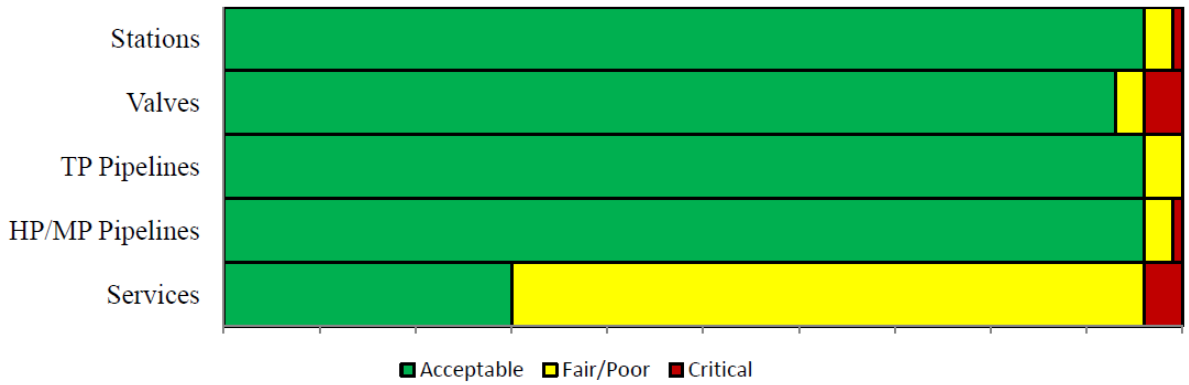


Figure 3-1: Estimated Condition of Centra's Major Asset Classes, 2017

Consistent with the Gate Stations, the average and median 2018 condition scores for Centra's Regulator Stations were 18% and 13% respectively. Twelve stations had condition scores equal to or above 30%, with one (Crystal Springs) having a score in excess of 50%. While the results of the two station health assessment documents are generally consistent, Centra acknowledged that the results of the individual Station ACAs, were not leveraged in the development of the system-wide ACA presented in Appendix 4.4.[28]

In the absence of more nuanced understanding as to the reasons for not using this information in a larger study, METSCO sees this as an opportunity missed to compare two types of source data and reconcile any

[25] Appendix 4.4, p. 19 of 137
[26] CAC/CENTRA-II-148a
[27] Based on analysis of the Applicant's data provided in CAC/CENTRA-II-148b-Attachment. For the 14 stations where 2018 scores were not available, METSCO used 2017 scores where provided. Seven stations with no scores after 2016 were excluded from calculation.
[28] CAC/CENTRA-II-148c

apparent discrepancies and encourage the Utility to do so in the future. We do note, however, that our cursory examination of the rate of change between the numerical scores for the stations across two most recent consecutive years (where such data is available) suggests opportunities for methodological improvement, as the median 2017-2018 rate of change in score for both types of stations approached 50%, with the scores for nearly 20% of stations in each category increasing by more than 100%.[29] In METSCO's opinion, such drastic changes in numerical scores over a one-year period cannot credibly represent a degree of deterioration sustained by the assets. As such, it is likely a function of subjective assessments of different evaluators, and/or the general lack of component weighting across the eight assessment categories that make up the inspection forms. Despite Centra's statement that the current 99.99% reliability performance levels of its distribution system are a testament to the effectiveness of this assessment method,[30] the Applicant stated that it will consider varying the weights of assessment categories in the coming year.[31]

Centra's System ACA also provides a forecast of the expected asset condition in 20 years, using the current equipment replacement rates as a basis. This analysis indicates that the pipeline assets are expected to deteriorate most significantly, with between 14% ad 26.5% reaching the Fair/Poor grade across various types, and as much as 4% of Transmission Pressure pipelines reaching the critical condition.[32] However, and notwithstanding the condition data gaps that the report helpfully acknowledges, METSCO suspects that the forecasted 20-year deterioration levels may be overly conservative. This is because the report appears to rely on current replacement rates to forecast the extent of anticipated degradation relative to replacement. The report notes that "No replacement [rates]" are currently calculated for most steel and plastic pipeline assets, which we understand to mean that the 20-year pipeline condition forecast assumes that no replacements would take place through to 2040.[33]

Subject to the confirmation of our understanding of the methodology, it is, in METSCO's opinion, unrealistic to expect that no pipelines will be replaced over the next 20 years – in response to outages, inspections or otherwise. Moreover, the estimated deterioration levels may also contradict the early directional evidence of the ILI assessments, which point to significantly lower than anticipated levels of

[29] Derived by calculating the percentage change in numerical scores between the 2017 and 2018 assessments, where information for both years was available. The score gaps present across many years for both types of stations prevented us from assessing longer-term trends.
[30] CAC/CENTRA-I-43a
[31] CAC/CENTRA-II-148d
[32] Appendix 4.4, p. 20 of 137
[33] Appendix 4.4, p. 21 of 137, Table 6

degradation, reportedly leading the Applicant to revise its estimation of end of life for steel pipelines by 20 years or more.[34]

Overall, Centra's estimates of replacement value of its assets in Critical condition today amounts to $18.2 million,[35] or approximately 1% of the system's total replacement valuation estimated in the report.[36] A 20-year Critical asset replacement value estimate is forecasted to increase to $105.4 million, or approximately 5% of the system's projected replacement value calculated using Centra's assumptions. While the report estimates that the percentage of assets in Fair/Poor condition in 20 years would amount to about 25% of the forecasted system replacement value, we note our earlier comment regarding the report's apparent assumption that no pipelines will be replaced in the next two decades. Moreover, Centra's grouping of Fair and Poor condition assets in the same category is also likely to overstate the scope and value of assets that may needed to be replaced by early 2040s.

Overall, and subject to better insights on the report's input assumptions, METSCO sees the state of Centra's assets and the replacement value estimates of those approaching deterioration to be indicative of a healthy system, largely devoid of any major impending financial pressure points.

Strong Reliability Performance

Centra's reliability record related over the recent past is excellent and shows no apparent declining trends. The total number of Corrosion and Degradation-related events since 2011 is 209, or 17% of across all event cause codes. Figure 3-2 below provides a three-year rolling average of the proportion of total corrosion and degradation-related events. As the figure indicates, there are no apparent concerns that the number of events caused by deteriorating condition of Centra's assets are increasing.[37]

[34] PUB/CENTRA-I-72-Attachment, p. 26
[35] CAC/CENTRA-I73-d
[36] Appendix 4.4, p. 3 of 137
[37] Rolling average used to smooth annual fluctuations, though trends are consistent on the year over year basis. Source data for this and subsequent figure is drawn from CAC/CENTRA I-85h-Attachment

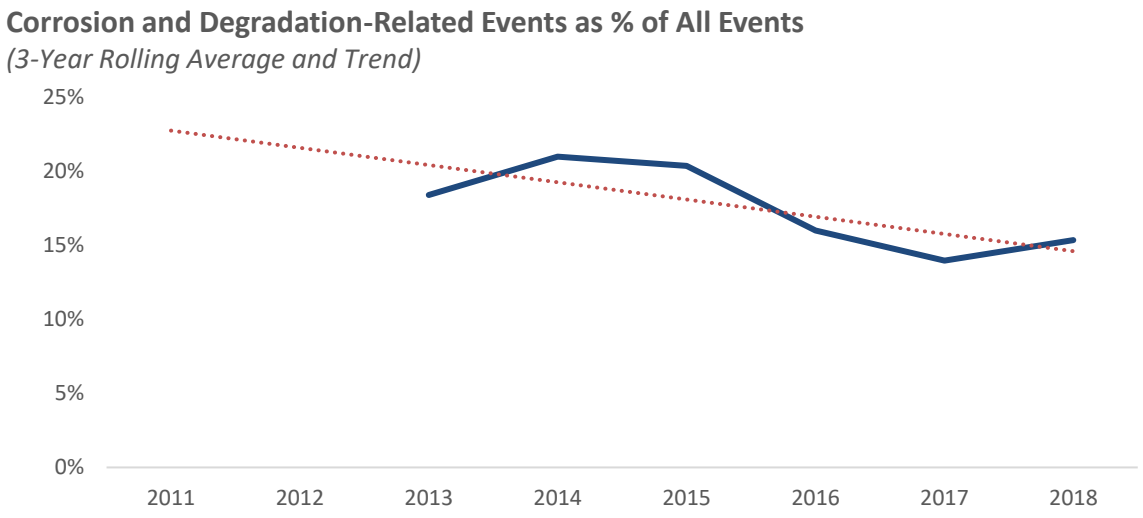


Figure 3-2: Condition-Related Event Trends, 2011-2018

The historical three-year rolling average of events caused by Materials, Manufacturing, or Construction-related (MMC) defects produced in Figure 3-3 shows a similar declining trend, with the total percentage of historical MMC occurrences representing 18% of all outages.

