Active Applications

Hydro Ottawa Limited's distribution rates and services are regulated by the Ontario Energy Board, an independent provincial government agency. At any time, Hydro Ottawa Limited may have one or more applications before the OEB, and may be participating in other OEB-sponsored proceedings.

EB-2019-0261 Custom Incentive Regulation (CIR)

EB-2019-0261: Hydro Ottawa Limited filed an application with the Ontario Energy Board on February 10, 2020 under section 78 of the *Ontario Energy Board Act, 1998*, S.O. 1998, c.15 Sched. B, seeking approval to change the rates that Hydro Ottawa charges for electricity distribution, to be effective January 1, 2021 to December 31, 2025.

Proposed residential distribution rate changes summary

Residential customers are charged a monthly fixed distribution charge, which covers Hydro Ottawa's costs to safely and reliably deliver electricity from generating stations across Ontario to homes in Ottawa and Casselman.

Hydro Ottawa's current monthly fixed distribution charge for residential customers is $28.64. Hydro Ottawa is proposing to increase the monthly charge to $29.95 in 2021. By the end of the five-year term, the distribution charge is proposed to be $35.56, representing a rate increase of $6.92.

	2020 Current	**2021 Proposed**	**2022 Proposed**	**2023 Proposed**	**2024 Proposed**	**2025 Proposed**	*2021-2025 Average*
Monthly fixed distribution rate	$28.64	**$29.95**	**$32.13**	**$33.97**	**$34.95**	**$35.56**	
Monthly rate change ($)		**$1.31**	**$2.18**	**$1.84**	**$0.98**	**$0.61**	*$1.38*
Annual percentage increase (%)		**4.57%**	**7.28%**	**5.73%**	**2.88%**	**1.75%**	*4.44%*

NOTICE OF HEARING:

Issued March 4, 2020

- English
- French

KEY APPLICATION DOCUMENTS:

- Application Cover Letter (PDF, 56KB)
- Updated Customer Summary (PDF, 2.26MB)
- Updated Executive Summary (PDF, 403KB)

UPDATED APPLICATION AND EVIDENCE Filed May 5, 2020

- Hydro Ottawa UPDATED Exhibits 1-9 May 5, 2020 (PDF, 33.8MB)
- EB-2019-0261 Update for 2019 Actuals Cover Letter and Table of Revisions (PDF, 195KB)

ORIGINAL APPLICATION AND EVIDENCE

- Exhibit 1 - Administration (PDF, 57.5MB)
- Exhibit 2 - Rate Base (PDF, 55.9MB)
- Exhibit 3 - Operating Revenue (PDF, 2.4MB)
- Exhibit 4 - Operating Expenses (PDF, 35.1MB)
- Exhibit 5 - Cost of Capital and Capital Structure (PDF, 9.6MB)
- Exhibit 6 - Calculation of Revenue Deficiency or Surplus (PDF, 2.5MB)

- Exhibit 7 - Cost Allocation Study Requirements (PDF, 1.3MB)
- Exhibit 8 - Rate Design (PDF, 5.4MB)
- Exhibit 9 - Deferral and Variance Accounts (PDF, 2.9MB)

For live versions of excel files submitted as part of EB-2019-0261, refer to Hydro Ottawa's application on the OEB's Advanced Regulatory Document Search, or contact Hydro Ottawa at RegulatoryAffairs@HydroOttawa.com

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Hydro Ottawa

2711 Hunt Club Road,
PO Box 8700
Ottawa, ON K1G 3S4

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UPDATED DISTRIBUTION SYSTEM PLAN ATTACHMENTS

Hydro Ottawa's 2021-2025 Distribution System Plan ("DSP") is included in this Application as Exhibit 2-4-3. While the updates being made to this Application for purposes of incorporating 2019 actuals include certain updates to Exhibit 2-4-3, Hydro Ottawa is opting to forego re-filing of the Exhibit in its entirety for a few reasons.

First, the updates are very limited in their scope and number. What's more, both the length and electronic file size of Exhibit 2-4-3 are significant. Hydro Ottawa is therefore of the view that wholesale re-filing of the Exhibit would frustrate, rather than facilitate, efficient review of the updated Application materials.

In lieu of re-filing, Hydro Ottawa is including this cover sheet, which provides a summary of the modest set of updates to select Attachments of the Exhibit, as follows:

- UPDATED Attachment 2-4-3(A): OEB Appendix 2-AA - Capital Programs Table and UPDATED Attachment 2-4-3(B): OEB Appendix 2-AB - Capital Expenditure Summary – these appendices provide an overview of Hydro Ottawa's capital programs and expenditures, respectively. Both of these appendices have been updated to incorporate 2019 actuals.

