

## **RATE BASE**

### **1. INTRODUCTION**

This exhibit provides a comparison of 2017 Board Approved rate base with the forecast 2017 rate base as well as a forecast of Hydro One Distribution's rate base for the test years of 2018 to 2022 and a detailed description of each of the components.

In accordance with the 2006 Electricity Distribution Rate Handbook ("Handbook"), the rate base underlying each of the test years' revenue requirements includes a forecast of net fixed assets, calculated on a mid-year average basis, plus a working capital allowance. Net fixed assets are calculated as gross plant in service minus accumulated depreciation and contributed capital<sup>1</sup>. Working capital includes an allowance for cash working capital as well as materials and supply inventory.

### **2. COMPARISON OF RATE BASE TO BOARD APPROVED**

Table 1 below compares 2017 forecast costs to the 2017 Rate Base approved by the Board in its Decision on Hydro One Distribution's previous application EB-2013-0416.

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<sup>1</sup> Contributed capital refers to amounts contributed by third parties to specific capital projects, e.g. Joint Use Assets, Customer Contributions

**Table 1: 2017 Board-approved versus 2017 Bridge Year Forecast Rate Base**

**(\$ Millions)**

<b>Rate Base Component</b>	<b>2017 Bridge Year (Forecast)</b>	<b>2017 Board- approved</b>	<b>Variance</b>
Mid-Year Gross Plant	11,372.7	11,239.1	133.6
Less: Mid-Year Accumulated Depreciation	(4,335.6)	(4,311.7)	(23.9)
<b>Mid-Year Net Utility Plant</b>	<b>7,037.1</b>	<b>6,927.4</b>	<b>109.7</b>
Cash Working Capital	310.2	255.7	54.5
Materials & Supply Inventory	4.0	6.8	(2.7)
<b>Total Rate Base</b>	<b>7,351.3</b>	<b>7,189.9</b>	<b>161.5</b>

Total rate base in 2017 is expected to be \$161.5 million above the OEB-approved amount. This variance of 2.2% is explained by higher in-service additions due to higher than forecast replacement of assets due to trouble calls and storm damage, as well as joint use and relocation projects. In addition, a higher cash working capital requirement also contributes to the higher rate base. This is partially offset by lower demand for distribution generation connections and reduced spending on wood pole replacements.

### **3. UTILITY RATE BASE**

Utility rate base for the distribution system for the test years is filed at Exhibit D2, Tab 1, Schedule 1. The calculation of Net Utility Plant is provided at Exhibit D2, Tab 1, Schedule 2 and 3.

Hydro One Distribution's forecast rate base for the test years 2018-2022 is shown in Table 2.

Witness: Joel Jodoin

**Table 2: Distribution Rate Base (\$ Millions)**

Description	Test				
	2018	2019	2020	2021	2022
Mid-Year Gross Plant	11,948.7	12,541.0	13,219.8	14,082.3	14,783.5
Mid-Year Accumulated Depreciation	(4,601.7)	(4,833.1)	(5,097.7)	(5,431.3)	(5,749.7)
<b>Mid-Year Net Plant</b>	<b>7,347.0</b>	<b>7,708.0</b>	<b>8,122.0</b>	<b>8,651.0</b>	<b>9,033.8</b>
Cash Working Capital	321.2	335.7	348.3	378.5	395.3
Materials and Supply Inventory	4.1	5.5	6.5	5.9	5.5
<b>Distribution Rate Base</b>	<b>7,672.3</b>	<b>8,049.1</b>	<b>8,476.8</b>	<b>9,035.4</b>	<b>9,434.7</b>

The mid-year gross plant balance reflects the capital expenditure programs forecast for the bridge and test years. These programs are described in detail in Sections 3.0 through 3.6 of the DSP. The justification for capital projects in excess of \$1 million are provided in Sections 3.7 and 3.8 of the DSP.

Table 3 below provides historical and bridge year continuity of total fixed assets. The growth in gross plant primarily reflects the in-service additions made to Hydro One Distribution's rate base during the period from 2015 to 2017.

**Table 3: Continuity of Fixed Assets Summary - Rate Base (\$ Millions)**

Description	Historic Years			Bridge Year
	2014	2015	2016	2017
Opening Gross Asset Balance	9,256.2	9,832.0	10,533.1	11,127.7
In-Service Additions	623.7	755.3	657.1	651.8
Retirements	(38.7)	(36.1)	(63.0)	(39.9)
Sales	(10.2)	(18.5)	0.0	0.0
Transfers	1.0	0.4	0.5	0.0
<b>Closing Gross Asset Balance</b>	<b>9,832.0</b>	<b>10,533.1</b>	<b>11,127.7</b>	<b>11,739.6</b>
Less Future Use Land	(0.3)	(0.3)	(0.3)	(0.3)
Less Provincial Funded Assets	(28.4)	(42.9)	(57.1)	(64.0)
<b>Gross Asset Balance for Mid-Year Rate Base</b>	<b>9,803.3</b>	<b>10,489.9</b>	<b>11,070.3</b>	<b>11,675.2</b>

Table 4 provides the forecast continuity of total fixed assets for the test years.

**Table 4: Forecast of Fixed Assets Summary - Rate Base (\$ Millions)**

Description	Test	Forecast			
	2018	2019	2020	2021	2022
Opening Gross Asset Balance	11,739.6	12,291.7	12,933.5	13,656.7	14,488.5
Integration of Acquired Utilities				176.5	
In-Service Additions	640.9	775.6	768.1	734.3	815.1
Retirements	(88.8)	(133.8)	(45.0)	(79.0)	(62.7)
Sales	0.0	0.0	0.0	0.0	0.0
Transfers	0.0	0.0	0.0	0.0	0.0
<b>Closing Gross Asset Balance</b>	<b>12,291.7</b>	<b>12,933.5</b>	<b>13,656.7</b>	<b>14,488.5</b>	<b>15,240.9</b>
Less Future Use Land	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)
Less Provincial Funded Assets	(69.2)	(73.3)	(76.7)	(79.6)	(82.2)
<b>Gross Assets for Mid-Year Rate Base</b>	<b>12,222.2</b>	<b>12,859.9</b>	<b>13,579.6</b>	<b>14,408.6</b>	<b>15,158.4</b>
<b>Mid-Year Gross Asset Balance (1)</b>	<b>11,948.7</b>	<b>12,541.0</b>	<b>13,219.8</b>	<b>14,082.3</b>	<b>14,783.5</b>

Notes: (1) Mid-year gross asset balance is calculated only for the test years.

In-service additions reflect the placing in service of Hydro One Distribution's capital programs and are discussed in Exhibit D1, Tab 1, Schedule 2. These programs are described in detail in Sections 3.0 through 3.6 of the DSP.

The retirement of assets over the test years includes distribution plant equipment, meters and computer software. In 2018 and 2019, phases of Hydro One's SAP Cornerstone project become fully depreciated and thus retired.

Transfers over the period reflect movement between the strategic spares inventory and fixed assets.

**4. CASH WORKING CAPITAL**

In 2016, Hydro One Distribution retained Navigant Consulting Inc. to undertake a lead-lag study. The results of the new Navigant study and the provision for working capital for the 2018 through 2022 test years are incorporated.

The Cash Working Capital requirement for the distribution system includes the following factors:

- the forecast of OM&A;
- the retail cost of power;
- capital and income taxes; and
- the net lead-lag days determined.

The application of the methodology from the lead-lag study results in a net cash working capital requirement including the impact of HST, as shown in Exhibit D1, Tab 1, Schedule 3, Attachment 1, Table 9 and Exhibit D2, Tab 1, Schedule 5. Hydro One has calculated the 2018 test year cash working capital allowance to be \$321.2M. The cash working capital allowance for 2021 and 2022 includes the working capital requirement of the Acquired Utilities. Table 5 is a summary of total cash working capital allowance for test years 2018 to 2022.

**Table 5: Total Cash Working Capital Allowance (\$ Millions)**

	Test years				
	2018	2019	2020	2021	2022
Cash Working Capital	321.2	335.7	348.3	378.5	395.3

1     **5.       MATERIALS AND SUPPLY INVENTORY**

2  
3     In addition to cash working capital, the other component of working capital is materials  
4     and supply inventory. The average annual materials and supply inventory balances are  
5     \$4.1 million for 2018, \$5.5 million for 2019, \$6.5 million for 2020, \$5.9 million for 2021,  
6     and \$5.5 million for 2022. Materials and supply inventory is discussed in further detail in  
7     Exhibit D1, Tab 1, Schedule 4.