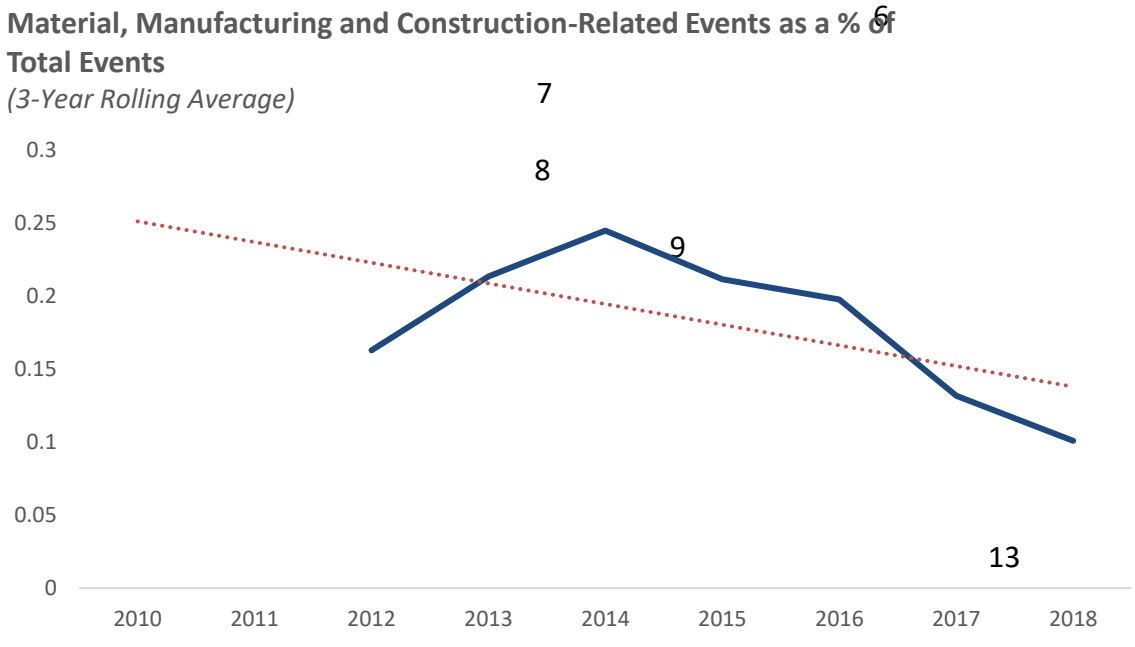


Figure 3-3: MMC-Related Event Trends, 2010-2018

Outages caused by Equipment Malfunction (which may due to condition affecting operability) amount to about 1% of all historical occurrences.

Importantly, the largest major cause of reliability events recorded over the past decade are External Interference, which accounts for nearly 60% of all events. Considering that asset replacement rates and volumes are in and of themselves unlikely to prevent future external intervention occurrences, Centra's overall reliability statistics do not indicate that any changes in asset renewal rates are warranted. METSCO does acknowledge the fact that a relatively small and comparatively rapid change in the rate of equipment failures could present a substantially different picture in the coming years. However, considering the available condition information and the most recent reliability statistics, we question the overall degree to which Centra's CIJ explanation rely on the need to mitigate outages and facilitate system reliability as a major justification driver.

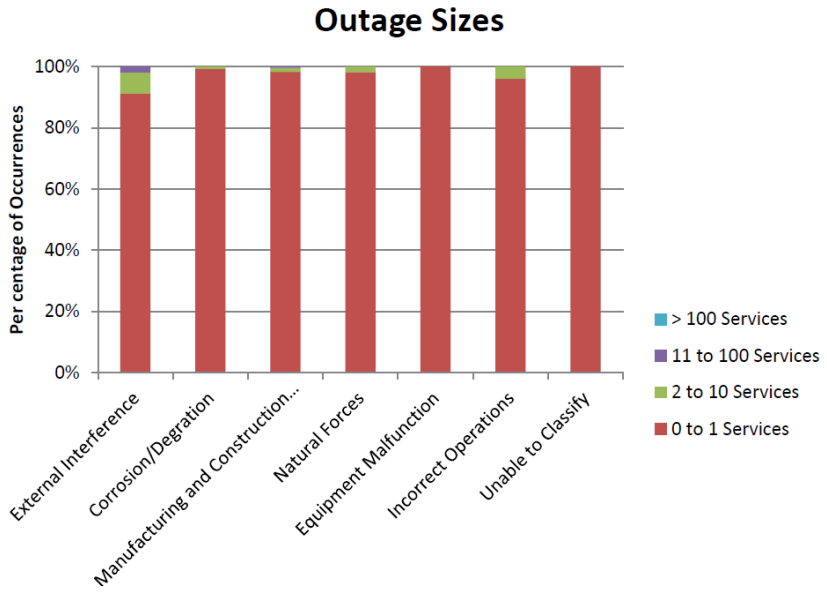


Figure 3-4 Customers Affected by Major Outage Cause Codes, 2010-2018

Consistent with outage occurrences, the data on impact of outages indicates highly reliable performance. Relying on the visual information provided by the Applicant in the IRs, it appears that as much as 95% of historical (2010-2018) outages affected no more than one Centra customer, with another ~4% affecting between two and ten customers.[38] Moreover, as indicated by Figure 3-4,[39] the equipment condition-related outages were not a significant source of customer interruptions (by customer count). Aside from historical performance, Centra has also taken steps to mitigate the customer impact of potential outages by procuring

[38] CAC/CENTRA-II-159b
[39] *Ibid*

Compressed Natural Gas (CNG) storage and distribution capabilities. We understand that the storage and trucking assets are sufficient to fully offset the demand of a smaller community (~1200 residential customers) under certain weather conditions. Centra's CIJs suggest that this system is capable of partially satisfying the demand in larger communities, or under more severe weather conditions.[40] While the impact of the CNG storage and delivery systems certainly has its limitations, it nevertheless represents a tangible step towards mitigating the harm of future outages in many areas of the province. As such, it amounts to a reduction of reliability risk for parts of the system where CNG delivery is practical.

As to the direct cost impact of outages to the utility itself, the IR responses suggest that only one outage since 2010 resulted in remediation costs in excess of $100,000.[41] We acknowledge, however, that this historical cost figure provided in the IR appears to be inconsistent with a much larger estimate of direct outage rectification costs cited in the Steinbach Upgrade CIJ. That document lists "previous Manitoba Hydro gas outage experience" as a source.[42] Since the CIJ does not reference the specific year(s) or events, we are unable to reconcile this potential inconsistency.

In aggregate, however the evidentiary record examined by METSCO suggests no major concerns with Centra's asset condition or performance at this time. To the extent that Centra's investments cite mitigating reliability risks as a major justification driver, the practical evidence on record does not support it.

