

Corporate Report

REPORT NUMBER 234-2025-Infrastructure & Operations-Environment		
DATE		FILE
PREPARED	June 2, 2025	
MEETING DATE July 14, 2025		
SUBJECT Automated Meter Reading - Business Case Study		

RECOMMENDATION

WITH RESPECT to Report 234-2025-Infrastructure & Operations-Environment we recommend the implementation of Advanced Metering Infrastructure (AMI) technology to automate the water meter reading system;

AND THAT the project costs be included in the 2026-2028 Waterworks and Wastewater rate-supported capital budgets;

AND THAT the City Manager be authorized to sign any necessary agreements related to this Report;

AND THAT any necessary by-laws be presented to City Council for ratification.

LINK TO STRATEGIC PLAN

This report directly supports the 'Growth' section of the Maamawe, Growing Together City of Thunder Bay Strategic Plan 2023 – 2027. This section of the Plan identifies the goal to implement better ways of serving the public that focus on continuous improvement and delivering positive outcomes for the City. As well this report supports the 'Prosperity and Sustainability' section, to deliver customer-centered, digitally powered City services as indicated in the Digital Strategy.

EXECUTIVE SUMMARY

A business case study for the implementation of Automated Meter Reading for the City's water system was conducted as recommended by the Grant Thornton Program Service Review in December 2020. The study results indicate positive improvements in the areas of customer service, revenue protection, and operational efficiency while providing a positive return on the City's investment with the implementation of an

Advanced Metering Infrastructure (AMI) system, which is a form of automated water meter reading.

Therefore, it is recommended that the costs for the AMI project be included in the upcoming capital budget process.

DISCUSSION

The City of Thunder Bay provides drinking water and wastewater services to the community through a network that includes more than 38,000 water meters. These water meters provide the primary billing input that allows the City to determine volumetric charges for both water and wastewater services.

To determine the best approach to optimizing the water metering system, three new scenarios were evaluated. The options reviewed included a new AMR system, a city-owned radio-based AMI system, and a cellular based AMI system, in addition to continuing with the existing approach (gradual replacement of manual read meters). It was determined through a consultant assignment and extensive consultations with the City's subject matter experts that implementation of a city-owned AMI system will provide the greatest benefits to customer service, revenue protection, and operational efficiency, while providing a strong rate of return to the City.

Advanced Metering Infrastructure is a green approach which includes a network of devices that transmit readings remotely to a central system owned by the City. This system automatically collects data, reduces meter reading costs, improves customer service, and reduces the health and safety risk associated with traveling through the city to read meters.

Results of Business Case Study

Customer Service Benefits

Transitioning to AMI provides significant improvements to customer service delivery. AMI improves billing accuracy as it eliminates the need for estimated bills. This enhances customer satisfaction as it reduces inaccurate or delayed readings caused by inaccessible or malfunctioning meters.

AMI allows for early identification of leaks allowing customers to address leaks that might go undetected for weeks or months and would otherwise result in a high water and wastewater bill. Under an AMI system all water meters communicate their hourly readings each day, empowering customers and city staff with greater visibility to detect leaks and unusual consumption including early customer warnings, promoting water conservation and cost savings.

Many AMI systems provide online customer portals where residents can view their

water usage patterns. Customers are better able to understand their consumption patterns, identify unusual usage, and take steps to reduce usage and associated costs.

Meter Age

Mechanical water meters, such as those currently in use by the City of Thunder Bay, degrade over time, resulting in under-registration and under-billing of water consumed. The average age of meters in the City's water system is 23.5 years, with more than 4,700 meters over 40 years old. Industry practice is to replace meters when they reach 15 to 20 years of age to maintain accuracy and reduce the risk of meter failure.

A conservative estimate of meter accuracy reveals the City's Water Authority is losing \$1.5 million per year in combined water and wastewater volumetric charges. This value increases with every year that the mechanical meters are left in service. Replacing these meters with non-mechanical meters that do not lose accuracy over time will protect the water and wastewater revenues over their expected twenty-year lifecycle. The revenue loss calculation is based on a meter accuracy decline of approximately 5% on average, which could be the expected annual increase for customers' water bills. The average result is an increase around \$0.11 per day for a customer.

Furthermore, meters purchased prior to 2002 were manufactured with bronze alloy that contained 5% to 7% lead. The city's water system still includes 20,459 of these meter types that need to be prioritized to be removed from service.

Meter Reading

All of the City's meters are installed indoors with only 21% equipped with remote receptacles that enable them to be read without entering the premises. As a result, customers are largely responsible for submitting their own meter readings. Of the 150,000 quarterly bills issued in 2023, only 18% were generated based on a City-captured actual reading of the meter. It is industry practice to strive to capture actual readings for nearly 100% of all meters.

The fact that meters are largely read by customers adds a service burden to those customers, especially those who may have difficulty accessing the meter. In addition, without the ability to read the meters, the City is unable to confirm that the meter has been read correctly.

The automation of meter reading will allow the reduction in workforce for manual meter reading work, resulting in three (3) fewer FTEs in that function.

Of the 56 cities in Canada with populations of 100,000 or greater, only Thunder Bay and Winnipeg continue to install direct-reading meters in basement settings. Currently, the City of Winnipeg is developing a procurement to change this practice and move to an AMI system.