## IN-SERVICE ADDITIONS

Hydro One's strategy is to invest in its distribution assets to achieve the best value for its customers. The company's commitment is to explore opportunities for improved productivity and efficiency before passing costs on to customers. In-service additions represent increases to rate base as a result of capital work being declared in-service and ready for use by Hydro One customers. It is important to note that, in aggregate, the values for in-service additions will differ from capital expenditures in any given year. This difference arises from the fact that work and associated capital expenditures for many projects span multiple years, at the end of which time the projects are declared "in-service" and the associated accumulations of those capital expenditures are recognized as "in-service additions". As well, some capital projects may come into service in stages.

Table 1 presents the actual in-service capital additions for historical years 2013 to 2015, forecast in-service additions for 2016 and the bridge year 2017. The table also shows the variance between the actual in-service amounts and those approved by the OEB in Hydro One Distribution's 2015 to 2017 Custom Cost of Service application, EB-2013-0416.

**Table 1: In-Service Capital Additions 2013-2017 (\$M)**  
**OEB Approved and Actual/Forecast**

	Historic					Forecast			Bridge		
	2013	2014	2015			2016			2017		
	Actual		OEB Approved	Actual	Variance	OEB Approved	Forecast	Variance	OEB Approved	Forecast	Variance
<b>Sustaining</b>	296.6	324.8	294.2	420.2	126.0	311.9	363.3	51.4	335.7	310.7	-25.1
<b>Development</b>	194.1	187.6	218.9	216.9	-2.0	200.8	176.3	-24.5	211.2	179.1	-32.1
<b>Operations</b>	1.4	5.0	11.1	7.0	-4.1	8.06	-0.3	-8.4	16.4	12.7	-3.8
<b>Customer Service</b>	13.9	1.4	46.0	16.6	-29.4	20.6	6.3	-14.3	27.7	12.7	-14.9
<b>Common &amp; Other</b>	223.4	105.0	86.5	94.5	8.1	80.4	111.5	31.1	104.97	136.7	31.7
<b>Total</b>	<b>729.3</b>	<b>623.7</b>	<b>656.7</b>	<b>755.3</b>	<b>98.6</b>	<b>621.8</b>	<b>657.1</b>	<b>35.4</b>	<b>696.0</b>	<b>651.8</b>	<b>-44.2</b>

Witness: Kathy Moulton

1 The 2015 in-service additions are \$98.6 million higher than the OEB-approved level of  
2 \$656.7 million. The 2016 in-service additions are forecast to be \$35.4 million higher  
3 than the approved level of \$621.8 million. The 2017 in-service additions are forecast to  
4 be \$44.2 million lower than the OEB-approved level of \$696.0 million.

5  
6 The 2015 in-service additions are \$98.6 million higher than the OEB-approved level,  
7 primarily, due to higher spending on storm damage and repair in November and  
8 December, as well as, higher than planned in-service additions for joint use and  
9 relocation projects, which are customer-driven programs that Hydro One must deliver.

10  
11 The 2016 in-service additions are forecast to be \$35.4 million higher than the OEB-  
12 approved level, primarily, due to higher spending on trouble calls and storm damage and  
13 repairs, as well as, higher spending on metering. Hydro One is replacing meters because  
14 its service provider is phasing out network cellular technology by April 2018. New  
15 meters align with the service provider's new technology and prevent loss of data  
16 communication between Hydro One and its customers.

17  
18 The 2017 in-service additions are forecast to be \$44.2 million lower than the OEB-  
19 approved level, primarily, due to lower demand for distribution generation connections as  
20 a result of changes made to IESO program rules, and more efficient completion of wood  
21 pole replacements. Hydro One improved bundling and scheduling of this work and  
22 reduced funding for the system capacity reinforcement program.

23  
24 Table 2 represents the in-service levels requested in 2018 through 2022. As a result of  
25 the integration of Norfolk, Haldimand and Woodstock, as discussed in Exhibit A, Tab 7,  
26 Schedule 1, the in-service additions for 2021 and 2022 include \$9.4 million and \$9.5  
27 million, respectively, for the newly integrated utilities.



**Table 2: In-Service Capital Additions 2018-2022 (\$M)**

	Forecast				
	2018	2019	2020	2021	2022
<b>Sustaining</b>	292.5	335.6	361.5	384.2	427.3
<b>Development</b>	194.4	268.9	218.9	219.2	221.0
<b>Operations</b>	2.2	10.3	68.9	1.6	20.2
<b>Customer Service</b>	30.2	0.2	0.2	0.2	0.2
<b>Common &amp; Other</b>	121.5	160.6	118.6	129.1	146.5
<b>Total</b>	<b>640.9</b>	<b>775.6</b>	<b>768.1</b>	<b>734.3</b>	<b>815.1</b>

The 2018 in-service additions are forecast to be \$55.1 million lower than the 2017 OEB-approved level, primarily, due to lower demand for distribution generation connections as a result of changes made to IESO program rules, more efficient completion of wood pole replacements, as well as, lower funding for joint use and relocation projects, for which anticipated demand by Hydro One customers has decreased.

Hydro One is committed to aligning customer preferences, responsible management of assets and rate impacts. Strong understanding of needs of customers and efficient use of resources have, in concert, resulted in forecasts lower than previous approved levels.

The major drivers of the in-service levels requested for 2018 through 2022 include the following:

- new connection and upgrades;
- the replacement of PCB transformers to meet the OEB's mandate to replace all devices by 2025;
- system capacity reinforcements;
- efficiencies gained in the completion of wood pole replacements;
- Integrated System Operating Center;

Witness: Kathy Moulton

- 1           • in-service additions from the acquired LDCs in 2021 and 2022.
- 2
- 3       Hydro One Distribution expects to achieve the levels of in-service capital additions being
- 4       sought for 2018 through 2022 by utilizing a mix of internal and external resources,
- 5       including outsourcing. The Work Execution Strategy in Exhibit B1, Tab 2, Schedule 1
- 6       explains in more depth how Hydro One Distribution plans to accomplish the work
- 7       program.

## **WORKING CAPITAL**

### **1. INTRODUCTION**

Each and every day, Hydro One must be in a position financially to perform the work that keeps the system safe and reliable and provides strong distribution outcomes its customers will value. Working capital is integral to this commitment. Working capital is the amount of funds required to finance the day-to-day operations of a regulated utility and is included as part of rate base for ratemaking purposes. The determination of working capital relies on a lead-lag study.

In 2009, Hydro One commissioned Navigant to carry out a lead-lag study. In EB-2009-0096 Decision with Reasons, the OEB accepted the results of the Navigant lead-lag study. In preparation of new rate applications, Hydro One commissioned Navigant to conduct an updated lead-lag study for both the Transmission and Distribution businesses in March 2015. Both studies were based on 2014 actual results. The finalized Distribution lead-lag study is included in Exhibit D1, Tab 1, Schedule 3, Attachment 1 (entitled Working Capital Requirements of Hydro One Networks' Distribution Business – dated December 19, 2016).

### **2. SUMMARY**

Hydro One Distribution's net cash working capital requirement for the 2018 test year is \$321.2 million or 7.7% of the sum of OM&A (\$591.9 million) and Cost of Power expenses (\$3,578.4 million). Applying the same formula, the net cash working capital requirement in years 2019 through 2022 is also 7.7% of the sum of OM&A plus Cost of Power.

Witness: Joel Jodoin

1 Table 1 summarizes the net cash working capital requirements determined by using the  
2 lead-lag days from the Navigant study to reflect the 2018-2022 test year revenues,  
3 expenses and HST amounts (Table 2).

4  
5 The methodology used to determine the net cash working capital required is based on the  
6 Navigant study that was accepted by the OEB and updated as part of this filing, and it  
7 takes the following into consideration:

- 8
- 9 • has considered the most important elements of revenue lags, including the service,  
10 billing and collection lags;
  - 11 • includes the most important elements of expense leads such as payroll and  
12 benefits, operations, maintenance, administration expenses, and taxes, including  
13 property taxes; and
  - 14 • takes the major cost elements into consideration in calculating the net cash  
15 working capital.