3.2. Most CIJ documents do not rely on quantitative AM tools. Those that use them – tend to misapply them.

METSCO has spent a considerable amount of time examining the individual program and project Capital Investment Justification (CIJ) documents that form the basis of Centra's most recent capital forecast.[43] Our overall impression is that these documents appear to largely ignore the quantitative tools and analytical frameworks like Pipeline Risk Assessments and Asset Condition Assessments. This is despite the fact that these source documents were available at the time of most CIJs preparation. In its response to the CAC's IRs, Centra acknowledges that other than identifying the needs for additional information through the In-Line Inspections, neither the Natural Gas System Asset Condition Assessment, nor the latest iteration of the Pipeline Risk Assessment analysis had any bearing on the expenditure plans presented to the PUB.[44]

[40] CAC/CENTRA-I-82b, see also footnote 19
[41] CAC/CENTRA-II-159b.
[42] PUB/CENTRA I-73-Attachment, p. 207 of 370
[43] As provided in PUB/CENTRA I-73-Attachment
[44] CAC/CENTRA-I-73, p. 307 of 370

Lack of Reliance on Condition Data in CIJs

METSCO's review of Centra's Capital Project Justifications (CPJ) and Capital Investment Justifications (CIJ) revealed only one instance where the condition of assets (be it measured or estimated) has been relied on specifically to justify the investment. The CPJ in question is a ~$370,000 proposed upgrade to the Russel Gate Station, driven by the results of Station Condition Assessment. While this is a positive development, the project in question is a relatively minor investment compared to other initiatives that make up CEF18.[45] While several other CIJs mention future condition degradation, or state that condition is not known, they do so without relying on any specific data references or assumptions, which could make their deliberations less abstract and more credible.

No Attempts to Quantify the Probability of Outages or Load Growth Manifestation in CIJs

Although the mitigation of potential failures is among the most prominent justifications used in the CIJs, Centra acknowledges that it "has not performed statistical failure analysis, such as generation of failure curves."[46] METSCO found no examples of CIJs where probability of failure was discussed in numerical terms. Instead, the qualitative "risk" of outages that various projects seek to mitigate, represents no more than the "possibility" of outages – a casual contention that falls short of analytical rigour appropriate in AM analysis. Centra attempts to partially mitigate this gap by referring to the possibility of outages occurring during peak winter heating conditions. The circumstances of such hypothetical outages are indeed dire and make an impact on the reader of the CIJs whenever invoked. While increased asset loading or frost-related equipment malfunctions could conceivably lead to increased outage probability in cold weather, their risk of occurrence would also be reduced by the fact that only a portion of a year coincides with cold weather. In any case, Centra makes no attempts to explore these considerations in a quantitative manner.

METSCO acknowledges that the exceptionally good historical performance of Centra's system[47] would complicate the task of deriving statistically significant failure curves, given a relatively small sample of outage incidences. However, Centra could have pursued multiple avenues to make up for its own lack of failure data (such as seeking out datasets of comparable utilities), or at least establish definitively that its own records were insufficient, and adopt a default set of assumptions that could be refined over time. One such approach could involve using the incident frequencies calculated and estimated in the 2014 and 2017

[45] PUB/CENTRA I-73-Attachment, p. 207 of 370
[46] CAC/CENTRA-I-47c
[47] For example, as stated by the Applicant in CAC/CENTRA-I-43c

Pipeline Risk Analysis reports. Despite the availability of this potential course of action, none of the Capital CIJ documents appear to reference any quantitative data on failure probability, or refer to the results of the several condition assessment documents noted above.

Consistent with the lack of quantified outage probability evidence, Centra made no effort to quantify the probability of the anticipated load growth materializing within the estimated timelines.[48] The Applicant could have done so by comparing the timing of past connection completions and actual load increases with the number of historical requests or its own past estimates for the areas in question. Instead, the utility's load forecast projections relied upon in the individual CIJs appear to extend the linear growth trends into the future. While it appears that many areas targeted for load growth increases have indeed experienced consistent population growth in the recent years, Centra should consider enhancing the sophistication of its load projection analysis. Doing so would increase the confidence of both internal and external stakeholders that the proposed capacity expansion projects are needed within the timeframes specified and could not be delayed in an effort to manage the associated rate impacts.

Misapplication of Customer Interruption Cost Calculations in CIJs

Several of Centra's CIJs reference the impact of outages on customers' economic well-being (the so-called Customer Interruption Costs (CICs) or "Value of Lost Load to Customers" as Centra refers to it).[49] They do so to justify the need for investments in reliability enhancements. In the few cases where these calculations are present, they appear to be methodologically inconsistent among themselves, or with Centra's stated Gas Customer Minutes Interrupted cost assumptions in the Corporate Value Framework Implementation Document.[50]

In the case of the Steinbach Upgrade CIJ, the customer interruption cost value estimate used appears to have been sourced from a paper estimating such costs for electricity outages.[51] Centra's own documents acknowledge that using electricity CICs to estimate the gas CICs is inappropriate since the costs are non-

[48] CAC/CENTRA-I-41
[49] PUB/CENTRA I-73-Attachment, p. 208 of 370
[50] PUB/CENTRA I-67a-c-Attachment, p. 14 of 40
[51] We suspect that the October 7, 2013 Brattle Group report cited as a source for load lost value to customers estimate in the Steinbach CIJ (PUB/CENTRA-I-73-Attachment, p. 207 of 370) is based on the paper entitled *Electric Reliability, Resiliency, Rates and Region*, which does not feature any information related to natural gas outage costs. The report is accessible at the following link: https://www.brattle.com/news-and-knowledge/publications/electric-reliability-resiliency-rates-and-region.

comparable.[52] More concerning yet is the fact that the CIJ in question took no steps to estimate the probability of such an outage occurring, which would serve to adjust downward the stated cost impact if used appropriately. Absent this critical adjustment, the estimated outage cost impact to customers appears to have led the CIJ's author to conclude that the more expensive of project options considered was the preferred alternative.[53] A similar methodologically incorrect approach is employed to justify the Portage La Prairie CIJ, with similar conclusions and implications or higher than justified costs for ratepayers.

Qualitative Assessments in Place of More Rigorous Estimates

Aside from unquantified failure risk estimates, the predominant sources of justification plant sustainment CIJs are subject matter expert expectations. METSCO has no reason to question the expertise of Centra's planners and engineers. However, in our assessment, the level of rigour that these modes of justification entail, falls considerably short of the mark that the regulator and consumers should expect from a modern asset management organization. This is especially the case when considering the types of investments that Centra classifies as System Efficiency / System Betterment work.[54] A number of capabilities proposed seek to enhance the Applicant's ability to monitor the system remotely or respond to incidents more quickly. While enhancing reliability is noted as these projects' predominant driver, in the absence of any specific reliability estimates, the Applicant should have attempted to calculate their financial benefits (however minor), which it specifically acknowledges was not done.[55]

In general, METSCO endorses investments that seek to improve the efficiency of system operation or acquire additional data to inform the subsequent planning. However, and in addition to our previously noted reservations, we question the nature and the amounts of such investments in the absence of a defined and approved Asset Management Plan. As the CAC has established through IRs, Centra does not anticipate having an overall AM Plan in place until 2020/2021.[56] We expect that this plan will outline the elements of Centra's Asset Management System and clearly define future development priorities and the inherent tradeoffs. Absent such a plan, material investments in new technologies not supported with explicit economic benefit calculations and not meaningfully tied to reliability should be considered premature.