- Attachment 2-4-3(E): Material Investments – the only updates to this Attachment are for the utility's Distribution Enhancements program within the System Service category. More specifically, the updates are in relation to the Smart Grid project known as "MiGen" described in section 2.3.3.

As originally submitted, section 2.3.3 of Attachment 2-4-3(E): Material Investments provides a full description of the MiGen project, including external partners engaged in project development

and deployment. Among the key partners is Natural Resources Canada ("NRCan"). In identifying NRCan as a participant, Hydro Ottawa also states the following:

> *[NRCan] is a critical partner for this project. At the time of writing, in response to expressions of interest from NRCan itself, Hydro Ottawa is engaged in detailed discussions with NRCan regarding the lessons learned from the initial phase of the project and how these lessons can be incorporated into the next phase. Through this engagement, NRCan has signalled openness to adjusting the parameters of the project, if it can be demonstrated that such adjustments will add value and ensure that the broader objectives of both the project and NRCan's funding program will be met. Depending upon the outcome of further discussions with NRCan, Hydro Ottawa may subsequently submit updates to the project information included in this Application.*[1]

In step with the foregoing, and with the outcomes of Hydro Ottawa's recent engagement with NRCan on this matter, the utility is hereby submitting updates to the project information for MiGen. Please see the updated version of section 2.3.3 in Attachment 2-4-3(E): Material Investments for additional information.

[1] Attachment 2-4-3(E): Material Investments, page 357.

2.4.3.2. Field Area Network

2.4.3.2.1. Project Summary

As part of the Telecommunications Master Plan project that was created and executed during the previous rate period (2016-2020), a portion of the investments were designated for a Field Area Network (FAN). The FAN was intended to provide robust, secure, private, high bandwidth, and low latency wireless connections from field devices (e.g. automation devices, sensors, etc.) to Hydro Ottawa owned and operated towers along the Optical Telecommunications Network (OTN). Unfortunately, during the early execution phase of the Telecommunications Master Plan, it was discovered that the technology originally selected for the FAN was not an appropriate or prudent choice (WiMAX) therefore the decision was made to postpone the FAN investment to the next rate period (2021-2025). This project is designed to deploy a FAN that will enable Hydro Ottawa to securely communicate to its existing and future field assets.

2.4.3.2.1.2. Project Description

Current Issues

There are several gaps being addressed by the FAN project:

- Connectivity: There is a significant need to have wireless access and connectivity from Hydro Ottawa back office systems to the various switches, sensors, automation devices, and metering aggregation points across the service territory. Wireless is the preferred alternative as fibre connectivity becomes cost prohibitive to each individual device.
- Security/Privacy: The Field Area Network selected by Hydro Ottawa must take into account the critical nature of the Utility Infrastructure and as such, any wireless system used must provide for the protection of that infrastructure and the data that it transmits.
- Reliability/Availability: The FAN must perform particularly well when there are severe weather events or other power interruptions. The selected FAN technology and implementation will need to contain features and design aspects that make it reliable and available during these events.
- Flexibility: There are several needs particular to the utility sector, including priority and latency. Not all utility network traffic is classified equally; special functions like a transfer-trip protection signal will require priority and lower latency than routine data collection.

The selected FAN technology must accommodate this type of traffic classification and prioritization.

Project Scope

This project is essentially an advanced technology application that will include the deployment of a wireless system to enable communications to remote field devices from Hydro Ottawa owned facilities (offices, substations). This project will encompass the following elements:

- Back Office Systems: There will be a need for software and hardware systems solution that will provide the connection between the wireless network and the wired network within the utility back office systems. Furthermore the back office system will enable the configuration, monitoring, management, and control of the wireless network and its constituent parts.
- Towers: There will be physical towers and associated infrastructure to mount the base-station radio equipment. This includes tower structures, roof mounting equipment, radiofrequency (RF) and power cabling as well as any small buildings or cabinets designed to hold power and interface equipment.
- Base Station Radio equipment: This will encompass the physical antennas and RF equipment and supporting systems at the base stations.
- Modems or Customer Premise Equipment (CPE): These are the remote radios that will be used at the location of the remote field devices. This will encompass any antenna, radio device and supporting equipment. It is expected that this project will deploy many CPE radios and that Hydro Ottawa will continue this deployment
- Radio or Spectrum Licenses: Due to the need for privacy as well as reliability it is expected that Hydro Ottawa will secure licensed frequencies for its FAN system.