Facilitation of Monthly Billing

Many water utilities make the decision to move to monthly billing as this practice helps households manage their expenses more effectively. Smaller, more frequent bills are easier for most customers to budget and pay for than larger, quarterly bills, which may cause financial strain. Furthermore, unusual consumption patterns which could indicate leaks are identified sooner allowing the City and its customers to address leaks quickly, preventing wasted water and higher bills.

While a decision to move from quarterly to monthly billing will be made independent of the decision to implement AMI, by implementing an AMI system the City of Thunder Bay will have the ability to facilitate this change.

System Efficiency and Rate Stability

In 2023, the Bare Point Water Treatment Plant produced, treated, and pumped 16.1 million cubic meters of water, of which only a portion was billed to customers. The unbilled volume, referred to as Non-Revenue Water (NRW), includes a mix of real losses (such as leaks within the distribution system), apparent losses (such as meter inaccuracy), and authorized unbilled consumption - including water quality maintenance, fire suppression and existing community agreements.

Reducing the share of NRW arising from leaks and meter inaccuracies will enhance operational efficiency and help moderate future rate pressures. Implementing AMI will advance this goal by supplying accurate, near-real-time usage data. With that data, staff can locate and repair leaks more quickly, correct metering inaccuracies, and better distinguish among the various categories of unbilled water. These improvements will protect revenue, avoid unnecessary treatment and pumping costs, and contribute to long-term rate stability.

Project Costs and Net Present Value Analysis

The total capital cost of an Advanced Metering Infrastructure deployment is expected to be just under \$23 million, which includes approximately \$2 million in contingency to address unexpected costs for system hardware and installation. This investment is expected to yield a simple payback of 12.3 years, which is well within the expected 20-year life of the system with a net present value more than \$3.4 million. In comparison, should the City opt to replace its meters over a 20-year period without improving its meter reading technology the capital cost is estimated to be \$12 million, but the long-term financial benefit would be much smaller, with a net present value of only \$856 thousand. This approach would also limit customer service improvements and require more staff to support monthly billing.

Environmental

Water production, treatment, and distribution is a very energy-intensive activity, representing 33% of the City of Thunder Bay's consumption of natural gas and 53% of its electricity consumption in 2023. The reduction of Non-Revenue Water will result directly in energy savings.

Reducing energy consumption has follow-on benefits of reducing greenhouse gas emissions (GHG). The result of this energy consumption is an estimated production of 4,135 tonnes of CO₂ representing 38% of the City of Thunder Bay's total greenhouse gas (GHG) emissions¹. For every 1 million cubic meters of water produced and treated by the City, almost 257² tonnes of GHG are generated.

Reducing water loss effectively adds capacity to the Bare Point Water Treatment Plant capabilities by freeing up existing production capacity, which could delay the need for major capital investments to support anticipated future growth and water consumption demands of the community.

FINANCIAL IMPLICATION

The financial impact of the AMI project to the Water and Wastewater Financial Plans was evaluated. Results indicate that the project can be implemented over the course of the next four years without changing the current approved water rates. The analysis considered the recovery of lost revenue once the project is completed, the reduction in resources required for meter reading and the increase in purchased services for software and network maintenance. Key financial metrics include:

Financial Metric	Value
Capital Costs	\$22,954,033
Operating Savings (annual)	\$2,090,954
Net Present Value (over 20 years)	\$3,451,249
Simple Payback	12.3 years

The capital costs of the project will be split between the water and wastewater rate-supported capital programs from 2026 to 2028.

¹ City of Thunder Bay, "Energy Conservation & Demand Management Plan 2024", www.thunderbay.ca/en/city-hall/resources/Energy-Management/Thunder-Bay_ECDM-Report-Final_2024.06.19-signed.pdf, accessed October 15, 2024, pp. 14 & 17.

² Calculated based on 4,135 tonnes of GHG generated in the production of 16.1 million m³ of water in 2023.

LINK TO THUNDER BAY CORPORATE STRATEGIES

The AMI project aligns with the City of Thunder Bay's existing strategic initiatives and directly supports the City of Thunder Bay Digital Strategy and Climate-Forward City: Thunder Bay Net-Zero Strategy.

CONCLUSION

It is concluded that the implementation of an AMI system will enhance customer service, provide revenue protection, and increase operational efficiency. The project will remove the burden of reading meters from customers, improve their access to information on water use, and empower them to manage their water and wastewater bills. Replacement of aging, inaccurate meters is expected to enhance revenue by \$1.5 million per year over the 20-year expected life of the system. The resulting reduction in Non-Revenue Water and manual meter reading costs will improve the City's efficiency in providing essential water services.

BACKGROUND

In 2020, Grant Thornton City Program and Service Review identified Automated Meter Reading to be installed to achieve efficiencies in water meter reading and revenue recovery.

REFERENCE MATERIAL ATTACHED

Appendix A – Business Case for AMI/AMR Implementation – Findings and Recommendations Report, November 26, 2024.

REPORT PREPARED BY

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REPORT SIGNED AND VERIFIED BY

Kayla Dixon – Commissioner Infrastructure & Operations

07/03/2025 (MM/DD/YEAR)