EB-2017-0049

Hydro One Networks Inc.
Application for electricity distribution rates beginning January 1, 2018 until December 31, 2022

VECC COMPENDIUM PANEL 6

JUNE 25, 2018

TAB 1

1.1.11 SPECIAL METER READS - RETAILER REQUESTED OFF-CYCLE READ (RATE CODE 15)

Where a Service Transfer Request is made, a switch bill will be issued to the customer. This bill will be based on an actual meter read unless the Customer, Hydro One and the Retailer agree in writing to an alternative. The effective date of the service transfer shall be the next scheduled meter reading date unless a request is made for a special meter reading and Hydro One can accommodate the request. In these instances, Hydro One proposes to recover the cost of labour and material by implementing the charge in Table 10.

TAB 2

Vulnerable Energy Consumers Coalition Interrogatory # 107

Issue:

Issue 51: Are the revenue-to-cost ratios for all rate classes over the 2018 – 2022 period appropriate?

Reference:

H1-02-03 Page: 30-31

Interrogatory:

a) If the customer has a smart meter, why would Field Staff be required in order to perform the off-cycle read?

Response:

A Special Meter Read charge is applied when a Retailer requests an enrollment / drop prior to the next scheduled read. If an off-cycle meter read is required, Field Staff may be required to perform the off-cycle read if the customer does not have a smart meter or the customer's smart meter isn't communicating.

TAB 3

requires all Ontario Distribution Utilities to complete Stray Voltage Investigations on livestock farm customers by a competent person. Hydro One considers this service as part of the standard level of service in accordance with the DSC. Therefore, it is recommended that the current approved charge for Tingle/Stray Voltage Investigation be removed from the list of Hydro One Specific Services Charges.

2. A Stand-By Administration Charge (Rate Code 44) only covers the administration-related costs and not the costs of having distribution facilities in place to deliver stand-by power. Hydro One has no record of this charge ever being applied to Hydro One customers.

1.1.2 VACANT PREMISE – MOVE IN WITH RECONNECT OF ELECTRICAL SERVICE – AT METER OR AT POLE (RATE CODE 31A & 31B)

A Vacant Premise occurs when an existing customer cancels their account with Hydro One and the meter is left active when the existing customer's contract ends. When this occurs, if the new home owner, or landlord, does not call Hydro One to have the account for that premise moved into their name, Hydro One attempts to contact the premise owner by mail or letter delivered to the premise. If the owner of the premise does not contact Hydro One after the notices are given, Hydro One disconnects the service at the meter or pole, as the service is no longer associated with a customer.

When the new premise address owner or landlord contacts Hydro One to have an account set up in their name for the now disconnected service, Hydro One goes to the premise to perform a reconnect at the meter or pole. The reconnect service fee is recovered from the new premise address owner.

TAB 4

ONTARIO ENERGY BOARD

FILE NO.: **EB-2017-0049** **Hydro One Networks Inc.**

VOLUME: **Technical Conference**

DATE: **March 2, 2018**

31, and the relevant IR, I believe, is issue 42, VECC 62.

This has to do with your charge related to vacant premises, and I think in the original application you noted that this was a new charge. There was no existing charge for rate code 31 A or B, and this was a new charge being introduced. And in the question we noted that there were volumes/revenues associated with some of the historical years. We were just curious trying to clarify how these volume/revenues arose when there was no approved charge, and that question wasn't really answered in the response.

I just wanted to clarify that. My understanding was when I re-looked at it again, what you were showing there were just the volumes of requests that -- volumes of instances in each year, but there would have been no charge to customers for those instances. So there would have been a volume, but no revenue associated with it historically.

Am I correct in interpreting what the historical data shows?

MR. MERALI: Correct.

MR. HARPER: Okay, fine, I just wanted to clarify that. The next one has to do with -- actually, it's trying to reconcile responses to two IRs.

The first one was issue 51, VECC 109. This has to do with rate codes 18 and 19. And here I guess the issue -- this has to do with the application of a reconnection charge. In this particular one, you were saying that if there's a disconnection -- it has to do with the response to part D, which says if there's a disconnection and a new

customer moves in, the reconnection charge will not be assessed to the new customer who's moving in. That's how I understood the response to that one.

Then I would like to go to the response to issue 51, VECC 13, which is a few more forward from that. This has to do with rate code 31 we were just talking about. Here, if I look at part B, it looks like if the premises has been vacated and a disconnection has been made and a new customer moves in, in this instance you're actually going to be charging a reconnection charge to the new customer who moved in.

I wanted to know if you could reconcile your -- how you're applying these two rate codes to new customers. It seems that -- it seems that the same instance in my mind is a new customer moving in or -- not because of his fault but some previous customer's fault there has been a disconnection, in the one case you're going to be charging the reconnection charge to the customer and in the other case you aren't.

MR. MERALI: So I think part of the reason for the confusion is we don't do this right now, right? So we're sort of forward-looking like, what's our policy going to be on this matter.

MR. HARPER: Right.