[52] CAC/CENTRA-I-67a-c-Attachment, p. 14 of 40
[53] PUB/CENTRA I-73-Attachment, p. 208 of 370
[54] PUB/CENTRA-I-75
[55] *Ibid*
[56] CAC/ENTRA-I-53c

Significant Reliance on Past Expenditure Levels and Lack of Rigour in Out-Year Forecasting

Finally, Centra's capital projections rely to a great degree on the past expenditure levels – both in the CIJs and the overall Five-Year Forecast presented in Appendix 4.3. While METSCO does not disagree that the volumes of smaller sustainment capital work may show generally consistent patterns from year to year, the program CIJs that provide no information as to the actual numbers, locations, or anticipated condition of units expected to require intervention should be treated with a degree of skepticism. We understand that competing priorities and relatively low materiality of many types of forecasted investment work necessitate higher-level estimation from a practical perspective. Yet, it is unreasonable for Centra to expect that the prior-year investment volumes alone should suffice as reasonable estimates of future funding requirements.

While many of Centra's *program* CIJs appear to base their financial forecasts on past work volumes, we see this approach as particularly problematic in the context of longer-term *project* volume forecasts. The Cost Summary Table in the Applicant's Five-Year Asset Management Capital Investment Plan includes a category labelled "Planning Item." The dollar value of this category corresponds to 0%, 15.9%, 45.3%, 76.8%, and 100% of the total project cost forecasts for the plan years one through five respectively.[57] Meanwhile, the absolute values of forecasted project investment remain virtually unchanged in years three through five. Since projects (unlike programs) represent discrete, finite and material undertakings, METSCO sees the forecasting approach chosen by Centra as problematic. In our view, such an approach should give the PUB serious grounds to question whether the document before it is in fact a five-year plan.

When asked about the implications of this level of forecasting, Centra stated that given its current practices of developing project investment scopes two years out, a Planning Item is necessary to act as an indicative volume of future investments. In Centra's view stating a budget of $0 where no specific investments are known would be misleading.[58] METSCO agrees that the out-year investment projections in multi-year capital plans are always challenging to quantify with any degree of accuracy. We also see the value of higher-level cost placeholders not grounded in any specific evidence *for the purposes of Centra's internal financial and work planning documents*. We do, however, see their presence as potentially problematic in the context of rate applications for both the utility and the regulator, as these estimates invariably serve as "anchors" that influence stakeholders' expectations in future proceedings.

[57] CAC/CENTRA I-53a
[58] CAC/CENTRA II-150

From the ratepayer perspective, an unsubstantiated out-year estimate is likely to facilitate future acceptance of investments in the comparable magnitude when an out-year becomes a test year. Having established an initial baseline projection, a utility may be adversely incentivized to meet this level of spend irrespective of its actual needs. On the other hand, an applicant's out-year estimate that proves to be too low when more information becomes available, may be a difficult obstacle to surpass, given the previously set expectations and the subsequent inquiries into the variance between the earlier and most recent forecasts.

In providing this commentary, METSCO does not suggest that Centra should cease filing any information on out-year estimates. It is our intent, however, to encourage the Applicant to exert more effort in outlining the overall factual drivers (such as specific locations, subsystems, number and condition of assets) that give it reasons to expect a given volume of capital work on the outer plan horizons. Aside from increasing the two-way accountability between the Applicant and the PUB, doing so would also generate a useful and increasingly precise discourse on the two parties' concerns and expectations. The insights of such ongoing discussions could be leveraged by both parties to refine their ongoing assumptions or resolve the impending issues at an earlier juncture.

Overall METSCO sees the scope, volume and analytical Centra's forecasts and planned work justification as relying too heavily on qualitative assessments of "possible events" and high-level referenced to current practices or past work execution volumes. Where more advanced asset management planning concepts are raised, they are either misapplied or mentioned in passing. At the same time, virtually no references are made to the risk or condition assessment work that the utility has developed – either to support the project rationales or acknowledge and substantiate the information that could be seen as inconsistent. As such, we see much of Centra's project and program justification work to be grounded in subjective assessments that fall short of the evidentiary rigour expected of a modern system planner.

3.3. Centra's successive attempts to develop quantitative risk scoring are moving towards a *less granular* and *less transparent* approach.

2014 Pipeline Risk Assessment Methodology

Judging from the application record, Centra's journey towards establishing the quantitative value of asset risk (and its ensuing mitigation by the proposed investments) dates to at least 2014, when the original Pipeline Asset Risk Assessment methodology and report were produced. The report's methodology constitutes an algorithm designed to determine an individual risk score between 0 and 100 for each of ~37,000 segments comprising Centra's pipeline system. The overall score is computed by multiplying the

Frequency Analysis Score (a measure of an outage's probability) and a Consequence Analysis Score (a measure of its anticipated impact). In this inaugural methodology, Centra considered only four types of hazards (External Interference, Corrosion, Construction and Material Defects, and Natural Forces.[59]

Each type of hazard had a default frequency (percentage) value assigned to it across comparable pipe segments, with the total frequency summing up to 100% (presumably based on historical outage event cause analysis at the time). The next step, which helped distinguish among the segments, involved applying the Hazard Susceptibility Factor multipliers to each segment based on their locational, demographic, historical and condition-based attributes as relevant. For example, a segment with a history of past outages, located in a geologically unstable area, or featuring coating design known to be more susceptible to natural degradation, would receive higher susceptibility scores across the relevant hazard parameters. Similarly, a segment with no past failures, a geotechnically stable location, and a superior coating design would have a relatively low score, indicating lower risk.

As a final step in determining the Frequency Score, the algorithm deflated the scores calculated thus far in cases where data was available to suggest that the asset in question was less vulnerable to the hazards (e.g. a confirmed depth of cover survey, or positive in-line inspection results). The result of these calculations was an initial ranking of segments according to their calculated probability of failure, reflecting past system-wide outage experience and the asset-specific attributes that Centra had reasons to expect to increase and/or decrease failure likelihood. The probability score was then multiplied by the Consequence Analysis (impact) Score. Centra derived the impact score by considering the safety consequences of a segments' potential failure using the data on pipe size, network maximum operating pressure, and the building density in the surrounding areas. The inaugural model contained no consequence factors apart from safety.

In the end, by multiplying the Frequency Score by the Consequence Score, Centra was able to rank its pipeline segments based on their total calculated scores. The 2014 Report features a list of 100 segments representing the highest risks and provides detailed business case-like documents for the 10 highest-rated pipe systems segments.[60] Each of these "mini business cases" documents featured a clear articulation and reasoning for the component hazard and impact scores, provided available technical, demographic and geographical data, along with a map. In multiple cases, these documents also calculated the anticipated risk reduction impact of potential mitigation efforts like cover restoration or cathodic protection enhancement.

[59] CAC/CENTRA I-44a-d-Attachment, p, 3 of 66
[60] CAC/CENTRA-I-44-a-d-Attachment, pp 24-34 of 36.

In METSCO's assessment, the quality and transparency of information contained in these 10 case studies exceeds that of most CIJ documents supporting CEF18.[61]

The report acknowledged the numerous asset data gaps that its authors addressed through assumptions, In our assessment, however, both its methodology and execution were rigorous, transparent, replicable and generally commendable given the available data. As METSCO found out by way of IRs, the 2014 Report was not used in Centra's subsequent capital planning work,[62] though its findings reportedly validated the project work already underway.