1 **Table 1: Distribution Net Cash Working Capital Requirement**  
2 **(All Data in \$millions Except Lead/Lag Days)**

	<b>Revenue Lag (Days)</b>	<b>Expense Lag (Days)</b>	<b>Net Lag (Lead Days)</b>	<b>2018 Test Year</b>	<b>2019 Test Year</b>	<b>2020 Test Year</b>	<b>2021 Test Year</b>	<b>2022 Test Year</b>
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
<b>Expenses</b>								
Cost of Power	51.82	32.72	19.10	3,578.43	3,738.1	3,915.19	4,096.92	4,300.13
OM&A	51.82	25.13	26.69	591.94	599.6	607.43	615.33	623.33
Removal Costs	51.82	24.39	27.43	58.65	69.5	70.06	69.22	70.07
Environmental Costs	51.82	16.97	34.85	13.20	13.4	13.80	14.11	14.42
Interest on Long-Term Debt	51.82	(1.93)	53.75	185.55	194.6	205.01	214.45	223.97
PILS	51.82	13.67	38.16	58.01	61.3	62.60	68.17	68.96
<b>Total</b>				<b>4,485.78</b>	<b>4,676.50</b>	<b>4,874.09</b>	<b>5,078.20</b>	<b>5,300.88</b>
HST				51.66	54.68	56.47	59.03	62.33
<b>Total Amounts Paid/Accrued</b>				<b>4,537.44</b>	<b>4,731.18</b>	<b>4,930.56</b>	<b>5,137.23</b>	<b>5,363.21</b>
<b><u>Working Capital Required</u></b>								
(Calculations based on above values, for each expense category, calculated using the following formula: For Test Years 2018 to 2022 (Col (D)*Col (C)/365))								
Cost of Power				187.23	195.59	204.29	214.36	224.99
OM&A				43.28	43.85	44.29	44.99	45.58
Removal Costs				4.41	5.22	5.25	5.20	5.27
Environmental Costs				1.26	1.29	1.31	1.35	1.38
Interest on Long-Term Debt				27.33	28.67	30.11	31.58	32.98
Income & Capital Tax				6.06	6.41	6.53	7.13	7.21
Total				269.57	281.02	291.78	304.60	317.40
HST (see Table 2)				51.66	54.68	56.47	59.03	62.33
<b>Net Working Cash Required</b>				<b>321.23</b>	<b>335.70</b>	<b>348.25</b>	<b>363.63</b>	<b>379.74</b>

Witness: Joel Jodoin

**Table 2: Distribution Summary of HST Cash Working Capital Requirement  
(All Data in \$M Except Lead-Lag Days)**

	<b>HST Lead Time (Days)</b>	<b>Working Capital Factor</b>	<b>2018 Test Year</b>	<b>2019 Test Year</b>	<b>2020 Test Year</b>	<b>2021 Test Year</b>	<b>2022 Test Year</b>
Revenue (external)	(8.97)	(2.46%)	(16.24)	(16.92)	(17.59)	(18.39)	(19.19)
OM&A	43.31	11.87%	3.42	3.46	3.50	3.55	3.60
Cost of power	46.42	12.72%	59.16	61.80	64.55	67.73	71.09
Removal costs	41.76	11.44%	0.10	0.12	0.12	0.12	0.12
Environmental costs	41.76	11.44%	0.07	0.07	0.08	0.08	0.08
Capital expenditures	41.76	11.44%	5.15	6.15	5.82	5.94	6.64
<b>Total</b>			<b>51.66</b>	<b>54.68</b>	<b>56.47</b>	<b>59.03</b>	<b>62.33</b>

More detail on the Distribution HST Cash Working Capital Requirement is in page 12 of Attachment 1.

### **3. COMPARISON TO PRIOR STUDY**

A comparison to the prior Navigant study is in attachment 1 of this exhibit on page 16, section 5.1. The impact of implementing the current study results as compared to previously approved study has resulted in an increase of cash working capital of \$7.6 million, or an increase in revenue requirement of approximately \$0.6 million.

### **4. INTEGRATION OF ACQUIRED UTILITIES**

Hydro One calculated the net cash working capital requirement of each of the Acquired Utilities by using 7.7% of the sum of OM&A and Cost of Power expenses, as determined by Navigant.

Witness: Joel Jodoin

**Table 3: Cash working capital of Acquired Utilities for 2021 and 2022**  
(\$millions)

Acquired LDCs	Test years				
	2018	2019	2020	2021	2022
Cash Working Capital	-	-	-	14.9	15.6

**Table 4: Total Cash working capital of the Acquired Utilities and  
Hydro One Distribution**

(\$millions): Consolidated (HONI Dx + Acquired Utilities)	Test years				
	2018	2019	2020	2021	2022
Cash Working Capital	321.2	335.7	348.3	378.5	395.3

Witness: Joel Jodoin

# Working Capital Requirements of Hydro One Networks

## Distribution Business

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This report (the “report”) was prepared for Hydro One Networking Inc. (“HONI”) by Navigant Consulting Ltd. (“Navigant”). The report was prepared solely for the purposes of HONI’s distribution rate application to the Ontario Energy Board and may not be used for any other purpose. Use of this report by any third party outside of HONI’s rate application is prohibited. Use of this report should not, and does not, absolve the third party from using due diligence in verifying the report’s contents. Any use which a third party makes of this report, or any reliance on it, is the responsibility of the third party. Navigant extends no warranty to any third party.

## EXECUTIVE SUMMARY

In preparation for an upcoming distribution rate filing before the Ontario Energy Board (“OEB”), Hydro One Networks, Inc. (“HONI”) retained Navigant Consulting Ltd. (“Navigant”) to prepare an update to its prior working capital study. This report provides the results of the update and the working capital requirements of HONI’s distribution business.

Listed below are key findings and conclusions from this study:

1. In terms of lead-lag days, the results from this study are generally comparable with HONI’s previous distribution working capital study (EB-2013-0416). Where there are differences, they have been identified, explained, and their impact on working capital requirements quantified;
2. The approach and methods used in this study are generally consistent with prior HONI studies as well as studies performed by other local distribution companies in Ontario; and,
3. Data from calendar year 2014 was used as a basis for this analysis. Known and measurable changes have been reflected, where appropriate.

Results from the lead-lag study applied to HONI’s test years identify the following working capital amounts.

**Table 1: Summary of Working Capital Requirements**

Year	2018	2019	2020	2021	2022
<b>Percentage of OMA</b>	7.70%	7.74%	7.70%	7.72%	7.71%
<b>Working Capital Requirement \$(M)</b>	\$321	\$336	\$348	\$364	\$380

## Organization of the Report

Section 1 of this report discusses the lag times associated with HONI’s collections of revenues. This includes a description of the sources of revenues and how an overall revenue lag is derived.

Section 2 presents the lead times associated with HONI’s expenses. This includes a description of the types of expenses incurred by HONI’s distribution operations and how expenses are treated for the purposes of deriving an overall expenses lead.

Section 3 presents the working capital requirements of HONI’s distribution business including the working capital requirement associated with the Harmonized Sales Tax (“HST”).

Section 4 presents a summary comparison of the results from this study with results from EB-2013-0416 study. Differences between the two have been noted, explained, and their impacts on working capital quantified. The intent of presenting the discussion in Section 4 is to demonstrate that the approach used in this study is an accurate reflection of the current distribution operations of HONI and that the results are reasonable when compared with the prior distribution studies.

## 1. WORKING CAPITAL METHODOLOGY

Working capital is the amount of funds that are required to finance the day-to-day operations of a regulated utility and which are included as part of a rate base for ratemaking purposes. A lead-lag study is the most accurate basis for determination of working capital and was used by Navigant for this purpose.

A lead-lag study analyzes the time between the date customers receive service and the date that customers' payments are available to HONI (or "lag") together with the time between which HONI receives goods and services from its vendors and pays for them at a later date (or "lead")<sup>1</sup>. "Leads" and "lags" are both measured in days and are dollar-weighted where appropriate.<sup>2</sup> The dollar-weighted net lag (lag minus lead) days is then divided by 365 (or 366 for leap years) and then multiplied by the annual test year expenses to determine the amount of working capital required. The resulting amount of working capital is then included in HONI's rate base for the purpose of deriving revenue requirements.

### 1.1 Key Concepts

This section provides an overview of the key concepts used for a lead-lag study.

#### Mid-Point Method

When a service is provided to (or by) HONI over a period of time, the service is deemed to have been provided (or received) evenly over the midpoint of the period, unless specific information regarding the provision (or receipt) of that service indicates otherwise. If both the service end date ("Y") and the service start date ("X") are known, the mid-point of a service period can be calculated using the formula:

$$\text{Mid-Point} = \frac{([Y-X]+1)}{2}$$

When specific start and end dates are unknown, but it is known that a service is evenly distributed over the mid-point of a period, an alternative formula that is generally used is shown below. The formula uses the number of days in a year (A) and the number of periods in a year (B):

$$\text{Mid-Point} = \frac{A/B}{2}$$

#### Statutory Approach

In conjunction with the mid-point method, it is important to note that not all areas of this study may utilize dates on which actual payments were made to (or by) HONI. In some instances, particularly for the HST, the due dates for payments are established by statute or by regulation with significant penalties for late payments. In these instances, the due date established by statute has been used in lieu of when payments were actually made.