MR. MERALI: Per this piece of evidence we're required to charge customers for reconnections. I think subject to the approval of this rate order, customers would be charged a fee to have their premise connected if they moved in and

the status of the meter was in a de-energized state. We would charge per the evidence submitted on a go-forward basis.

I would note that in a number of these instances now we are deploying remote disconnect- and reconnect-capable meters. So our intention is when we go out there the first time, let's say somebody moves out, premises, you know, energized, no one moves in, we're going to roll a field crew. We'd install a meter with a remote disconnect and reconnect functionality such that when somebody subsequently does move in a second time there is no second truck roll and the premise can be re-energized remotely, which is why when you go back to the table you referenced earlier, with the volumes, I think you'll see that the historical volumes were quite high because truck rolls were being done, and you'll see the future volumes are quite low because we envision that in most cases a remote disconnect meter will be installed.

MR. HARPER: But the principle of the policy -- I'm just trying to understand what the -- from your mind what the principle of the policy should be, is your mind the principle of the policy is that -- in my mind you're getting new customers, someone who is willing to pay you for power, and your principle is that you would -- in principle you should or should not be charging them a reconnection charge when he is moving in -- when you're -- they're getting a new account in that -- in that premises. I understand, you know, because you have the principles,

and then you -- the policy is trying to follow through those principles... all those principles. I understand what your principle going -- going and looking at this is.

MR. MERALI: That the customer would be charged a fee for that connection.

MR. HARPER: Okay. Fine. No, thank you. I understand your point. That's all I was trying to do at this point in time.

The next one I have is trying -- and actually, it -- unfortunately, it has to do with two IRs. One was authored by Mr. Boldt, one was authored by yourself. So again, if I'm in the wrong spot, let me know.

It has to do at issue 54, CME 93. This was the one that was authored by Mr. Boldt, and then that response referred us to 51-VECC-103, which was authored by yourself, actually, and it has to do with -- the original question from CME had to do with why some specific service charges weren't changing over time while other ones were increasing over time.

And from the response to -- I guess from the combination of the two responses -- and maybe you can look at VECC 51 and VECC 103 -- am I correct that the decision as to whether charges will be increased as opposed where they remain fixed over time was really based on what was going to be the annual cost of -- if we had to -- if you did change these rates every year, what was going to be the annual cost to the company? Was it going to be complex? Did we have to retrain a whole bunch of customer-service

TAB 5

Vulnerable Energy Consumers Coalition Interrogatory # 109

Issue:

Issue 51: Are the revenue-to-cost ratios for all rate classes over the 2018 – 2022 period appropriate?

Reference:

H1-02-03 Page: 34-35

Interrogatory:

a) On what basis is the decision made as to whether the service will be disconnected or a load limiter installed?

b) Why does it require less field staff time to disconnect service/install a load limiter (per page 35) than it does to perform an off-cycle meter read (per page 31)?

c) If a customer is disconnected and then subsequently pays and is reconnected during regular hours is this charge levied once or twice?

d) If a new customer takes over a premise where service has been disconnected and sets up an account with Hydro One, is the new customer levied a reconnection charge?
   i. If yes, why is this appropriate?

Response:

a) Hydro One no longer installs load limiters. Disconnection is always a last resort and is only carried out once all other collection avenues have been exhausted.

b) The Time Study shows that where there are Special Meter Reads, more travel time is required, whereas Collection activities (Rate Codes 18 and 19) can be grouped according to geographical proximity.

c) The customer is charged both a disconnection and a reconnection fee, as this reflects our costs to perform two site visits.

d) A reconnection charge is not applied to the new customer.

TAB 6

Consumers Council of Canada Interrogatory # 58

Issue:

Issue 38: Are the proposed OM&A spending levels for Sustainment, Development, Operations, Customer Care, Common Corporate and Property Taxes and Rights Payments, appropriate, including consideration of factors considered in the Distribution System Plan?

Reference:

C1-03-01-02 Page 2

Interrogatory:

Please explain why the Fleet Management Services Budget is increasing significantly in 2018 relative to historical levels – 2014-2016.

Response:

As stated in Exhibit C1, Tab 3 Schedule 2, Attachment 2, page 2, line 19, the increase in Operations and Repairs from 2016 to 2017 is due to additional costs related to the Telematics project. On page 3, line 5 of the Exhibit it states that the Depreciation costs are expected to be higher beginning in the bridge year due to an increase in fleet size to support planned work programs.

School Energy Coalition Interrogatory # 58

Issue:

Issue 29: Are the proposed capital expenditures resulting from the Distribution System Plan appropriate, and have they been adequately planned and paced?

Reference:

B1-01-01 Section 3.8 GP-01, Page 3

Interrogatory:

For each of the various fleet requirement types included on Table 1, please provide the total number of units Hydro One currently has.

Response:

Below is the current number of units by equipment type.

Equipment Type	Equipment count as of January 24, 2018
Light	2,720
Heavy	1,413
Off-Road	474
Miscellaneous	2,599
Helicopter	7
Total	**7,213**

Witness: BERARDI Rob

OEB Staff Interrogatory # 173

Issue:

Issue 29: Are the proposed capital expenditures resulting from the Distribution System Plan appropriate, and have they been adequately planned and paced?