Main and Secondary Drivers

The primary drivers of this project are:

- System Efficiency: In order to effectively optimize and control the Hydro Ottawa system, there is a need to remotely operate the various switches and intelligent devices in the field. In order to fully realize the benefit of these devices and the software systems that

control them, a reliable and secure wireless connection must be made so that the devices can be used and monitored in real time.

- Reliability: In order to effectively and quickly respond to outage events, the Hydro Ottawa control room must have the ability to view real time information from sensors and meters as well as remotely operated switches or other devices (either manually or through advanced software systems such as the SCADA/DMS or OMS platforms) so that any service interruptions are minimized in both duration and the number of customers affected.

- Other Performance/functionality: The FAN will allow Hydro Ottawa to deploy CPEs at customer locations that have Distributed Energy Resources (DERs). This is seen as a critical function as the number of DER installations within the Hydro Ottawa service territory will continue to grow throughout the next rate period.

- Power Quality: Finally, the FAN will enable additional telemetry collection that can assist control room operators to address power quality issues at the very edge of the distribution system. Using telemetry collected from the field, the DMS and SCADA platform can provide operators recommendations and automatic functions to reduce system losses and improve performance.

Secondary drivers of this project include the following:

- Safety: It is anticipated that having the FAN available will improve telemetry collection, enable higher levels of automation, and enable remote operations of field devices. This additional telemetry and remote control of devices will have a net positive effect on employee and public safety as Hydro Ottawa control room staff will have enhanced visibility and control over potentially hazardous situations.

Performance Targets and Objectives

The FAN project is a foundational and enabling technology. It is therefore difficult to attribute specific system performance objectives to the deployment of this system. The connectivity, security, and reliability factors of the proposed FAN solution all serve to support the effective

and efficient management of the Hydro Ottawa grid during normal operations as well as during an outage response.

2.4.3.2.3. Project Justification

Alternatives Evaluation

Alternatives Considered

There are essentially five alternatives for consideration in the Field Area Network Project:

- The proposed approach is a private LTE (Long Term Evolution) network deployment using licensed spectrum in the 3GPP Band 43 or Band 48 (The LTE technology standard is the current global standard for the 4G wireless used in personal cell phones. This standard is governed by two international bodies; the 3GPP or 3rd Generation Partnership Project and the ITU or International Telecommunication Union). This approach, while being the most capital intensive, does address all of the problems identified.
- The first alternative considered is the 'do-nothing' approach which is to continue with the existing practice of using individual public carrier LTE networks (e.g. Rogers, Bell, or Telus etc.). This alternative is by far the simplest approach in that the infrastructure is managed by a 3rd party and the utility simply pays for the CPE and a monthly connection fee. Unfortunately, this simplicity comes at the cost of reliability, security, and flexibility. Furthermore it represents an ever increasing risk for both operational costs (OM&A dollars) and the dependency on a 3rd party to maintain the network to the required service levels that a public utility is expected to maintain.
- The second alternative is to create or join a Private Virtual Network Operator (PVNO) and operate the utility CPEs outside of the normal contractual relationship with an individual public LTE carrier. This alternative represents the ideal approach in that it removes many of the issues related to engaging a single carrier (improved reliability by roaming onto many carrier networks, prevention of carrier lock-in by having to replace SIM cards in the CPEs when changing providers). Furthermore, it would allow the utility to negotiate lower cost agreements for the volume of data transmitted. Unfortunately, this approach is under regulatory review by the Canadian Radio-Television and

Telecommunications Council (CRTC) and is not yet available in Canada and therefore, eliminated from further consideration.

- The third alternative is to join the growing Public Safety Broadband Network (PSBN) and leverage the deployment of LTE network that is being designed and deployed across Canada to support first responders and other emergency services. This alternative would solve many of the issues identified; however, at this time; Public Utilities are not considered priority users of the Band 14 frequency spectrum that has been selected for the PSBN to utilize. The PSBN network architecture is one that will feature the ability for the network to prioritize emergency first response organizations over all other users. This feature will not impact utility traffic during a normal day, however in the event of a major catastrophe or extreme weather event the utility use of this network could be severely curtailed. Therefore with these constraints to the use of the PSBN network, is not recommended in the Hydro Ottawa area given the number of public safety and emergency response organizations in close proximity to the Ottawa area.
- The final alternative is the non-LTE based solutions such as:
    - WiMAX: WiMax was the original technology selected for the FAN deployment. Unfortunately, this technology is near end of life and there are currently only 2 vendors that are selling WiMAX systems in the Utility reserved frequency space.
    - Unlicensed Radio systems: These include 900MHz, 2.4GHz or other similar technologies. These systems have the advantage of completely avoiding the problem of licensing and do not suffer any onerous constraints pertaining to the deployment of the radio devices. Unfortunately, the lack of constraints and the no-cost nature of the spectrum mean that there are typically far too many users and no protections offered against interference.