2017 Pipeline Risk Methodology and 2018 Update

Building on the previous methodology's framework, the 2017 Pipeline Risk Methodology and the 2018 Report update introduced several enhancements, including the separate evaluation of transmission and distribution segments, and expression of frequency and impact values as defined units (incidents per 1000 kilometer-years, and units per incident). The revised approach also features several enhancements to the manner of derivation of system-average and segment-specific hazard frequency scores.[63]

Yet, the methodology also contains several steps of questionable value, such as an arbitrary selection of transmission outage frequency (in lieu of the lack of past examples of such events), and the bucketing of the calculated frequency scores into six discrete qualitative categories, chosen to represent the various degrees of likelihood of an event taking place. Among them is "Likely – this event might occur several times or more in a decade", for all pipelines with calculated frequency scores equal or greater than 40 incidents / 1000 kilometer-years, or "Rare – have heard of something of this happening elsewhere" (0.5 incidents /1000 kilometer years.[64]

Similar "qualitative conversion" applied to the calculated value of an event's consequence. In this case, the quantitative likelihood values were broken down into "High," "Medium" and "Low" impact categories, corresponding to defined thresholds of an arguably non-intuitive "Units per Event" metric.[65] These qualitative descriptors were then used in the process of Risk Evaluation (as distinct from the preceding

[61] These documents however did not include the cost estimates of potential remediation work
[62] CAC/CENTRA I-44a-c
[63] Attachment 2, p. 32 of 36

[65] Ibid, p. 33 of 36

quantitative Risk Analysis) to determine the significance of a given risk.[66] No detailed business cases comparable to the 2014 iteration were present in the 2017 or 2018 versions.

METSCO understands that the restatement of risk scores into qualitative terms was driven by the desire to align the pipeline risk methodology with the broader corporate risk framework. However, we believe that the additional qualitative "round" of risk assessment, where values determined through mathematical calculation are converted into qualitative terms stands to confound the intended implications of assessment, opening them up to interpretation and potential gamesmanship. Importantly, Centra's IR responses indicate that the results of this assessment were also not used in development of the current capital forecast.[67]

2015-2017 "Interim" Risk Assessment Framework

Complicating the matters further is the existence of yet another Risk Assessment framework, featured in the Applicant's 2019-2023 Asset Management Capital Investment Plan. While we understand that the latest Pipeline Risk Assessment Methodology remains in use, this framework is distinct from it and appears to have existed in parallel with it. It is also explicitly applied to the Projects section of the five-year capital plan.[68] The methodology represents a largely qualitative Scorecard-like document made up of five assessment categories (Financial, Reliabiluty, Safety, Environment, Customer Value).

Each category has three (predominantly qualitative) Risk Rating definitions, corresponding to High, Medium and Low risk ratings representing consequence. The likelihood criteria are defined by the same six-level hierarchy from "Almost Certain" to "Very Rare" as the one used in the last step of the 2017 Pipeline Risk Assessment. However, in a departure from the previous methodology, there are no strict

[66] Ibid, p. 3 of 36
[67] CAC/CENTRA II-144a
[68] Appendix 4.3, pp, 40-61 of 64

quantitative boundaries to demarcate these likelihood assessment levels. The Likelihood and Consequence assessment parts are then integrated in the form of a Red/Yellow/Green matrix depicted in Figure 3-5.[69]

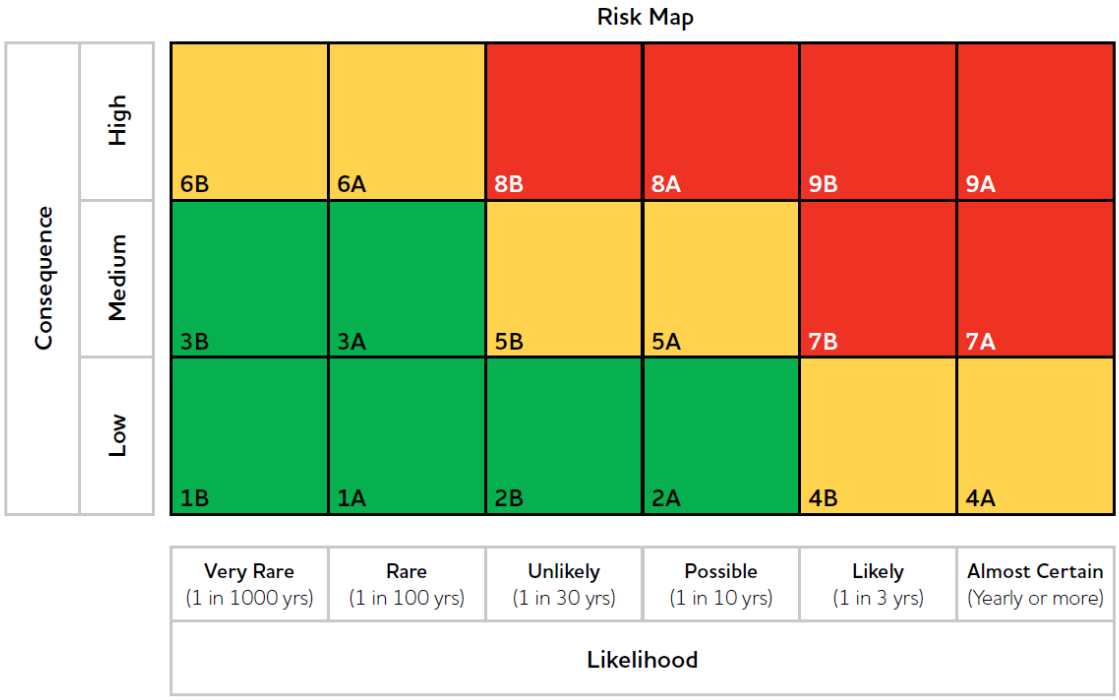


Figure 3-5: Risk Matrix Framework Used in the 5-Year Investment Plan

Apart from entailing a more qualitative framework yet, the consequence category descriptions (presumably developed for Manitoba Hydro) have little relevance to Centra's operations, as they feature descriptive thresholds such as "Loss of 2000 MW, NERC Level 2." While Centra has confirmed that it will discontinue the use of this framework in the favour of the Corporate Value Framework, it is not clear why the utility adopted this interim approach, or chose to integrate it into its 5-year Asset Management Capital Investment plan.[70] When viewed from the perspective of evolution of Centra's post-2014 risk-based planning, this interim framework like yet another step away from a transparent, intuitive and objectively replicatable approach that the original framework entailed and could have been built on.

On to the Corporate Value Framework

[69] Appendix 4.3 p. 62 of 64
[70] CAC/CENTRA II-155

Although the calculation of the Corporate Value Framework (CVF) scores appears in nine CIJs,[71] the approach was not formally used in the preparation of CEF18.[72] In our opinion, the application record does not contain sufficient information to weigh in on the merits of this approach in any degree of detail. From the perspective of our observation of Centra's post-2014 risk articulation trends, it appears that the CVF could potentially further complicate the task of objectively deriving, validating and comparing the asset risk scores. We make this preliminary assertion due to the large number of potential assessment categories and the related adjustment factors that a planner could apply to virtually any given investment.[73]

Moreover, the CVF scores presented as "Net Value" and "Net Value/$K,"[74] appear to reintroduce the very problem of numerical scores that are not grounded in any specific output units that the 2017 Pipeline Risk Methodology solved relative to its 2014 predecessor. Yet, in the absence of a detailed evaluation of CVF's practical application anywhere in the proceeding's record, METSCO believes that it is best to forgo making any definitive conclusions as to the CVF's value in articulating natural gas project risks.

Overall, Centra's successive and overlapping attempts to define and leverage quantified risk scores over the past five years, are yet to manifest themselves in a consistent manner within any single Capital Expenditure Forecast. We see two major concerning factors in this situation. The first is the variety of approaches attempted in a relatively short period. The second is the fact that none of them were used in earnest to analyze or prioritize the planned investments. The combination of these factors signals a potential disconnect between the overarching corporate priorities and technical, subject matter-specific needs of utility plant sustainment.

It is possible that the experience gained through development of all the frameworks discussed in this section will enable Centra to deliver a robust multi-layer framework, capable of "rolling up" the necessarily technical and granular asset risk assessment values into an objective and functional corporate-wide framework. However, from the standpoint of the current application, Centra's complex risk costing journey provides no tangible value to the PUB and consumers.