Reference:

Q-01-01
1.2 A reduction in the capital forecast; updated rate base and in-service additions forecasts

Interrogatory:

Hydro One has updated the capital forecast for the years 2018-2022 due to adjustments made to General Plant projects and productivity targets.

Please provide the updated ISD for each General Plant investment that has affected the updated capital forecast and highlight the changes in project scope or explain the productivity change that attributed to the updated capital forecast.

Response:

The attachment to this response includes the following updated ISDs:

- GP-01
- GP-02
- GP-03
- GP-04
- GP-05
- GP-06
- GP-07
- GP-08
- GP-09
- GP-10
- GP-11
- GP-12
- GP-13
- GP-14
- GP-15
- GP-17

Investment Description:

Fleet capital replacement requirements are based on:

1. Industry standards (manufacturer's recommendations) for life cycle expectancy;
2. Net Book Value (NBV) to Original Capital Value (OCV) ratios; and
3. Operating cost drivers which are then linked to the Business Plan and Work Programs.

Currently, the fleet is at 39% NBV to OCV where industry standards, established through a combination of Canadian Utility Fleet Manager workshops, direction from Fleet Management Companies and Industry experts, suggest that 45% as an optimum level. Our present replacement criteria are based on manufacturers' recommendations and repair history.

Key contributors to the 2018-2022 capital program include:

- The replacement of core transport and work equipment (about 7%, approximately 500 vehicles, of Fleet annually);
- Replacement of aging helicopters.

Table 1 – Forecast of Acquisitions for 2018 to 2022

Equipment Type	2018		2019		2020		2021		2022	
	Cost ($M)	# of Units	Cost ($M)	# of Units	Cost ($M)	# of Units	Cost ($M)	# of Units	Cost ($M)	# of Units
Light[1]	3.7	292	6.4	294	7.7	331	7.7	334	7.8	336
Heavy[2]	11.0	77	10.4	77	12.5	87	12.6	88	12.7	88
Off-Road[3]	5.3	21	5.0	22	6.0	24	6.0	25	6.1	25
Miscellaneous[4]	3.6	140	3.4	141	4.1	159	4.1	160	4.2	161
Helicopter	0	0	4.7	1	0.	0	0	0	0	0
Service Equipment [5]	2.5	12	1.9	9	1.9	9	1.9	9	2.0	9
Total	**29.1**	**542**	**31.8**	**543**	**32.1**	**611**	**32.4**	**615**	**32.6**	**620**

Note: Number of units is based on average unit costs per category of equipment and is subject to change based on specific LOB staff and the right-sizing initiative being completed by Fleet Management Service to reduce the Fleet complement by analysing the Telematics utilization data.
Numbers of units are based on the Tx and Dx Capital Investment Costs.

[1]Light – cars, SUVs, pickups, vans
[2]Heavy – service trucks, highway tractors, radial boom derricks (RDB), bucket trucks

TAB 7

OEB Staff Interrogatory # 200

Issue:

Issue 38: Are the proposed OM&A spending levels for Sustainment, Development, Operations, Customer Care, Common Corporate and Property Taxes and Rights Payments, appropriate, including consideration of factors considered in the Distribution System Plan?

Reference:

C1-01-05 Page: 4-5

Interrogatory:

Under Meter Reading, Hydro One indicates that approximately 150,000 meters require a manual meter read due to the limited geographical reach of the Smart Meter Network infrastructure.

a) To what extent is Hydro One striving to reduce the number of meters that require manual meter reading?

b) What are the targets to reduce manual reading over the course of the IRM period?

c) Hydro One also indicates that as a result of amendments to the DSC, requiring distributors to install an interval meter in any installation that is forecast to have a monthly average peak demand during a calendar year of over 50 kW, spending will be higher in 2017 and 2018. How many additional meters will have to be installed as a result of these amendments?

Response:

a) Hydro One's Advanced Metering Infrastructure (AMI) communication network is reliant on commercial cellular carriers to provide the communication backhaul for remote meter reading. The team is closely monitoring cellular service provider's network expansion in the Hydro One's service territory. Once network expansion occurs, Hydro One follows suit in expanding AMI capabilities.

b) Based on recent historical trends, it is anticipated that approximately 5,000 meters will no longer required manual meter reads over the IRM period.

c) The requirement will result in the installation of approximately 6,000 interval meters and an enhancement to the local Advanced Metering Infrastructure (AMI) network to ensure remote interval meter reading reliability standards are met.

Witness: MERALI Imran

TAB 8

OEB Staff Interrogatory # 121

Issue:

Issue 24: Does Hydro One's investment planning process consider appropriate planning criteria? Does it adequately address the condition of distribution assets, service quality and system reliability?