Evaluation Criteria

There are no specific performance measures that would differentiate the alternatives discussed. Therefore, the solution that best resolves the identified issues will be selected.

Preferred Alternative

The preferred alternative is the Private LTE network deployment using licensed spectrum as it best resolves the current issues while still allowing for a transition to one of the other LTE based alternatives should any of the regulatory or governance issues be resolved.

- Connectivity: The preferred alternative provides for the connectivity that is required for effective field asset control and monitoring.
- Security/Privacy: The preferred alternative brings the LTE back end systems under Hydro Ottawa control and will therefore allow the utility to control the encryption from end to end. This encryption is inherent to the LTE technology however the encryption of the radio transmissions is typically controlled by the network operator.
- Reliability/Availability: The preferred alternative will be deployed with reliability and availability at the top of mind. This will ensure that the network contains all of the requisite features and redundancies that are necessary to meet the reliability and availability goals.
- Flexibility: As Hydro Ottawa will be deploying this network it will remain flexible to the needs of the utility and the investments will be targeted towards the priority geographical areas.

Project Timing & Expenditure

This project does not have any expenditure prior to 2021 as the project was deferred from the previous rate period. For the years 2021 to 2025 the timing and expenditure appears in Table 2.83.

The first year (2021) will see the purchase and installation of the back-office systems as well as the initial base-station and up to 30 CPEs.

For the subsequent years (2022-2025) Hydro Ottawa will purchase and install up to 20 base stations and approximately 30 CPEs per year.

Table 2.83 - Expenditures ($'000,000s)

	Historical					Future				
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total Expenditure	$0.00	$0.00	$0.00	$0.00	$0.00	$1.79	$1.04	$1.04	$1.04	$1.04

Benefits

As discussed above, the FAN project is a foundational and enabling technology deployment project. As such, the benefits from the FAN deployment are not readily quantified but the FAN availability will enable additional tools and devices in support of automation, listed in Table 2.84.

Table 2.84 - Project Benefits

Benefits	Description
System Operation Efficiency and Cost Effectiveness	The FAN provides high-bandwidth and low latency connectivity to the various devices in the field which includes the metering infrastructure and automated switches and sensors. This connectivity will enable the optimal configuration of the utility grid as operations personnel will receive near real-time information on system performance and enable them to take corrective action.
Customer	As discussed above, the connectivity provided by the FAN will further enable the deployment of automation devices and sensors to assist the utility in managing outages. This improved management will result in a reduction in the outage durations and will therefore have a significant positive impact on the customer.
Safety	Having the FAN available will improve telemetry collection, enable higher level automation, and enable remote operations of field devices. This additional telemetry and remote control of devices will have a net positive effect on employee and public safety in that Hydro Ottawa control room staff will have enhanced visibility and control over potentially hazardous situations
Cyber-Security, Privacy	The private LTE based FAN includes encryption that is inherent to the LTE technology. Furthermore the use of licensed spectrum will further enhance the privacy and security of the information and control data that is transmitted.
Coordination, Interoperability	N/A
Economic Development	N/A
Environment	N/A

2.4.3.2.4. Prioritization

Consequences of Deferral

As the FAN is an enabling technology project, deferring this investment will result in a further delay on the overall operational efficiency and reliability performance improvements of Hydro Ottawa. While the FAN is not the only element required for the increased automation of the Hydro Ottawa system, the lack of a coherent wireless connectivity system will result in additional and potentially costly engagements with the public carriers.

Priority

This project is considered Medium Priority based on the following considerations:

- This project has significant potential of improving performance across the Hydro Ottawa distribution system and therefore the experience of all customers.
- This project has many second order benefits in that it will drive utility staff towards improving the records within the Hydro Ottawa technology systems and will improve the performance of other related tools (Outage Management System, SCADA) which will in turn further improve performance of the utility.

2.4.3.2.5. Execution Path

Implementation Plan

This project will begin in the back office communications systems as Hydro Ottawa purchases and installs the required technology to manage, operate, and maintain the FAN. Once the back office systems are in place, the deployment of the Towers and base stations will proceed in a prioritized fashion starting with geographic areas that contain the greatest amount of automated devices and sensors and proceeding to areas that are targeted for additional automation.