#### Dollar Weighting

Both leads and lags are dollar-weighted where appropriate and where data is available to accurately reflect the flow of dollars. For example, suppose that a transaction has a lead time of 100 days and has a dollar value of \$100. Further, suppose that another transaction has a lead time of 30 days with a dollar value of \$1 Million. A simple un-weighted average of the two transactions would give us a lead time of 65 days  $([100+30]/2)$ . However, when these two transactions are dollar weighted, the resulting lead time would be closer to 30 days which is more representative of how the dollars actually flow.

<sup>1</sup> A positive lag (or lead) indicates that payments are received (or paid for) after the provision of a good or service.

<sup>2</sup> The notion of dollar-weighting is discussed further in the sub-section titled "Key Concepts".

## Expense Lead Components

As used in this study, expense leads are defined to consist of two components:

1. Service lead component (services are assumed to be provided to HONI evenly around the mid-point of the service period); and,
2. Payment lead component (the time period from the end of the service period to the time payment was made and when funds have left HONI's possession).

## 1.2 Methodology

Performing a lead-lag study requires two key undertakings:

3. Developing an understanding of how the regulated distribution business operates in terms of products and services sold to customers/purchased from vendors, and the policies and procedures that govern such transactions; and,
4. Modeling such operations using data from a relevant period of time and a representative data set. It is important to ascertain and factor into the study whether (or not) there are known changes to existing business policies and procedures going forward. Where such changes are known and material, they should be factored into the study.

To develop an understanding of HONI's operations, interviews with personnel within HONI's Accounts Payable, Customer Service, Wholesale Market Operations, Human Resources, Payroll, Treasury, and Tax Departments were conducted. Key questions that were addressed during the course of the interviews included:

1. What is being sold (or purchased)? If a service is being provided to (or by) HONI, over what time period was this service provided;
2. Who are the buyers (or sellers);
3. What are the terms for payment? Are the terms for payment driven by industry norms or by company policy? Is there flexibility in the terms for payment;
4. Are any changes to the terms for payment expected? Are these terms driven by industry or internally? What is the basis for any such changes;
5. Are there any new rules or regulations governing transactions relating to distribution operations that are expected to materialize over the time frame considered in this report; and,
6. How are payments made (or received)? Payment types have different payment lead times (i.e., internet payments have shorter deposit times than cheques).

## 2. REVENUE LAGS

A distribution utility providing service to its customers generally derives its revenue from bills paid for service by its customers. A revenue lag represents the number of days from the date service is rendered by HONI until the date payments are received from customers and funds are available to HONI.

Interviews with HONI personnel indicate that its distribution business receives funds from the following funding streams:

1. Retail Customers;
2. Rural or Remote Rate Protection Customers ("RRRP");
3. The Ontario Ministry of Finance via the Independent Electricity System Operation ("IESO");
4. Other sources (revenues from municipalities, electricity retailers and revenues for miscellaneous services such as jobbing and contracting work performed by HONI); and,
5. Other revenues which are comprised of payments (expenses) to embedded generators such as Feed-in-Tariff (FIT) and microFIT customers that are managed similar to revenues.

The lag times associated with the funding streams above were weighted and combined to calculate an overall revenue lag time as shown below.

**Table 2: Summary of Revenue Lag**

Description	Lag Days	Revenues (\$M)	Weighting	Weighted Lag
Retail Revenue	50.86	\$4,093	118%	60.24
RRRP	32.72	\$173	5%	1.64
Other Revenue <sup>3</sup>	42.90	\$(811)	-23%	(10.07)
<b>Total</b>		<b>\$3,456</b>	<b>100%</b>	<b>51.82</b>

Retail revenue lag consists of the following components<sup>4</sup>:

1. Service lag;
2. Billing lag; and,
3. Collections lag.

The lag times for each of the above components, when added together, results in the retail revenue lag for the purpose of calculating the working capital requirements for HONI's distribution business. Table 3 below summarizes the total retail revenue lag.

**Table 3: Summary of Retail Revenue Lag**

Description	Lag Days
Service lag	17.25
Billing lag	7.71
Collections lag	25.90
<b>Total</b>	<b>50.86</b>

The estimation of each component of the retail revenue lag is described below.

<sup>3</sup> Other Revenue represents payments to embedded generators, therefore the revenues are negative

<sup>4</sup> There is no additional lag time for payment processing as funds are available to HONI immediately after funds are deposited

## 2.1 Service Lag

The service lag is the time from HONI's provision of electricity to a customer, to the time the customer's service period ends, which is typically defined as when the meter is read. Interviews with customer service staff at HONI indicated that based upon revenue weighting, approximately 90.3% of customers are on a monthly billing schedule, 0.3% of customers are on a bi-monthly billing schedule, 2.5% of customers are on a quarterly billing schedule and 6.9% of customers do not have an assigned billing schedule. The breakdown of the customer meter reading frequency shows a shift of more customers into the monthly billing category versus the prior study due to the implementation of smart meters, which allow for more accurate monthly meter readings. Taking this information into account and using the mid-point methodology, the Service Lag was estimated to be 17.25 days.

## 2.2 Billing Lag

The billing lag is the time period from when the customer's service period ends, which is typically defined as when the meter is read, and the time that the customer's bill is generated and provided to the customer. Interviews with billing staff at HONI and analysis of meter billing data indicated that HONI customers have an average billing lag of 7.71 days, which is similar to the billing lag in the prior study.

## 2.3 Collections Lag

The collections lag is the time period from when the customer's bill is provided to the customer, to the time period that the customer provides a payment to HONI and when that payment is recorded in HONI's billing system. This period of time is measured by analyzing the receivables aging data contained in receivables reports used by HONI for normal business purposes. Using such data provided by HONI for the calendar year 2014, a dollar-weighted average collections lag of 25.90 days was determined for HONI's distribution operations. This collections lag is shorter than the collections lag in the prior study due to HONI's increased efficiencies in the collection of receivables outstanding from customers.

### 3. EXPENSE LEAD

The determination of working capital requires both a measurement of the lag in the collection of revenues for services provided by HONI's distribution business, and the lead times associated with payments for services provided to HONI. Therefore, in conjunction with the calculation of the revenue lag, expense lead times were calculated for the following items:

1. Cost of power;
2. OM&A expenses;
3. Removal & environmental remediation costs;
4. Interest on long term debt;
5. Payments in lieu of taxes; and,
6. HST.

#### 3.1 Cost of Power

HONI purchases its power supply requirements on a monthly basis from the IESO and pays for such supplies on a schedule defined within the IESO's billing and settlement procedures. Taking all this information on actual payments made by HONI in 2014, a dollar-weighted cost of power expense lead time of 32.72 days was calculated. Table 4 below summarizes the components of the cost of power expense lead calculation.

**Table 4: Summary of IESO Cost of Power Expenses**

Delivery Month	Amounts (\$M)	Weighting Factor %	Payment Date	Service Lead Time	Payment Lead Time	Total Lead Time	Weighted Lead Time
Jan 14	\$ 237.81	11.16%	2/19/2014	15.50	19.00	34.50	3.85
Feb 14	\$ 250.84	11.77%	3/18/2014	14.00	18.00	32.00	3.77
Mar 14	\$ 176.67	8.29%	4/16/2014	15.50	16.00	31.50	2.61
Apr 14	\$ 230.91	10.84%	5/16/2014	15.00	16.00	31.00	3.36
May 14	\$ 129.03	6.06%	6/17/2014	15.50	17.00	32.50	1.97
Jun 14	\$ 126.10	5.92%	7/17/2014	15.00	17.00	32.00	1.89
Jul 14	\$ 130.90	6.14%	8/19/2014	15.50	19.00	34.50	2.12
Aug 14	\$ 138.05	6.48%	9/17/2014	15.50	17.00	32.50	2.11
Sep 14	\$ 137.09	6.43%	10/17/2014	15.00	17.00	32.00	2.06
Oct 14	\$ 163.26	7.66%	11/19/2014	15.50	19.00	34.50	2.64
Nov 14	\$ 178.82	8.39%	12/16/2014	15.00	16.00	31.00	2.60
Dec 14	\$ 231.25	10.85%	1/19/2015	15.50	19.00	34.50	3.74
<b>Total</b>	<b>\$ 2,130.72</b>	<b>100.00%</b>					<b>32.72</b>

#### 3.2 OM&A Expenses

For the purpose of the distribution lead-lag study, OM&A expenses were considered to consist of payments made by HONI to its vendors in the following categories:

1. Payroll & benefits;
2. Property taxes;



3. Corporate procurement card;
4. Trinity lease payments;
5. Payments to Inergi;
6. Consulting & contract staff; and,
7. Miscellaneous OM&A

Expense lead times were calculated individually for each of the items listed above and then dollar-weighted to derive a composite expense lead time of 25.13 days for OM&A expenses.