Reference:

Office of Auditor General of Ontario – Annual Report 2015 (Rec. 17)

The Auditor General's report recommended the following:

"To ensure that management can better manage and monitor capital projects that use its own workforce, as well as lower project costs, Hydro One should:

- *use industry benchmarks to assess the reasonableness of capital construction project costs, and whether using internal services and work crews is more economical that contracting out capital projects*

- *use and adhere to contingency and escalation allowances that are more in line with industry norms for capital construction projects*

- *improve its management reporting and oversight of project costs by regularly producing reports that show actual project costs and actual completion dates compared to original project cost estimates, cost allowances used, original approved costs, subsequent approvals for cost increases, and planned completion dates; and*

- *regularly analyze its success in preparing project estimates by comparing them with final project costs."*

Interrogatory:

a) Please provide the 5 year historical percentage used as project contingency and compare that to the current.

b) In Excel format, please provide a list of capital project that triggered a change control process in the last five years (eg. Project costs that exceeded approved capital, and change in project

scope/timeline). For each project in this list please provide the documentation provided to management in the form of change control log.

c) Does Hydro One have a unit costing database for the purpose of preparing estimates? If not, how does Hydro One ensure each project estimate is accurate? If yes, please provide the database, Also if yes are the unit costs based on historical actuals and how often are the unit rates updated?

d) How does Hydro One incent efficient completion of capital projects to mimic a competitive market?

Response:

a) Currently, the Company allocates a standard 10% contingency to its Distribution investments, although major projects (greater than $5M) will have a refined risk based contingency allocation that may vary slightly from the 10%. Since 2012, Hydro One has refined its estimating and field execution such that it has significantly reduced contingency usage over the past 6 years, reducing our contingency usage from 75% to less than 20% last year.

Year	Percentage of contingency used
2012	68%
2013	76%
2014	74%
2015	55%
2016	44%
2017	19%

b) Please refer to Exhibit I-24-Staff-121, Attachment 1.

c) No, Hydro One does not have a costing database for the purpose of preparing estimates.

For smaller investments (less than $5 million) - Hydro One estimates are built utilizing compatible units which are stored in SAP. The compatible units are made up of either a labour and/or material component which are based on historical actual labour hours, and material requirements. This is then combined with current rates to determine the dollar

values for labour and material costs. To ensure each project estimate is accurate, the compatible unit historical hours and material requirements are being reviewed in 2018.

For Larger investments (greater than $5 million) – Hydro One estimates are prepared using a bottom up approach with defined engineering deliverables. The estimates are built based on common construction tasks and their corresponding benchmarks which are continuously refined. This process results in a detailed class A (±10%) estimate being produced with a detailed risk registry and associated contingency allocation. Upon the project energization we complete a lessons learned and project closeout process in which we review the execution and incorporate any lessons into the upfront planning and engineering for future projects.

d) Hydro One drives efficient completion of capital projects through the following areas:

- Detailed review and critique of all variances.
- Aggressive yearly performance targets to ensure the capital work program is delivered on budget
- Performance comparison of our regional work centers to illustrate improvement opportunities and drive a healthy competitive environment
- Benchmarking with other North American utilities

TAB 9

OEB Staff Interrogatory # 4

Issue:

Issue 2: Has Hydro One adequately responded to the customer concerns expressed in the Community Meetings held for this application?

Reference:

Executive Presentation Day Transcript, page 42-43

At this reference, Mr. Pugliese indicated that Hydro One had changed its collections process from 4 stages to 8 stages. He also indicated that in 2014 accounts receivable were $194 million, which were reduced to $86 million in the most recent quarter of 2016.

Interrogatory:

a) Please provide an update to reflect the most recent quarterly amount.

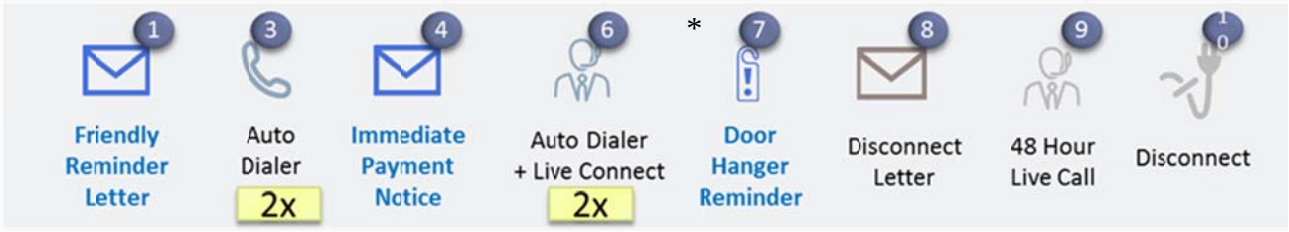
b) Please provide a more detailed account of how the collections process was changed, what the additional stages are and why this has resulted in lower levels of overdue accounts.

c) Please provide a more detailed accounting of the reduction in accounts receivable balances with a table which shows the trend of the reductions.

Response:

a) 2014 accounts receivable were $194 million, which were reduced to $86 million in the third quarter of 2017.

b) The Distribution System Code requires a utility to send a customer a disconnection notice and telephone call 48 hours prior to disconnection. Hydro One has found that more frequent contact with customers results in a reduction in overdue accounts receivable. Hydro One also reaches out to customers soon after they miss a payment, which provides customers more time to manage their arrears or arrange an affordable payment plan. Hydro One's residential collections process is outlined in the diagram below.