Risk to Completion and Risk Mitigation Strategies

As with any new technology implementation there are associated risks such as those outlined in the following areas:

- Complexity: There are a number of different software and hardware systems that will be required to effectively deploy and operate the FAN. For the most part, these systems are quite mature as they have been in use throughout the world in public carrier networks. However, this type of technology is new to Hydro Ottawa. The mitigation plan for such

complex technology deployments is the careful engagement and co-ordination between the Hydro Ottawa team and the vendor teams (the vendor that deployed the Optical Telecommunications Network for interfacing with the existing network, and the vendor for the FAN platform) to ensure that the requirements are fully captured in the project planning and execution phases. Finally, there will be extensive testing of the final product to ensure that the systems are fully functional.

- Cost: As with many technology projects, costs can be a challenge to manage as there is a significant scope of work planned for the FAN implementation. The strategy to minimize the risk of cost overrun is to only engage the vendor on an ongoing service basis while providing full accountability to the intended roadmap. This will incentivize the vendor to perform adequately as future contracts will be put at risk due to poor performance. Furthermore, the project will have a dedicated project manager and executive sponsor within Hydro Ottawa to ensure that the governance surrounding the project is sound and full management visibility is provided.

Timing Factors

The following factors could affect the timing of the FAN deployment:

- Successful engagement with a vendor and the timely completion of the architecture and detailed planning stems.
- Staff availability to support the deployment and installation of the FAN hardware.
- Availability of the locations for the base station installations
- Technology availability, the LTE technology used in the FAN is industry standard as a result there can be increased lead times as a result of global demand.

Cost Factors

As discussed above, technology investment projects can be difficult to implement and incur significant cost pressure. The strategy to minimize the risk of cost overrun is to engage the vendor on an ongoing service basis while providing full visibility to the intended roadmap. This will incentivize the vendor to perform adequately as future contracts will be put at risk due to poor performance.

Other Factors

With any wireless system deployment there is risk associated with the regulatory environment. With the use of LTE technology and licensed spectrum there are a number of organizations that could alter regulations that could have an impact on the planned Field Area Network. The mitigation strategy for this is to engage with other utilities making similar investments (in forums such as the Utility Telecommunications Council and the Canadian Electricity Association). There is also the possibility that there is regulatory or other management pressure that requires the de-prioritization of the DMS implementation project. This will likely result in a significant de-scoping of the project as to reduce the impact on cost and staff, however it is likely that the project would continue in a smaller and targeted manner in order to extract the benefits of the automation and enhanced situational awareness for the Hydro Ottawa System Operators.

2.4.3.2.6. Renewable Energy Generation (if applicable)

As discussed above, the FAN is a foundational technology investment that enables the communications between the Hydro Ottawa back office systems and field area assets. These assets could include ERFs that include renewable technologies such as solar. Therefore, the FAN could serve as an enabling technology to the deployment of renewable energy generation as the additional visibility and control the FAN provides would allow Hydro Ottawa to accommodate greater amounts of ERF within its distribution system.

2.4.3.2.7. Leave-To-Construct (if applicable)

N/A

2.4.3.2.8. Project Details and Justification

Table 2.85 - Field Area Network Overview

Project Name:	Field Area Network
Capital Cost:	Approx. $5.97M
O&M:	Approx. $1.0M
Start Date:	1-Jan-2021
In-Service Date:	Multiple - Incremental Functionality added each year
Investment Category:	System Service
Main Driver:	Connectivity to Field Assets for Reliability
Secondary Driver(s):	Efficiency
Customer/Load Attachment	Enter Number of Customers/Load Attached

Project Scope

This project would see the creation of a full Private LTE deployment in critical areas of our service territory. This private wireless network would be made up of the following elements:

1) A back end software and hardware solution
2) 20 Towers at select locations (4-per year)
3) 30 Radio devices in the field per year

Work Plan

In the first year, the bank end system would be installed on the existing Optical Telecommunications Network and for each year, 4 tower sites and 30 remote radios would be added. It is expected that the cost of these radio devices would continue to decline which would result in additional devices being purchased to increase the total number installed and provide greater connectivity.

Customer Impact

The customer would benefit from this additional network as it would be used to both offset the existing wireless services that are purchased by Hydro Ottawa as well as increasing the number of field assets that are wirelessly connected to our back office systems. This additional connectivity would result in better real-time data from the field as well as improved ability to remotely operate devices and therefore improve Outage Performance and therefore reliability.