**Table 5: Summary of OM&A Expenses**

Description	Amounts (\$M)	Weighting	Expense Lead Time	Weighted Lead Time
Payroll & benefits	\$ 677.08	49.92%	23.74	11.85
Property taxes	\$ 3.84	0.28%	36.29	0.10
Corporate procurement card	\$ 51.05	3.76%	29.87	1.12
Trinity lease payments	\$ 5.55	0.41%	-14.21	-0.06
Payments to Inergi	\$ 141.57	10.44%	32.82	3.43
Consulting and Contract Staff	\$ 62.01	4.57%	1.91	0.09
Miscellaneous OM&A	\$ 415.20	30.61%	28.09	8.60
<b>Total</b>	<b>\$ 1,356.29</b>	<b>100.00%</b>		<b>25.13</b>

### 3.2.1 Payroll & Benefits

The following items were considered to be expenses related to the payroll & benefits of HONI:

1. Four types of payroll including basic, construction, management, board of directors and supervisor pension payroll;
2. Three types of payroll withholdings including the Canada Pension Plan, Employment Insurance, and income tax withholdings for each of the payroll types;
3. Contributions made by Hydro One to the Hydro One Pension Plan;
4. Group health, dental, and life insurance related administrative fees and claims;
5. Payments made by Hydro One on account of the Employer Health Tax ("EHT"); and,
6. Payments made by Hydro One to the Worker Safety Improvement Board ("WSIB").

When all payroll, withholdings and benefits were dollar-weighted using actual payment data, the weighted average expense lead time associated with payroll & benefits was determined to be 23.74 days as shown in Table 6 below.

Table 6: Summary of Payroll &amp; Benefits Expenses

Description	Amounts (\$M)	Weighting	Expense Lead Time	Weighted Lead Time
Pensions	\$ 99.40	15%	28.27	4.15
WSIB	\$ 4.10	1%	44.76	0.27
Employee Health Tax	\$ 9.93	1%	30.91	0.45
Group life insurance	\$ 3.11	0%	0.86	0.00
Group health & dental - ASO	\$ 4.25	1%	56.48	0.35
Group health & dental - claims	\$ 26.76	4%	10.90	0.43
Payroll	\$ 0.00			
Basic	\$ 254.72	38%	26.70	10.04
Construction	\$ 97.21	14%	11.49	1.65
Management	\$ 2.14	0%	25.91	0.08
Board of directors	\$ 0.24	0%	59.51	0.02
Supervisor pensions	\$ 2.14	0%	25.91	0.08
Payroll withholdings	\$ 0.00			
Basic	\$ 8.36	19%	25.73	4.88
Construction	\$ 42.83	6%	19.03	1.20
Management	\$ 0.89	0%	40.29	0.05
Board of directors	\$ 0.11	0%	69.59	0.01
Supervisor pensions	\$ 0.89	0%	40.29	0.05
<b>Total</b>	<b>\$ 677.08</b>	<b>100%</b>		<b>23.74</b>

### 3.2.2 Property Taxes

HONI makes property tax payments to a number of municipalities and taxing authorities in the Province of Ontario. These payments are made in the current year for the current year and are typically made in installments. Using actual payment dates and amounts associated with HONI's distribution business for calendar year 2014, a dollar-weighted expense lead time of 36.29 days was determined.

### 3.2.3 Corporate Procurement Card

Procurement (or charge) cards are used by the HONI's employees for a variety of company related reasons including, and not limited to, purchases of materials in the field, incidental expenses, and to settle charges for travel and accommodation. Based on actual invoices from the HONI's charge card provider and payments made by HONI, a dollar-weighted expense lead time of 29.87 days was determined.

### 3.2.4 Trinity Lease Payments

HONI leases its office space in the Bell Trinity Square Building from Northam Realty. HONI generally makes its lease payments on or around the end of the month prior for the current month. Taking this information into account and using actual invoices and payments for 2014, a dollar-weighted expense lead (-lag) time of -14.21 days was determined.

### 3.2.5 Payments to Inergi

Inergi (a division of CapGemini) provides a number of services to HONI including (and not limited to) customer service operations, finance, human resources, accounts payable, information technology, IESO settlement services, and supply management services. HONI generally makes payments to Inergi on or around the last day of the month for the current month. Based on a review of payments made by HONI to Inergi in 2014, a dollar-weighted expense lead time of 32.82 days was determined.

### 3.2.6 Consulting and Contract Staff

HONI engages consulting and contract staff to provide assistance in the areas of engineering, environmental services, receivables management, accounting, and general consulting. A dollar-weighted expense lead time of 1.91 days was determined based on a review of invoices rendered and payments made by HONI in 2014.

### 3.2.7 Miscellaneous OM&A

This category of expense includes items such as product purchases, equipment rentals, and provision of general services to HONI. Based on transactions in HONI's accounts payable system under this category, a dollar-weighted expense lead time of 28.09 days was derived.

## 3.3 Removal and Environmental Remediation Costs

HONI incurs costs when removing or replacing equipment from existing sites or right of ways. Further, costs relating to environmental remediation at these sites are also incurred. While costs are required to be reported as a depreciation and amortization expense for accounting purposes, there is a cash flow impact associated with HONI's expenditures on such removal and environmental remediation costs. Based upon discussions with HONI staff, estimates for the derivation of removal and environmental remediation costs were determined and summarized in Table 7 below.

**Table 7: Summary of Removal and Environmental Remediation Expenses**

Description	Expense Lead Time	% of Remediation Expenses	Weighted Lead Time
<b><u>Removal</u></b>			
HONI labour	23.74	85.0%	20.18
HONI materials	28.09	15.0%	4.21
External labour	1.91	0.0%	0.00
External materials	28.09	0.0%	0.00
<b>Total</b>		<b>100.0%</b>	<b>24.39</b>
<b><u>Environmental Remediation</u></b>			
HONI labour	23.74	51.0%	12.11
HONI materials	28.09	9.0%	2.53
External labour	1.91	34.0%	0.65
External materials	28.09	6.0%	1.69
<b>Total</b>		<b>100.0%</b>	<b>16.97</b>

### 3.4 Interest on Long Term Debt

HONI makes interest payments on its long term debt outstanding out of current year revenues. Such payments are generally made twice a year. Taking into account the various bonds and other long term debt instruments, a dollar-weighted expense lead (-lag) time of -1.93 days was determined for the 2014 calendar year.

### 3.5 Payments in Lieu of Taxes (“PILs”)

HONI makes payments in lieu of taxes in monthly installments to the relevant taxing authorities. Using payment amounts that were made in calendar year 2014, a dollar-weighted expense lead time of 13.67 days was determined for PIL's.<sup>5</sup>

### 3.6 HST

The expense lead times associated with the following items that attract HST were considered in HONI's distribution lead-lag study.

1. Revenues;
2. Cost of Power;
3. OM&A<sup>6</sup>; and,
4. Removals, Environmental Remediation and Capital Costs.

A summary of the expense lead times and working capital amounts associated with each of the above items is provided in Table 8. Note that the statutory approach described at the outset was used to determine the expense lead times associated with HONI's remittances and disbursements of HST (i.e., both remittances and collections are generally on the last day of the month following the date of the applicable invoice).

**Table 8: Summary of HST Working Capital Amounts**

Description	HST Lead Time	Working Capital Factor	2018 (\$M)	2019 (\$M)	2020 (\$M)	2021 (\$M)	2022 (\$M)
Revenues	-8.97	-2.46%	\$(16.24)	\$(16.92)	\$(17.59)	\$(18.39)	\$(19.19)
Cost of Power	46.42	12.72%	\$59.16	\$61.80	\$64.55	\$67.73	\$71.09
OM&A expenses	43.31	11.87%	\$3.42	\$3.46	\$3.50	\$3.55	\$3.60
Removals	41.76	11.44%	\$0.10	\$0.12	\$0.12	\$0.12	\$0.12
Environmental remediation	41.76	11.44%	\$0.07	\$0.07	\$0.08	\$0.08	\$0.08
Capital	41.76	11.44%	\$5.15	\$6.15	\$5.82	\$5.94	\$6.64
<b>Total</b>			<b>\$51.66</b>	<b>\$54.68</b>	<b>\$56.47</b>	<b>\$59.03</b>	<b>\$62.33</b>

<sup>5</sup> HONI is now a publicly traded company as opposed to a Crown Corporation. HONI will depart from PILs and instead pay federal and provincial taxes, however the financial impact of this change on working capital should be neutral as the amount of total taxes is expected to be similar to that of the amount paid for PILs

<sup>6</sup> Costs within OM&A that attract HST include Corporate Procurement Card, Trinity Lease Payments, Payments to Inergi, Consulting and Contract Staff and Miscellaneous OM&A

## 4. HYDRO ONE DISTRIBUTION – WORKING CAPITAL REQUIREMENTS

Using the results described under the discussion of revenue lags and expense leads, and applying them to HONI's proposed distribution expenses for the 2018-2022 test years, HONI's working capital requirements were determined and are shown in the tables below.