** Step 7 is completed in certain circumstances*

c) Hydro One's historical overdue accounts receivable is provided below.

	2014				2015				2016				2017		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
A/R ($M)	$158	$179	$194	$181	$194	$184	$158	$148	$152	$132	$114	$117	$116	$104	$86

Energy Probe Research Foundation Interrogatory # 21

Issue:

Issue 18: Are the metrics in the proposed additional scorecard measures appropriate and do they adequately reflect appropriate outcomes?

Reference:

B1-01-01 Section 3.6 Page: 6

Interrogatory:

How many customers have signed up to Hydro One's pre-determined threshold program?

Response:

The solution was fully operational as of December 2016. As of December 31, 2017, the solution has resulted in the following enrollments:

- 99,000 customers enrolled in "payment due soon" reminders;
- 98,000 customers enrolled in "payment overdue" reminders; and
- 30,500 customers enrolled for "high usage alert" notifications.

Witness: MERALI Imran

SS-01 Remote Disconnection / Reconnection Program

Start Date:	Q1 2018	**Priority:**	Demand
In-Service Date:	Program	**Plan Period Cost ($M):**	28.5
Primary Trigger:	System Efficiency		
Secondary Trigger:	Customer Service Requests		

Investment Need:

Hydro One currently owns, operates, and maintains approximately 1.3 million retail revenue meters. From time to time, there is a need to have power to these meters disconnected and/or reconnected as a result of customer non-payment and vacant premises.

Hydro One makes every effort to work proactively with customers to address billing issues and adheres closely to all steps mandated in the OEB Distribution System Code. Disconnection is only considered as a last resort; as customers rely on their power and understandably become upset if a decision is made to disconnect power. Hydro One makes every effort to take swift action in the reconnection of power for customers in order to reestablish important electrical services to their home or business.

Hydro One currently implements a manual disconnection and reconnection process, requiring at least two trips to the customer premises. These disconnection and reconnection activities cause between 10,000 and 21,000 on-site visits per year. The costs and associated risks of this manual process can be avoided with the utilization of meters that have the functionality to execute remote disconnection and reconnection.

Alternative 1: Continue Manual Disconnections/Reconnections

Continue to manually disconnect and reconnect customer meters when required in accordance with Section 4.2 of the OEB Distribution System Code. This alternative is rejected as it will not result in improving the customer experience or achieving operational efficiencies.

Alternative 2: Remote Disconnections/Reconnections *(Recommended)*

Install new meters with remote disconnection and reconnection functionality at customer sites where non-payment and/or vacant premises situations exist. This alternative is

recommended as it will reduce the number of visits to customer premises resulting in operational efficiencies, and improve customer experience by providing a faster response time for disconnection and reconnection requests. Active and timely actions to address customers in arrears also assists customers in staying current with their invoices and reducing bad debt expenditure.

Investment Description:

This investment addresses the replacement of existing meters at customer premises with new meters capable of remote disconnection and reconnection functionality. Meter replacements will be identified for replacement when disconnection required based on assessment of customer accounts in arrears due to non-payment and/or customer premises with noted vacancy. These replacements are to be rolled out in stages as work orders are authorized and appropriately approved for action of disconnection. The table below is an annual forecast of meter replacements.

	2018	2019	2020	2021	2022
Number of Meter Replacements	11,875	11,500	11,125	10,750	10,375

Once the new meters are installed, the actual execution of the reconnection (or disconnection) is accomplished within a few minutes after the customer request has been authorized and appropriately approved for action thereby reducing lost revenue for unbilled power, and providing improved customer service through faster response time.

Risk Mitigation:

The risks to completion of this investment as planned are the availability of the vendor to manufacture and deliver the meters in a timely manner, and the accessibility of the meters required to be replaced. These risks are mitigated by providing procurement forecasts upfront to the vendor, maintaining ongoing discussions with vendor regarding future product supply, and managing coordination with resources required to gain access.

TAB 10

Table 15: Collection of Account Charge – Disconnect/Reconnect at Pole – After Regular Hours