[71] PUB/CENTRA II-37b
[72] PUB/CENTRA-I-67b
[73] PUB/CENTRA-I-67a-c-Attachment
[74] PUB/CENTRA-II-37b

4. Centra's forecasts feature multiple discretionary projects not adequately supported by its evidence.

Having addressed our reasons to question Centra's reliance on quantitative assessment tools in the previous chapter, we move to our second major contention – namely that Centra's capital forecasts include a number of discrete projects, programs and/or specific investment features that we suspect may be discretionary in nature. We make this observation for the following reasons:

- Several projects aimed at reliability are inconsistent with industry planning practices;
- There is currently no evidence of Centra experiencing capital project backlogs; and
- Justifications for system enhancement / efficiency projects do not showcase tangible value.

While nothing prevents a utility from planning and executing the projects that may not be strictly required to meet its core operating expectations, it is METSCO's firm belief that the evidentiary standard associated with seeking rate recovery for such investments is substantially higher. In this type of evidence requires clear articulation of anticipated ratepayer value. As we argue below, we see Centra's evidence as not going sufficiently far to attain this standard in a number of relevant instances.

4.1. Several projects aimed at reliability enhancements are inconsistent with industry planning practices

Among other potential benefits, several of Centra's forecasted investments seek to enhance the reliability of supply by providing secondary connections or interconnections in the urban areas with existing supply paths. Among these projects are the $4.5-million Steinbach Upgrade,[75] the $3.5-million Winnipeg HP Interconnection – Inkster Blvd to King Edward St,[76] and the $1.6-million Portage la Prairie Secure Gas Supply Project[77]. In all three cases, a substantial part of proposed investments is justified by providing a secondary supply / distribution path to maintain reliability in the event of the primary asset's failure.

While this type of supply redundancy planning is commonplace in the electricity sector, METSCO's review of the evidence supplied by Centra suggests that this may not be the case in the natural gas industry.

[75] PUB/CENTRA I-73-Attachment, p. 204 of 370
[76] Appendix 4.3, p. 57 of 64
[77] PUB/CENTRA I-73-Attachment, p. 232 of 370

Specifically, section 6.3 of Manitoba Hydro's 2014 Gas Planning Criteria Document entitled "Reliability" states the following:

> "*In general, the gas industry does not mandate strategies such as redundant pipelines to provide reliability if one pipeline were to fail. The gas industry does not have a reliability mandate similar to the North American Reliability* [sic] *(NERC) Standards which are mandated in the electrical supply industry*."[78]

Although the document proceeds to describe some instances where redundant supplies may be contemplated, the implication of the above passage is that the provision of supply redundancies (such as those proposed in the projects referenced above) is a matter of a given utility's discretion. This fact alone need not imply that the redundancies planned by Centra are imprudent. However, considering these common industry practices, and given Centra's excellent reliability record, it is reasonable for the PUB to expect that the planners would to justify these enhancements with robust data. This is not the case.

As we discuss earlier, the Steinbach Upgrade CIJ appears to draw on an electricity sector Customer Interruption Cost (CIC) source document to quantify the impact of a potential outage in the community, which it subsequently uses to justify a higher-cost option. Unlike the other two options intended to drive capacity upgrade only the chosen option both enhances the capacity of the primary supply point and provides a backup supply path.[79] Having done so, the authors then fail to adjust the estimated dollar value impact of outage by an estimate of its relative probability, which would invariably serve to reduce the calculated risk cost. Instead, the improperly estimated risk cost leads to the selection of a project option that doubles the estimated cost relative to the alternatives designed to accommodate load growth.[80]

The authors of the Portage la Prairie Secure Gas Supply CIJ – a project also primarily driven by capacity constraints – follow a similar approach. They explicitly reference Manitoba Hydro's Electricity Distribution Planning Criteria that would classify the city as an urban centre, and mandate that a redundancy be "permanently installed to address a lower tolerance for outages."[81] Having made this statement, the planners do not proceed to compare the electricity service supply economics with those of natural gas transmission. Instead, they resort to an estimation of an outage CIC impact, unadjusted for probability in the same manner as the Steinbach project. This improperly estimated risk cost then leads the planners to select an option that

[78] PUB/CENTRA I-76a-b-Attachment 1, p.30 of 84
[79] PUB/CENTRA-I-73-Attachment, p. 207 of 370, see also footnote 52
[80] PUB/CENTRA-I-73-Attachment, p. 208 of 370
[81] PUB/CENTRA-I-73-Attachment, p. 232 of 370

meets both the capacity constraints and redundant supply objectives. This dual driver option increases the project cost almost threefold relative to the supply-only option.

As to the Winnipeg Inkster to King Edward HP interconnection, METSCO notes that the project does not currently have an approved CIJ, though the project's cost flows suggest that as much approximately 10% of its budget is planned to be spent in 2019/20. METSCO encourages the PUB to monitor the developments associated with this project, to avoid the potential circumstances where the project is underway while its economic or technical rationales are challenged.

4.2. Centra does not appear to be facing any capital project backlogs

A utility facing backlogs in core capital project/program work to support safe and reliable operation of its system, is less likely to entertain investments that may be beneficial, but not strictly necessary in the environment of scarce resources and funding constraints. Having examined the application record, METSCO sees no evidence to suggest that Centra is facing any such core work backlogs. In METSCO's assessment, this makes it more likely to propose certain investments, forgoing which would have no adverse impact, but could facilitate lower rate increases.

Echoing our discussion from section 3.1, we believe that the estimated condition of Centra's assets and the observed performance of its system, suggest a utility whose reinvestment rates appear to be sufficient to maintain adequate performance in the near-to-medium term. Moreover, the early results of ILI work suggest that the condition of Centra's steel pipelines may be better than previously anticipated.[82] Should these findings be confirmed by broader deployment of ILI technology, it is conceivable that Centra's medium-to-longer term sustainment needs could decrease further.

At this juncture, Centra's own statements appear to confirm the absence of any significant investment backlogs. In responding to the CAC's request to explain the methodology used to estimate the forecasted condition of its assets over the coming 20-year period, the Applicant confirms that the "full replacement would be achieved within the estimated life expectancy of stations, as no 'backlog' or work exists." [83] Similarly, when discussing the benefits of the cathodic protection enhancement program, Centra contends that relatively modest investments in this technology enable the steel pipelines to remain functional for 100 years "and in many cases much longer if properly maintained."[84] Coupled with the fact that CEF18 does

[82] PUB/CENTRA-I-72-Attachment, p. 26
[83] CAC/CENTRA I-74a
[84] PUB/CENTRA I-73-Attachment, p. 356 of 370

not contain any specific projects or programs primarily aimed at pipeline replacement, the evidence suggests that the Applicant's capital sustainment program has no signs of material backlogs, which it would seek to liquidate through investments without delay had they were in place.

4.3. Justifications for system enhancement / efficiency projects lack the evidence of tangible economic value upside

Approximately 10% Centra's 2018/19 and 2019/20 annual program budgets is dedicated to the System Betterment: Measurement and Regulator Stations program. Based on METSCO's review of the program CIJ and other related evidence, Centra has not provided sufficiently robust justifications to support the forecasted amounts. Several of this program's components, namely Station Automation, Station Equipment and Control Hardware, and System Monitoring, seek to enable the remote control and automatic operation of station equipment.[85] Elsewhere in its evidence, Centra collectively refers to these investments as System Efficiency Projects, driven by reliability and cost reduction considerations. [86]

METSCO agrees that enhanced automation to improve reliability and manage operational costs represent worthwhile objectives for the Utility to pursue. Yet, neither the program CIJ nor the five-year Asset Management Capital Investment Plan contain any specific data related to the stated reliability objectives (e.g. station locations or network areas with known reliability deficiencies or the emerging outage risks). This being the case, it is reasonable to expect for these investments to be justified based on their cost reduction or cost management merit. In our view, Centra has not managed to do so effectively.