**Table 9: HONI Distribution Working Capital Requirements (2018)**

Description	Revenue Lag Days	Expense Lead Days	Net Lag Days	Working Capital Factor	Expenses (\$M)	Working Capital Requirements (\$M)
Cost of power	51.82	32.72	19.10	5%	\$3,578.43	\$187.23
OM&A expenses	51.82	25.13	26.69	7%	\$591.94	\$43.28
PILS	51.82	13.67	38.16	10%	\$58.01	\$6.06
Interest expense	51.82	-1.93	53.75	15%	\$185.55	\$27.33
Environmental remediation	51.82	16.97	34.85	10%	\$13.20	\$1.26
Removals	51.82	24.39	27.43	8%	\$58.65	\$4.41
<b>Total</b>					<b>\$4,485.78</b>	<b>\$269.57</b>
HST						\$51.66
<b>Total - Including HST</b>						<b>\$321.23</b>
<b>Working Capital as a Percent of OM&amp;A incl. Cost of Power</b>						<b>7.70%</b>

**Table 10: HONI Distribution Working Capital Requirements (2019)**

Description	Revenue Lag Days	Expense Lead Days	Net Lag Days	Working Capital Factor	Expenses (\$M)	Working Capital Requirements (\$M)
Cost of power	51.82	32.72	19.10	5%	\$3,738.15	\$195.59
OM&A expenses	51.82	25.13	26.69	7%	\$599.64	\$43.85
PILS	51.82	13.67	38.16	10%	\$61.33	\$6.41
Interest expense	51.82	-1.93	53.75	15%	\$194.66	\$28.67
Environmental remediation	51.82	16.97	34.85	10%	\$13.49	\$1.29
Removals	51.82	24.39	27.43	8%	\$69.52	\$5.22
<b>Total</b>					<b>\$4,676.79</b>	<b>\$281.02</b>
HST						\$54.68
<b>Total - Including HST</b>						<b>\$335.70</b>
<b>Working Capital as a Percent of OM&amp;A incl. Cost of Power</b>						<b>7.74%</b>

**Table 11: HONI Distribution Working Capital Requirements (2020)**

Description	Revenue Lag Days	Expense Lead Days	Net Lag Days	Working Capital Factor	Expenses (\$M)	Working Capital Requirements (\$M)
Cost of power	51.82	32.72	19.10	5%	\$3,915.19	\$204.29
OM&A expenses	51.82	25.13	26.69	7%	\$607.43	\$44.29
PILS	51.82	13.67	38.16	10%	\$62.60	\$6.53
Interest expense	51.82	-1.93	53.75	15%	\$205.01	\$30.11
Environmental remediation	51.82	16.97	34.85	10%	\$13.80	\$1.31
Removals	51.82	24.39	27.43	7%	\$70.06	\$5.25
<b>Total</b>					<b>\$4,874.09</b>	<b>\$291.78</b>
HST						\$56.47
<b>Total - Including HST</b>						<b>\$348.25</b>
<b>Working Capital as a Percent of OM&amp;A incl. Cost of Power</b>						<b>7.70%</b>

**Table 12: HONI Distribution Working Capital Requirements (2021)**

Description	Revenue Lag Days	Expense Lead Days	Net Lag Days	Working Capital Factor	Expenses (\$M)	Working Capital Requirements (\$M)
Cost of power	51.82	32.72	19.10	5%	\$4,096.92	\$214.36
OM&A expenses	51.82	25.13	26.69	7%	\$615.33	\$44.99
PILS	51.82	13.67	38.16	10%	\$68.17	\$7.13
Interest expense	51.82	-1.93	53.75	15%	\$214.44	\$31.58
Environmental remediation	51.82	16.97	34.85	10%	\$14.11	\$1.35
Removals	51.82	24.39	27.43	8%	\$69.22	\$5.20
<b>Total</b>					<b>\$5,078.18</b>	<b>\$304.60</b>
HST						\$59.03
<b>Total - Including HST</b>						<b>\$363.63</b>
<b>Working Capital as a Percent of OM&amp;A incl. Cost of Power</b>						<b>7.72%</b>

**Table 13: HONI Distribution Working Capital Requirements (2022)**

Description	Revenue Lag Days	Expense Lead Days	Net Lag Days	Working Capital Factor	Expenses (\$M)	Working Capital Requirements (\$M)
Cost of power	51.82	32.72	19.10	5%	\$4,300.13	\$224.99
OM&A expenses	51.82	25.13	26.69	7%	\$623.33	\$45.58
PILS	51.82	13.67	38.16	10%	\$68.96	\$7.21
Interest expense	51.82	-1.93	53.75	15%	\$223.96	\$32.98
Environmental remediation	51.82	16.97	34.85	10%	\$14.42	\$1.38
Removals	51.82	24.39	27.43	8%	\$70.07	\$5.27
<b>Total</b>					<b>\$5,300.88</b>	<b>\$317.40</b>
HST						\$62.33
<b>Total - Including HST</b>						<b>\$379.74</b>
<b>Working Capital as a Percent of OM&amp;A incl. Cost of Power</b>						<b>7.71%</b>

## 5. FINDINGS AND CONCLUSIONS

The purpose of this section is to compare the results from this study to HONI's prior working capital distribution study as per EB-2013-0416. In addition, this section demonstrates that the results from this study reflect the current operations of HONI.

### 5.1 Comparison with Prior Distribution Study

**Table 14: HONI Distribution Working Capital Requirements (2015)**

Description	Revenue Lag Days	Expense Lead Days	Net Lag Days	Working Capital Factor	Expenses (\$M)	Working Capital Requirements (\$M)
Cost of power	52.25	32.74	19.50	5%	\$2,626.87	\$140.35
OM&A expenses	52.25	27.11	25.14	7%	\$564.30	\$38.87
PILS	52.25	128.37	-76.12	-21%	\$55.60	-\$11.59
Interest expense	52.25	8.93	43.32	12%	\$177.86	\$21.11
Environmental remediation	52.25	40.98	11.27	3%	\$14.16	\$0.44
Removals	52.25	16.51	35.73	10%	\$54.46	\$5.33
<b>Total</b>					<b>\$3,493.25</b>	<b>\$194.51</b>
GST						\$41.70
<b>Total - Including GST</b>						<b>\$236.21</b>
<b>Working Capital as a Percent of OM&amp;A incl. Cost of Power</b>						<b>7.40%</b>

**Table 15: HONI Distribution Working Capital Requirements (2018)**

Description	Revenue Lag Days	Expense Lead Days	Net Lag Days	Working Capital Factor	Expenses (\$M)	Working Capital Requirements (\$M)
Cost of power	51.82	32.72	19.10	5%	\$3,578.43	\$187.23
OM&A expenses	51.82	25.13	26.69	7%	\$591.94	\$43.28
PILS	51.82	13.67	38.16	10%	\$58.01	\$6.06
Interest expense	51.82	-1.93	53.75	15%	\$185.55	\$27.33
Environmental remediation	51.82	16.97	34.85	10%	\$13.20	\$1.26
Removals	51.82	24.39	27.43	8%	\$58.65	\$4.41
<b>Total</b>					<b>\$4,485.78</b>	<b>\$269.57</b>
HST						\$51.66
<b>Total - Including HST</b>						<b>\$321.23</b>
<b>Working Capital as a Percent of OM&amp;A incl. Cost of Power</b>						<b>7.70%</b>



Table 16: Working Capital Requirements (2018 VS 2015)

Description	Revenue Lag Days	Expense Lead Days	Net Lag Days	Working Capital Factor	Expenses (\$M)	Working Capital Requirements (\$M)
Cost of power	-0.43	-0.02	-0.40	0%	\$951.56	\$46.87
OM&A expenses	-0.43	-1.98	1.56	0%	\$27.64	\$4.41
PILS	-0.43	-114.70	114.27	31%	\$2.41	\$17.66
Interest expense	-0.43	-10.86	10.44	3%	\$7.69	\$6.22
Environmental remediation	-0.43	-24.01	23.58	6%	-\$0.96	\$0.82
Removals	-0.43	7.89	-8.31	-2%	\$4.19	-\$0.92
<b>Total</b>					<b>\$992.52</b>	<b>\$75.06</b>
HST						\$9.96
<b>Total - Including HST</b>						<b>\$85.02</b>
<b>Working Capital as a Percent of OM&amp;A incl. Cost of Power</b>						<b>0.30%</b>

### 5.1.1 Revenue Lag

As shown in Table 16 above, the overall revenue lag in the current study has decreased slightly versus the prior study. The primary driver of this change is the reduction of the collections lag indicating that HONI is collecting outstanding balances more efficiently.