Year	Rate Code	Specific Service Charge Description	Labour Description	Rate Amount	Hours/Units	Overtime Factor	Calculated Total	Payroll Burdens	Total Labour	Other Description	Rate Amount	Hours/Units	Calculated Total	Total Other	Calculated Total Charge	Proposed Charge
2018	23	Collection - Disconnect/Reconnect at Pole - After Regular Hours	Direct Labour - Clerical	$80.08	0.43		$34.43	$18.46	$52.89	Large Vehicle Time	$57.00	1.56	$88.92			
			Direct Labour - Field Staff (RLM)	$79.43	4.00	1.40	$444.82	$238.42	$683.24							
			Payroll Burden	53.60%					**$736.13**					**$88.92**	**$825.05**	**$850.00**
2019	23	Collection - Disconnect/Reconnect at Pole - After Regular Hours	Direct Labour - Clerical	$81.00	0.43		$34.83	$18.91	$53.74	Large Vehicle Time	$57.00	1.56	$88.92			
			Direct Labour - Field Staff (RLM)	$80.35	4.00	1.40	$449.96	$244.33	$694.29							
			Payroll Burden	54.30%					**$748.03**					**$88.92**	**$836.95**	**$850.00**
2020	23	Collection - Disconnect/Reconnect at Pole - After Regular Hours	Direct Labour - Clerical	$81.96	0.43		$35.24	$19.35	$54.59	Large Vehicle Time	$57.00	1.56	$88.92			
			Direct Labour - Field Staff (RLM)	$81.32	4.00	1.40	$455.39	$250.01	$705.40							
			Payroll Burden	54.90%					**$759.99**					**$88.92**	**$848.91**	**$850.00**
2021	23	Collection - Disconnect/Reconnect at Pole - After Regular Hours	Direct Labour - Clerical	$82.92	0.43		$35.66	$19.82	$55.48	Large Vehicle Time	$57.00	1.56	$88.92			
			Direct Labour - Field Staff (RLM)	$82.28	4.00	1.40	$460.77	$256.19	$716.96							
			Payroll Burden	55.60%					**$772.44**					**$88.92**	**$861.36**	**$850.00**
2022	23	Collection - Disconnect/Reconnect at Pole - After Regular Hours	Direct Labour - Clerical	$84.20	0.43		$36.21	$20.13	$56.34	Large Vehicle Time	$57.00	1.56	$88.92			
			Direct Labour - Field Staff (RLM)	$83.56	4.00	1.40	$467.94	$260.17	$728.11							
			Payroll Burden	55.60%					**$784.44**					**$88.92**	**$873.36**	**$850.00**

SR-14 Advanced Meter Infrastructure Hardware Refresh

Start Date:	Q1 2018	**Priority:**	Medium
In-Service Date:	Program	**Plan Period Cost ($M):**	79.9
Primary Trigger:	Mandated Service Obligation		
Secondary Trigger:	Failure Risk		

Investment Need:

Hydro One currently owns, operates, and maintains approximately 1.3 million retail revenue meters. There are several factors that can trigger the need to upgrade these meters; some of the key factors are listed below:

- Hydro One Distribution is accountable, based on the market rules, to upgrade wholesale meter installations to a retail revenue meter when customers decide to become a retail customer of Hydro One Distribution at seal expiry;
- Hydro One Distribution has acquired non-standard meter installations due to a boundary change or the outright acquisition of an LDC;
- Hydro One Distribution has a population of 600V self-contained meters that are being replaced with inherently safer 120V transformer rated meters;
- Hydro One Distribution is required by the Distribution System Code, to upgrade existing customer's demand meters to interval meters when the average annual monthly peak demand is equal to or greater than 50 kW. There is also a requirement to install interval meters for customers who exceed 150,000 kWh of energy consumption per year; and
- Hydro One Distribution will require to replace smart meters once these meters reach the end of expected service life.

Alternatives:

No alternatives are considered, since this program represents the minimum level of work to satisfy Hydro One Distribution's operational requirements. Replacement of meters is critical to maintaining a reliable source of billing settlement data.

Investment Description:

This investment provides planned upgrades to address meters that no longer meet current standards, are obsolete, have reached end of service life; and to address regulatory

requirements imposed by the Distribution System Code. The work includes, but is not limited to the following:

- Upgrade wholesale meter installations or acquired non-standard retail meter installations to Hydro One Distribution's current retail revenue meter standard;
- Upgrade 600V self-contained meters, with expired seals, with new 120V meters. Replacing these 600V meters with an inherently safer 120V unit increases employee and customer safety, allows Hydro One Distribution to meet expired seal obligations, eliminates a reliance on a single source supply as like-for-like replacements are not readily available on the market, and assists in standardizing inventory;
- Upgrade existing customer's meters to interval meters or demand meters when the energy consumption exceeds the thresholds set out in the Distribution System Code; and
- Replace smart meters which have reached the end of their expected service life. Smart meters have a manufacturer service life of 15 years, therefore, meter replacements will commence in 2021 with 3,621 replacements and another 206,119 replacements in 2022. A similar level of replacements will be required beyond the planning period.

The forecast of the number of meters requiring replacement and upgrade annually over the five year period is provided in the table below. The capital investment of each meter upgrade is below $1 million.

	2018	**2019**	**2020**	**2021**	**2022**
Number of Meter Upgrades/Replaced	341	341	341	4,134	206,632

Risk Mitigation:

The risks to completion of this investment as planned are the availability of the vendor to manufacture and deliver the meters in a timely manner, and the availability of qualified resources to perform the volume of replacements required. These risks are mitigated by providing procurement forecasts upfront to the vendor, maintaining ongoing discussions with vendor regarding future product supply, and managing resources with option to hire temporary staff as required.

Result:

This meter upgrade program will result in:

- Ensuring timely replacement of meters,
- Complying with regulatory requirements, and
- Ensuring a continue reliable source of billing settlement date for customers.

Outcome Summary:

Customer Focus	• Maintain billing accuracy and customer confidence by ensuring reliable meter performance.
Operational Effectiveness	• Maintain reliable operation of the meter and meter infrastructure network by proactively replacing equipment.
Public Policy Responsiveness	• Comply with the OEB Distribution System Code Section 2.10 "Estimated Billing" requirement for no more than 2 estimated meter reads per year and Section 7.11 "Billing Accuracy" requirements.
Financial Performance	• Avoid the cost of manual meter reading through timely replacement of meter and network equipment.