When seeking to achieve operational efficiency improvements through ratepayer-funded capital projects, utilities can expect to derive several types of financial benefits – namely Net Income increases through lower operational improvements and higher depreciation spend and Return on Equity growth by way of increases to their Rate Base. Considering further that automation and monitoring investments typically have shorter depreciation lives, the full value of these financial benefits is attained relatively quickly. It is thus reasonable to expect that the Applicant's justifications for these types of ratepayer-funded investments should articulate the financial upside for customers. In our view, this is particularly pertinent in the context of Cost of Service rate-setting frameworks, where the applicants face no explicit incentives to identify and capitalize on operating or capital efficiencies.

[85] PUB/CENTRA-I-73-Attachment, p. 348 of 370
[86] PUB/CENTRA-I-75

This is not the case, as the CIJ contains no Net Present Value (NPV) or Internal Rate of Return (IRR) or payback period calculations, or other modes of quantifying their inherent value. When asked by the PUB whether it considers these financial metrics in evaluating the prospects of such investments, Centra pointed to "minimization of frequency and duration of an outage" as the core investment value drivers, adding that neither IRR nor Payback Period were calculated. Since the system appears to function at high reliability levels in the absence of such investments, and given no apparent concerns with reliability more generally, we expect Centra to have a significant degree of discretion in relation to these investments. Absent explicit articulation of financial value, METSCO is unable to discern whether these investments would offer tangible economic benefits to either the utility or its customers.

Unlike the automation / remote monitoring investments, however, it is our impression that the remaining items comprising this program are appropriately justified by relying on objective evidence. For example, the line heater units planned for replacement are clearly identified by location and justified using their advanced service ages and the need to prevent ice formation caused by higher-moisture shale gas from Eastern United States.[87] Similarly, having referenced the list of Regulator Stations proposed for replacement against the quantitative results of Station Condition Assessments provided in IRs, METSCO supports these investments, as they target the assets with some of the worst (highest) reported scores.

In conclusion of this chapter, METSCO once again acknowledges that it does not possess the natural gas engineering expertise to strictly assess the pipeline investments discussed here on technical merit. However, our expertise in asset management, along with our knowledge of regulatory principles and in-depth understanding of regulated utility business models, give us confidence to assert that the PUB should expect Centra to invest more analytical rigour into the development of evidence for projects, if it wishes the ratepayers to fund its discretionary capital objectives that are not strictly required by its key mandate.

[87] Appendix 4.3, p. 30 of 64; PUB/CENTRA-I-73-Attachment p. 348 of 370

5. The Applicant's evidence shows no meaningful effort to manage the rate impact of forecasted investments.

METSCO's concluding argument in support of position that Centra's capital forecasts are not adequately backed by its evidence, concerns the issues of continuous improvement in operations, investment planning, and capital work execution. As we note earlier, it is our belief that the Cost of Service / Rate of Return model used to set Centra's rates contains virtually no incentives for applicants to continuously seek out and leverage efficiencies throughout their activity value chains. Whereas incentive-based frameworks challenge utilities to revisit their cost structures and service delivery models to meet the rate cap thresholds, no such incentives are explicitly embedded in the Cost of Service model.

Nevertheless, given the scale of proposed capital expenditure increases, it is reasonable, in our view, to expect Centra's management to take meaningful steps aimed at proactive mitigation of consumer rate impacts driven by its work program. In METSCO's submission, the record of this proceeding shows no such effort on the part of the Applicant. On the contrary, several issues raised in this proceeding may be indicative of the reverse trend in operational efficiency and cost management discipline. This is primarily evidenced by the following three examples:

- Evidence pointing at the lack of consideration of operating and investment tradeoffs within and across Centra's departments and program areas;

- Centra's decision to capitalize the Meter Verification and In-Line Inspection activities, both of which are typically funded through operating budgets;

- The Applicant's reliance on Target Variance estimates to effectively hedge its program outcomes.

We substantiate each of these contentions below.

5.1. Centra makes no apparent effort to consider the tradeoffs inherent in its planning decision process

A fundamental part of every advanced Asset Management System is the asset lifecycle cost management. By considering both short- and longer-term tradeoffs between capital and maintenance activities, or proactive vs. reactive approaches to asset replacements, asset managers should seek to minimize the overall costs of their activities. While the nature and frequency of certain maintenance activities may be a function of technical or economic regulation requirements, tradeoff considerations are available across multiple operating dimensions. As it states in its response to a PUB IR, Centra does not explicitly consider the trade-offs between capital and maintenance activities when making investment decisions.[88]

In METSCO's opinion this represents a notable gap, indicative of the organization's asset management maturity levels. Similarly, Centra acknowledges that it does not prioritize the asset investment plans across most programs and departments.[89] While it is reasonable to expect this fact to change in light of the ongoing adoption of the CVF framework, the current lack of effort to explore the economies of scope or sequence across its activity areas may suggest foregone value gains. Perhaps even more importantly from a managerial perspective, the lack of cross-program / activity area prioritization may limit the planners' exposure to alternative means of accomplishing certain objectives, or opportunities to challenge their peers' assumptions, and have their own assumptions challenged. In a similar vein, it is also notable that Centra is yet to benchmark any of its activities (most notably costs) against its peers.

Finally, and supplementing our comments in Chapter 3 on the downsides of program budgeting driven by past expenditure levels, METSCO sees a significant limitation in the fact that only one of Centra's capital programs (Farm Tap Abandonment) underwent an explicit Cost-Benefit-Analysis (CBA) ahead of the filing.[90] Centra's commentary on this issue suggests that a number of other programs consider multiple execution options, to indicate that the value of investments ultimately pursued is assessed in an environment similar to a formal CBA framework.[91] This is a positive practice, although it may fall short of the benefits of a more rigorous assessment of whether and how does a given program continue to deliver value – through its outcomes, its manner of execution, or the assumptions of customer needs held by its managers.

[88] PUB/CENTRA-I-66b
[89] *Ibid*
[90] CAC/CENTRA-59a
[91] CAC-CENTRA-II-153

METSCO believes that even strictly mandated activities like connection and capacity increase work may benefit from periodic assessments of their continued ability to deliver the optimal services in the way that maximize the interests of the organization and promote the values important to ratepayers. In our view, Centra's evidence is largely devoid of examples that showcase organizational introspection driven by the objectives of continuous improvement and maximizing the value of inputs used to deliver the organization's core service outputs. Having shown no effort to manage its costs through considering tough tradeoffs, or learning through inter-program external benchmarking, Centra cannot credibly claim that its forecasts amount to the most cost-effective way for it to deliver on its mandate.

5.2. Capitalizing the Meter Verification and ILI activities may indicate suboptimal efficiency levels and could further discourage cost discipline

The majority of Centra's responses to the CAC's questions regarding its decision to capitalize the costs of Meter Compliance Verification and ILI activities referred to external accounting and technical standards authorities, whose rules permitted to the Applicant to undertake these steps. While METSCO believes that the costs of these programs are more appropriately discharged through O&A expenditures, we do not wish to dispute the legitimacy of Centra's decision to capitalize them, and/or the rate impact benefits that it may yield in the immediate term.