### 5.1.2 Cost of Power

Cost of power expense lead days have not changed significantly versus the prior study. HONI distribution still procures power from the IESO on a monthly basis and pays the IESO approximately two weeks after the end of the prior service period. Since payment schedules have not changed since the prior study, Cost of power expense lead days have not changed significantly either.

### 5.1.3 OM&A Expenses

OM&A expense lead days have decreased slightly by approximately 2 days versus the prior study. Factors driving this decrease include shorter expense lead times for corporate procurement card, payments to Inergi, consulting and contract staff and miscellaneous OM&A. These shorter expense lead times are offset by longer expense lead times for payroll & benefits and property taxes. Payroll & benefits expense lead times are longer in this study primarily due to payment schedules for pensions, where there was a significant pre-payment in the prior study that resulted in a shorter expense lead time. Furthermore HONI was able to provide actual splits between distribution and transmission by expense line item, which was not available in prior study. After dollar-weighting all OM&A categories however, the impact of these slightly increased expense lead times is minimal on HONI's overall working capital requirements.

### 5.1.4 PILs

PILs expense lead days have decreased significantly in this study versus the prior study primarily due to a large true-up payment made in 2012 for 2011, which was not present in this study. Discussions with HONI subject matter experts indicated that these true-up payments are not expected to continue with the same magnitude and scheduling parameters in the future. Based upon feedback from HONI subject matter experts, Navigant believes the change is an improvement to the prior methodology and is consistent with PILs lead time calculations for other utilities across Ontario.

### 5.1.5 Interest Expense

Interest expense lead days have decreased versus the prior study. The change is primarily driven by larger bond payments occurring in the first half of 2014 resulting in an expense lag instead of an expense lead. Furthermore a large bond that matured in 2014 and lower interest rates versus the prior study also contributed to the lower interest expense lead time. HONI was also able to provide actual splits between distribution and transmission by expense line item, which was not available in prior study.

### 5.1.6 Removals & Environmental Remediation

Removals & environmental remediation expense lead days have increased by approximately 8 days and decreased by approximately 24 days respectively. This change is driven by the differences in labour and materials lead times, which are directly impacted by the payroll & benefits and miscellaneous OM&A lead days respectively. After dollar-weighting all OM&A categories however, the impact of these changes is minimal on HONI's overall working capital requirements.

## 5.2 Comparison with the Prior Distribution Working Capital Study Using Constant Revenue Lag Days

Since the revenue lag days was one of the most impactful changes over the prior study, an analysis using constant revenue lag days was conducted to show the individual impacts of the differences in expense leads days. Table 17 below shows that when holding revenue lag days constant, working capital requirement in 2018 is approximately 0.43% higher than the amount in 2015.

**Table 17: Working Capital Requirements with 2015 Revenue Lag Days Held Constant (2018 VS 2015)**

Description	Revenue Lag Days	Expense Lead Days	Net Lag Days	Working Capital Factor	Expenses (\$M)	Working Capital Requirements (\$M)
Cost of power	0.00	-0.02	0.02	0%	\$951.56	\$51.04
OM&A expenses	0.00	-1.98	1.98	1%	\$27.64	\$5.10
PILS	0.00	-114.70	114.70	31%	\$2.41	\$17.73
Interest expense	0.00	-10.86	10.86	3%	\$7.69	\$6.43
Environmental remediation	0.00	-24.01	24.01	7%	-\$0.96	\$0.84
Removals	0.00	7.89	-7.89	-2%	\$4.19	-\$0.86
<b>Total</b>					\$992.52	\$80.28
HST						\$9.96
<b>Total - Including HST</b>						\$90.24
<b>Working Capital as a Percent of OM&amp;A incl. Cost of Power</b>						0.43%

## 6. CONCLUSIONS

The results of this study indicate a higher working capital requirement compared to HONI's EB-2013-0416 distribution lead-lag study. The reasons for the differences lie with the revenue lag days, where this figure has decreased in the current study primarily due to HONI's ability to collect outstanding balances more efficiently. This variance is offset by lower expense lead days across most components. Table 18 below summarizes the working capital requirements calculated in this study along with historical working capital amounts.

**Table 18: Summary of Historical Working Capital Requirements**

Year	Working Capital Requirements % (2013 Study)	Working Capital Requirements % (2016 Study)
2018	7.52%	7.70%
2019	7.58%	7.74%
2020		7.70%
2021		7.72%
2022		7.71%

**FORM A**

Proceeding: EB-2017-0049

**ACKNOWLEDGMENT OF EXPERT'S DUTY**

1. My name is Benjamin Grunfeld (name). I live at Toronto (city), in the Province (province/state) of Ontario.
2. I have been engaged by or on behalf of Hydro One Networks (name of party/parties) to provide evidence in relation to the above-noted proceeding before the Ontario Energy Board.
3. I acknowledge that it is my duty to provide evidence in relation to this proceeding as follows:
  - (a) to provide opinion evidence that is fair, objective and non-partisan;
  - (b) to provide opinion evidence that is related only to matters that are within my area of expertise; and
  - (c) to provide such additional assistance as the Board may reasonably require, to determine a matter in issue.
4. I acknowledge that the duty referred to above prevails over any obligation which I may owe to any party by whom or on whose behalf I am engaged.

Date March 7, 2017

  
Signature

This Statement is provided in compliance with Ontario Energy Board (“Board”) Rule 13A, regarding the report EB-2017-0049 Working Capital Requirements of Hydro One Networks Distribution Business (“Report”) dated Dec 19, 2016, prepared by Navigant Consulting Ltd. (“Expert”).

#### Consultants:

<b>Name</b>	<b>Benjamin Grunfeld</b> Managing Director	<b>Erik Larson</b> Associate Director	<b>Jodi Amy</b> Managing Consultant	<b>Andy Tam</b> Managing Consultant
<b>Business Name and Address</b>	Navigant Bay Adelaide Centre 333 Bay Street Suite 1250 Toronto, ON M5H 2Y2	Navigant 30 S. Wacker Suite 3100 Chicago, IL, 60606	Navigant Bay Adelaide Centre 333 Bay Street Suite 1250 Toronto, ON M5H 2Y2	Navigant Bay Adelaide Centre 333 Bay Street Suite 1250 Toronto, ON M5H 2Y2
<b>General Areas of Expertise</b>	<ul style="list-style-type: none"> <li>• Cost of service</li> <li>• Regulatory &amp; pricing</li> <li>• Electric transmission</li> <li>• Market &amp; economic analysis</li> <li>• Testimony</li> </ul>	<ul style="list-style-type: none"> <li>• Regulatory finance &amp; analysis</li> <li>• Market assessment</li> </ul>	<ul style="list-style-type: none"> <li>• Regulatory studies &amp; analysis</li> <li>• Generation and Electricity markets</li> </ul>	<ul style="list-style-type: none"> <li>• Regulatory finance</li> <li>• Financial planning &amp; analysis</li> <li>• Regulatory finance</li> </ul>

#### Qualifications:

<b>Name</b>	<b>Benjamin Grunfeld</b> Managing Director	<b>Erik Larson</b> Associate Director	<b>Jodi Amy</b> Managing Consultant	<b>Andy Tam</b> Managing Consultant
<b>Professional History</b>	<ul style="list-style-type: none"> <li>• Director, Navigant</li> <li>• Associate Director, Navigant</li> <li>• Managing Consultant, London Economics International</li> <li>• Senior Associate, Ampersand Energy Partners</li> <li>• Consultant and Senior Consultant, Navigant</li> <li>• Junior Engineer, Power and Electro-technology, Hatch</li> </ul>	<ul style="list-style-type: none"> <li>• Associate Director, Navigant</li> <li>• Managing Consultant, Navigant</li> <li>• Senior Consultant, Navigant</li> <li>• Senior Associate, Deloitte &amp; Touché</li> </ul>	<ul style="list-style-type: none"> <li>• Managing Consultant, Navigant</li> <li>• Senior Consultant, Navigant</li> <li>• Senior Business Analyst, OPA</li> </ul>	<ul style="list-style-type: none"> <li>• Managing Consultant, Navigant</li> <li>• Financial Analyst, Hydro One Networks Inc.</li> <li>• Leadership Rotation Program, Hydro One Networks Inc.</li> <li>• Systems Analyst, Nortel Networks Inc.</li> </ul>
<b>Education</b>	• M.Sc. Management and Economics (with Distinction),	• Master of Accounting, Ross	• Bachelor of Arts, Honours Economics	• Queens University, Honours, BSc,

	London School of Economics and Political Science, (London, UK) • B.Sc. Applied Mathematics and Electrical Engineering (with Honours), Queen's University (Kingston, ON)	School of Business, University of Michigan (USA) • B.B.A., Finance & Accounting, Ross School of Business, University of Michigan (USA)	University of Waterloo • MBA, (Candidate 2018) Rotman School of Management	Engineering (Computer Option) • Queens University, BA, Economics
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The lead expert on this project was: Benjamin Grunfeld

**Instructions Provided:**

Navigant Consulting Ltd (Navigant) was requested to prepare a report that provides estimates of the level of cash working capital for Hydro One Networks regulated transmission and distribution operations.