GP-34 Smart Meter Network Investments

Start Date:	Q1 2018	**Priority:**	Medium
In-Service Date:	Multiple	**Plan Period Cost ($M):**	14.7
Primary Trigger:	Customer Focus		
Secondary Trigger:	Operational Effectiveness		

Investment Need:

Hydro One was one of the first LDCs to implement a smart meter network in the province of Ontario. The smart meter project started in 2006 and ended in 2014. This project delivered the advanced meter infrastructure (AMI) in the field and installed approximately 1.2 million smart meters across its customer premises. The CIS billing project started in 2011 and ended in 2014. Its purpose was to replace the legacy billing CSS system in production at that time that was 20 years old and long past its end of life. Both projects were complex and difficult to implement because there was no ubiquitous end to end solution available on the market at the time. The systems had to be "stitched" together using in-house custom development to integrate the smart meter systems, the IESO Meter Data Management and Repository (MDM/R) and the billing systems to create the meter to bill processes that met regulatory requirements set by the Ontario Energy Board.

The Advanced Meter Infrastructure consisted of the Trilliant head end system, collectors and smart meters. The smart meters installation was completed by the 2010 OEB target date. The smart meter communication network was initially completed by 2013 but Hydro One experienced issues in that the network was not providing consistent communications due to factors such as topology, seasonal effects and availability of reliable cellular network services in its rural and remote territory. These constraints required the development of custom applications to handle the exception in the communications network. The smart meter project was concluded in December 2014 once it was determined that there was adequate consistency in the smart meter communications to meet OEB billing accuracy of greater than 98% accuracy.

The 20 year old CSS billing system was replaced with an SAP / Itron IEE solution. The Customer Information System (CIS) project was started in 2011 and implemented in 2013. The synchronization of the CIS with the smart meter network required further customization in order to integrate it with the smart meter systems. The remediation phase of the CIS project concluded in 2014 once it was determined that billing accuracy of greater than 98% could be maintained.

During the smart meter project lifecycle, Hydro One hired consultants to design and implement a number of applications to resolve issues that arose during the integration of the MDM/R. While integrating the Smart Meter network with the SAP CIS billing system additional customized solutions were required to report, track and resolve exceptions. This practice was necessary to create the smart meter to bill processes which was considered new territory for advanced meter infrastructure billing. Today Hydro One continues to operate those customized systems. However, there is both a cost and risks to maintaining this practice because the customized applications are not supported by vendors and they are reaching end of life. Hydro One must rely on very specialized knowledge from a few consultants to maintain these applications that are limited in their scalability and performance. Also costly modifications are required when adding new meter equipment.

Alternative 1: Status Quo

If the status quo alternative was selected, Hydro One would continue to rely on existing technology. This alternative is not recommended since the systems are past their recommended useful life and they are costly to maintain. As such, there is a higher risk of system failure. If the systems were to fail then our customers would receive estimated bills until such time the systems were restored. Furthermore, custom solutions developed internally are no longer consistent with the Company's IT strategy.

Alternative 2: Replace EOL Smart Meter Network tools with new Technology (Recommended)

This alternative is recommended since it will replace end of life technology and reduce the risk of system failure and impact to our 98% billing accuracy performance indicator.

Investment Description:

This investment is required to replace the following tools that support the Smart Meter network. Note that some of the tool replacements or upgrades will be grouped under one or multiple projects depending on the current and future level of integration. Each project will be assessed base on individual business cases that will define the specific costs, return on investments and timeline to implement.

A. Customer Migration Tool - Required to support mass migration of customers from two-tier RPP to Time of Use billing. Hydro One continues to have a number of customers for which a smart meter solution was not available at the time of conversion. This tool will be required to manage the migration of these customers to smart meters.

B. Customer Meter Order Management Tool - Tracks new smart meter installations.

C. Collector Design and Deployment Tool - Coordinates the activities and handoffs for design and deployment of the smart meter network equipment, including regional collectors and repeaters.

D. Customer Service Order Network Tool - Provides reporting for all service orders (planned and unplanned).

E. Index Read Tracking Tool (IRTT) – This tool is the core of the daily meter reading delivery process and serves to provide meter triage, meter reliability metrics, network performance metrics, manual estimation generator, missing read tickets and demand meter reading support.

F. Itron Enterprise Edition Meter Data Management Tool - This tool is an enterprise-wide data management solution that stores interval and register data for residential, commercial, and industrial customers. This tool will have reached end of life and will require an upgrade from the vendor.

G. Network Infrastructure performance reporting – These reports provide the Company's Advanced Meter Infrastructure support team with statistics as to the health of the network.

Risk Mitigation:

This is a complex investment that will require a phased projects approach with multiple vendors in order to deliver a robust, secure, and cost effective technology platform to replace or upgrade the tools listed above. As such, a market scan will be conducted as part of the discovery phase and business case development to determine best-in-class technology and cost to implement.