We were, however, interested to understand the managerial reasons that drove Centra to make this decision at this juncture. Unfortunately, we found the Applicant's responses to our requests to describe the circumstances surrounding these choices and/or confirm that ratepayer interests were considered in process, to be largely unhelpful.[92] We did establish that Centra is not aware of any other utilities that capitalize similar expenditures, though this finding was somewhat offset by the Applicant's response confirming that its auditors had no concerns regarding its capitalization practices.[93]

While we suspect that the decision to capitalize these two types of expenditure categories were driven by the Applicant's inability to effectively manage its O&A expenditures (so as to integrate the new ILI work into the existing scope of activities with minimal rate impact – such as by identifying opportunities to eliminate / reduce / optimize other activities), we have obtained no information on which such an assertion can rest with certainty. We do note with confidence, however, that facilitating this decision on the PUB's

[92] For example, CAC/CENTRA II-156 and CAC/CENTRA ll-157a-c
[93] CAC/CENTRA ll-157a

part may constitute an important precedent that may further discourage financial discipline and the culture of continuous improvement.

Accordingly, we encourage the PUB to explore the cost-benefit considerations of the contemplated move further in the remainder of this proceeding. In our view, it does not matter whether the PUB has a mandate to disallow certain regulatory accounting practices, since it always retains an ability to adjust the Applicant's levels of rate funding, in which the allowances can be made to encourage desired behaviour. Notwithstanding the rate impact management benefits, allowing Centra to capitalize these costs could further discourage cost management discipline and search for productivity gains to offset future increases.

5.3. The Applicant's reliance on Target Variance estimates allows it to hedge its program outcomes and avoid financial accountability

Concluding our discussion on the general lack of evidence to support a contention that Centra's planning and management practices reflect an adequate rigour and discipline is our position on the issue of Target Variances, which we see as another example of suboptimal cost management discipline. In METSCO's opinion, the Applicant's ability to rely on a 10% hedge on either side of its capital project completion targets may entail and appropriate internal cost management practice. However, in the context of regulated rate-setting, the PUB's continued tolerance of such a budgetary line item represents an accountability gap between the utility and its ratepayers. In making this observation we fully concur with Centra that the process of multi-year capital budgeting is volatile and complex.

By suggesting that the Target Variance line item is inappropriate, we do not wish to suggest denying the Applicant its ability to justify its future underspend or cost overruns. Instead, we encourage the PUB to consider whether a combination of a flexible capital investment target, out-year forecasts based on no evidence, and the lack of rate-setting framework's efficiency incentives are conducive to rigour and discipline in financial management and capital planning expected from a modern North American utility.

METSCO understands that the filing requirements governing the content of Centra's rate applications may not include any specific provisions to mandate information related to productivity, efficiency or continuous improvement in operational and capital work execution. Nevertheless, we believe that the issues raised in this section, along with those related to quality and rigour in capital forecasting discussed earlier, provide PUB with ample grounds to question whether the balance of Centra's evidence points to a prudent planner and cost-conscious work execution manager – one who is likely to have made an effort to optimize the costs of its program forecasts in consideration of ratepayer impact.

6. Concluding Observations

At the outset of this report, METSCO observed that modern utility asset management is as much about justifying and selecting *among* the potential investment opportunities, as it is about selecting *between* taking on incremental investments or effectively "returning" the capital they would require to customers by way of lower rate increases. Throughout the report's body, we identified a number of instances pointing at the Applicant's lack of reliance on objective data or quantitative tools that evaluate it; its misapplication of analytical frameworks, or explicit admissions that project prioritizations or program cost-benefit analysis work has not taken place.

To METSCO, the balance of examples raised in this report amount to compelling evidence to conclude that as an asset manager Centra was neither successful either in considering the relative merits among the contemplated projects, nor in ensuring that ratepayer value of all projects proposed is comparable to the value of lower rate increases in the absence of some projects.

At several junctures, METSCO has acknowledged the sheer complexity of any utility's asset management journey – a challenge compounded in Centra's case by the pace and scale of Manitoba Hydro's ongoing organizational transformation initiatives. However, we also cautioned the Applicant and the PUB as to what we see as potentially concerning trend away from the simpler yet robust and transparent asset risk assessment methodologies. While criticizing the observed lack of discipline in compiling the evidence to support its investment justifications, we also outlined and endorsed those examples where we felt that the Applicant's evidence was compelling. We noted the positive trends with the development and evolution of several distinct asset condition assessment, and commended Centra for its explicit acknowledgment of existing information gaps and the subsequent steps to rectify them.

On balance, we maintain our original position that the evidence presents the PUB with a number of compelling reasons to question the necessity and appropriateness of the proposed magnitude of Centra's CEF18 forecasts. However, we also see multiple areas of opportunity inherent in Centra's existing capabilities, which we suggest it should leverage to further build out their AM capabilities.

Presented on the following page is a brief table of recommendations that we encourage the Utility and the regulator to explore further – in the latter stages of this proceeding and beyond. Our recommendations address the projects where we feel the most significant opportunities for cost forecast reductions may exist. Notably, they also include suggestions as to the next steps in Centra's AM journey that could benefit the Utility and the Regulator alike, were they pursued in a collaborative manner.

1 Table 1: METSCO Recommendations for Further Consideration by the PUB and Centra

#	Initiative or Issue Area	Suggestions for Further Actions (PUB & CG)
1.	Steinbach Upgrade Project	Explore the rationale for a ~$2.5M scope increase due to proposed redundancy over the base option estimate that is driven solely by load growth. Consider revising the estimate back to capacity-only assumptions if reliability case is not confirmed.
2.	Portage La Prairie Gas Supply	Review the grounds for a ~3X cost estimate increase due to inclusion of a new supply point, justified through improper calculation. Consider revising the estimate to reflect the capacity-only assumptions if reliability case is not confirmed.
3.	CVF Implementation	Explore options for joint PUB Staff/CG workshops on the CVF framework's fundamentals and specific (hands-on) project assessment tasks. Doing so would foster trust and simplify future evidence exploration.
4.	Sustainment Program Impact Sensitivity	Conduct sensitivity analysis regarding the impact on Centra's operations and service levels of capital program cost reductions. Encourage Centra to not only state the impact of such costs, but also meaningfully explore opportunities to offset it beforehand. Contemplate funding reductions accordingly.
5.	Load Materialization Patterns	Utilize past data to empirically explore the probability of forecasted load increases relative to the timing and levels anticipated. Integrate the results into capacity planning work and update them regularly.
6.	Winnipeg HP Interconnection	Consider delaying project commencement until such time as the CIJ document is developed and review, having regard for the commentary on project justification issues contained in this report.
7.	Station Condition Assessment Enhancements	Explore options for integrating quantitative data (instrument readings), use of weighted parameters and integration with the System-Wide ACA framework. Ensure that year-over-year trends in results are analyzed / used as a KPI.
8.	Red River TP Replacement	Examine the options to estimate the statistical probability of a simultaneous dual supply point failure, and/or options for relocating of one of the two pipelines.
9.	Pipeline Risk Assessment Methodology Enhancements	Identify a path forward for further development and utilization of the 2018 Model, including the options for using it in support of the CVF evaluation framework on an ongoing basis.

#	Initiative or Issue Area	Suggestions for Further Actions (PUB & CG)
10.	System Efficiency Benefits Tracking & Justification	Initiate dialogue on options for joint PUB/CG tracking/reporting on the efficiency benefit realization to facilitate evidence-based System Betterment CIJ development.
11.	Asset Failure Data Research	Consider initiating efforts to identify and procure industry peer data on asset degradation-related failure patterns with the aim of developing probabilistic curves.
12.	Capital - Maintenance Tradeoffs	Identify areas of opportunity and specific milestones for exploration of economic benefits of lifecycle-based assessment of tradeoffs between capital and maintenance expenditures for various asset classes and operating program areas.

This concludes our report. METSCO thanks the PUB, Centra and the CAC for the opportunity to explore the diverse and impactful issues raised in this proceeding. It is our hope that our commentary proves valuable to all parties involved, motivating them to continue exploring the benefits of evidence-based system planning and asset management.


1
2
3
4
5