Result:

The key result is reduction in risk of using meter related customized applications that are not vendor supported. In addition, this is expected to bring efficiencies in the meter-to-bill process through improved reporting & analytics.

Outcome Summary:

Customer Focus	• Improve customer satisfaction as a result of issues being identified quickly and resolved within a timely manner. • Reduce risk to customers in using meter related applications that are no longer supported by the vendor. • Improve operational performance for maintaining billing accuracy.
Operational Effectiveness	• The new technology will result in improved performance.
Public Policy Responsiveness	• Comply with the OEB requirement of 98% billing accuracy.
Financial Performance	

Costs:

This project has a high degree of complexity; it includes a new technology platform and multiple lines of business that require coordination. Given this project is customer facing, thorough testing is required to ensure no impact to the billing process. The cost estimate is based on implementing similar complex applications in the customer domain. Final costs will be determined once detailed business requirements and discovery phases are finalized.

($ Millions)	**2018**	**2019**	**2020**	**2021**	**2022**	**Total**
Capital* and Minor Fixed Assets	2.5	6.9	4.0	1.4		14.7
Less Removals						
Gross Investment Cost	2.5	6.9	4.0	1.4		14.7
Less Capital Contributions						
Net Investment Cost	**2.5**	**6.9**	**4.0**	**1.4**		**14.7**

**Includes Overhead at current rates*.

TAB 11

Table 1: Summary of Total Common Corporate Functions and Services OM&A

($ Millions)

	Historic			Bridge	Test
Description	**2014 IRM**	**2015**	**2016**	**2017**	**2018**
	Actual	**Actual**	**Actual**	**Forecast**	**Forecast**
Corporate Management	9.2	16.4	16.1	23.4	23.3
Finance	40.0	39.1	38.1	41.8	40.4
People and Culture	12.8	13.6	15.6	16.4	16.2
Corporate Relations	19.5	17.3	15.2	15.8	17.5
General Counsel and Secretariat	8.7	8.6	10.1	10.0	10.1
Regulatory Affairs	23.0	24.1	23.3	22.6	22.9
Security Management	3.5	4.2	4.6	4.4	4.5
Internal Audit	3.6	4.2	4.9	6.8	6.9
Real Estate and Facilities	53.6	60.0	58.6	58.7	59.5
Total CCF&S Costs	**173.9**	**187.5**	**186.6**	**200.0**	**201.3**

Total CCFS costs increase from 2015 to 2018 primarily due to the following factors:

- higher Corporate Management costs from 2015 to 2017 due to increases in compensation resulting from the recruitment of senior managers with proven track-records of delivering on targeted commercial objectives (under this new leadership, incremental productivity savings are expected to significantly offset these increased costs as identified in the Distribution System Plan in Exhibit B1, Tab 1, Schedule 1 (the "DSP"), Section 1.5);
- higher Internal Audit costs mainly from 2015 to 2017 resulting from an increased staffing requirement to address an expanding work program to support construction and capital project audit capabilities. Increased staffing to support these capabilities will ensure the team can adequately support the work program;
- higher People and Culture costs from 2014 to 2017, primarily due to increased training costs for: (a) a larger new graduate population; and (b) existing employees, specifically on the topic of the "craft of management", with a focus on managers and

2. INVENTORY

As of December 31, 2016, Hydro One Distribution carried a total year-end inventory valued at $33.1 million. Table 1 provides the year-end and Table 2 provides the mid-year inventory levels for 2013 through 2022. Actual inventory levels are provided for 2013 to 2016. Forecast inventory levels for the bridge year 2017 and test years 2018 to 2022 are included in Tables 1 and 2.

Table 1: Year-End Inventory Levels (Distribution) 2013 – 2022 ($ Million)

Year-End Balances	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Materials and Supply	6.3	6.7	3.9	4.1	4.1	4.1	6.8	6.2	5.5	5.5
Future Use Inventory	29.0	28.6	29.0	29.0	30.2	30.8	31.4	32.0	32.7	32.7
Total Inventory	**35.3**	**35.3**	**32.9**	**33.1**	**34.2**	**34.9**	**38.2**	**38.2**	**38.2**	**38.2**

Table 2: Mid-Year Inventory Levels (Distribution) 2013-2021 ($ Million)

Mid-Year Balances	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Materials and Supply	6.4	6.4	6.6	3.9	4.1	4.1	5.5	6.5	5.9	5.5
Future Use Inventory	29.9	29.3	28.9	27.9	30.1	30.5	32.5	31.7	32.3	32.7
Total Inventory	**36.3**	**35.7**	**35.5**	**31.8**	**34.2**	**34.6**	**38.0**	**38.2**	**38.2**	**38.2**

Over the 2013 to 2016 period, the average annual inventory levels have decreased, while the forecasted inventory levels from 2017 to 2022 are shown to be increasing by approximately 2% annually. This increase is attributed to:

- the growth in the distribution work program to maintain an aging infrastructure;
- Regulatory requirement to connect new customers within five days at a rate of at least 90%;
- Vendor lead time/mitigation of “stock-outs”; and