**Basis of Evidence:**

The basis of evidence and assumptions have been documented in the above-noted report.

**Context of Evidence:**

The context of evidence has been documented in the above-noted report.

**Confirmation:**

The expert has been made aware of and agrees to accept the responsibilities that are or may be imposed on the expert as set out in Rule 13A.

*Signature:*



*Name of Expert:*

Benjamin Grunfeld

*Date:*

March 7, 2017

## **MATERIALS AND SUPPLY INVENTORY**

### **1. STRATEGY**

Hydro One Distribution maintains and optimizes materials and supply inventory to support the company's reliability, system growth and customer satisfaction objectives. Having the right material at the right work location at the right time is critical to keeping work projects on schedule and important in meeting Hydro One's business objectives. The timely restoration of power after a storm hinges on the optimal availability of materials and supply. The efficiencies realised from the effective management of Hydro One's materials and supply inventory translate into distribution outcomes that are valued by customers.

The 2013 to 2022 inventory levels reflect the impacts of Hydro One's increasing work programs. Hydro One Distribution has offset the effects of compressed timelines, increasing distribution asset base and asset condition, age and external cost pressures with initiatives to manage inventory growth, including the following:

- Adjustments in distribution maintenance-related inventories to increase flexibility in executing maintenance protocols;
- An increased focus on stocking material remaining at the end of capital projects to improve the visibility and redeployment of available material; and
- The use of stock algorithms to maximize inventory performance.

A further description of Hydro One Distribution's Supply Chain initiatives is provided in Exhibit C1, Tab 3, Schedule 1, Attachment 3, and in the Distribution System Plan (Exhibit B1, Tab 1, Schedule 1, Section 1.5.1.3).

Witness: Rob Berardi

**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
<b>Total Inventory</b>	<b>35.3</b>	<b>35.3</b>	<b>32.9</b>	<b>33.1</b>	<b>34.2</b>	<b>34.9</b>	<b>38.2</b>	<b>38.2</b>	<b>38.2</b>	<b>38.2</b>

**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
<b>Total Inventory</b>	<b>36.3</b>	<b>35.7</b>	<b>35.5</b>	<b>31.8</b>	<b>34.2</b>	<b>34.6</b>	<b>38.0</b>	<b>38.2</b>	<b>38.2</b>	<b>38.2</b>

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

Witness: Rob Berardi



- Storm/trouble damage and power interruption response.

## 2.1 PLANNED LEVELS OF INVENTORIES

Most of Hydro One Distribution's materials and supply are sourced from inventoried stock. The basis of forecasting inventory levels assumes that historical inventory patterns are maintained and modified to reflect planned work program changes.

Materials and Supply for major distribution projects are usually shipped directly to the project sites and are not included in the planned inventory levels. Inventories are held for the maintenance of existing assets and new development activities (i.e. new customer connections, etc.). Inventory primarily includes component parts – lines, poles, wire and cable, hardware, switches, transformers, protective devices, circuit breakers, contacts, pallet switches, insulators, etc.

## 2.2 MONTHLY INVENTORY LEVELS 2013 TO 2016

Actual month end inventory numbers for the years 2013 through 2016 are shown in Table 3 below.

**Table 3: Historical Monthly Inventory Levels 2013 – 2016 (\$ Million)**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>2013</b>	38.3	38.2	39	39.8	37.9	38.1	37.7	36.9	36.6	36.9	36.5	35.3
<b>2014</b>	64.1	35.7	35.5	35.8	35.7	35.7	35.5	35.2	35.0	35.4	35.0	35.3
<b>2015</b>	35.9	36.6	36.7	36.7	36.5	35.5	35.2	35.6	35.0	35.9	36.0	32.9
<b>2016</b>	33.7	33.3	33.5	32.9	32.1	31.8	31.7	31.7	32.4	32.7	33.7	33.1

Filed: 2017-03-31

EB-2017-0049

Exhibit D1

Tab 1

Schedule 4

Page 4 of 4

- 1 The inventories of consumable materials are seasonal in nature, driven primarily by storm
- 2 season and new connections.

Witness: Rob Berardi

## INTEREST CAPITALIZED

Consistent with the Board's Decision in EB-2008-0408, effective January 1, 2012, no allowance for funds used during construction ("AFUDC") rate is specified by the Board for use by Hydro One. Hydro One was directed to base its interest capitalization rate on its embedded cost of debt used to finance capital expenditures. This is consistent with Hydro One's adoption of United States generally accepted accounting principles ("US GAAP") per the Board's Decision in EB-2011-0399 and US GAAP requirements for determination of interest capitalized. The rates used in calculating capitalized interest for the bridge and test years represent the effective rate of Hydro One Distribution's forecast average debt portfolio during the year.

The interest capitalization rate/AFUDC rate for historical, bridge and test years are shown in Table 1:

**Table 1: Interest Capitalization/AFUDC Rate**

Year	Interest Capitalization/AFUDC	
	Rate (%)	(\$ Millions)
2013	4.6%	17.4
2014	4.6%	18.0
2015	4.7%	16.6
2016	4.3%	13.9
2017	4.4%	15.0
2018	4.4%	14.4
2019	4.5%	13.9
2020	4.5%	12.5
2021	4.6%	11.8
2022	4.7%	12.5

Witness: Samir Chhelavda

## CAPITAL STRUCTURE

### 1. INTRODUCTION

The purpose of this evidence is to summarize the method and cost of financing Hydro One Distribution's capital requirements for the rebasing year 2018.

The cost of capital as described in this Exhibit has been reflected in the revenue requirements for each year of this Application. Hydro One anticipates updating the revenue requirement for the 2018 to 2020 test years when the Board releases its 2018 cost of capital parameters, reflecting: (a) the Board-approved 2018 return on equity and short-term debt rates; and (b) a long-term debt rate based on Hydro One's actual 2017 debt issuances to-date and the September 2017 Consensus Forecast. Hydro One proposes that the 2018 cost of capital parameters established at that time be used to determine the final revenue requirements for 2018, 2019 and 2020 and be a placeholder for revenue requirement in 2021 and 2022.

Hydro One also proposes updating the cost of capital parameters for the 2021 and 2022 revenue requirements in the fall of 2020 when the Board releases its 2021 cost of capital parameters. This update will reflect: (a) the Board-approved 2021 return on equity and short-term debt rates; and (b) a long-term debt rate based on Hydro One's actual debt issuances to the end of 2020 and the September 2020 Consensus Forecast.

### 2. CAPITAL STRUCTURE

Hydro One Distribution's deemed capital structure for rate-making purposes is 60% debt and 40% common equity of utility rate base. This capital structure was approved by the Board, most recently as part of its Decision on Hydro One Distribution's 2015 to 2017

Witness: Samir Chhelavda

1 Rate Application (EB-2013-0416). This is consistent with the report of the Board on the  
2 Cost of Capital for Ontario's Regulated Utilities, dated December 11, 2009, (EB-2009-  
3 0084), and its subsequent Review of the Existing Methodology of the Cost of Capital for  
4 Ontario's Regulated Utilities, dated January 14, 2016. The 60% debt component is  
5 comprised of 4% deemed short-term debt and 56% long-term debt.

### 6 7 **3. RETURN ON COMMON EQUITY**

8  
9 Hydro One Distribution's evidence reflects a return on equity ("ROE") of 8.78% as a  
10 placeholder for 2018 to 2022 based on the Cost of Capital Parameters released by the  
11 OEB on October 27, 2016, for rates effective January 1, 2017. It is calculated as per the  
12 Board's formulaic approach in Appendix B of the Cost of Capital for Ontario's Regulated  
13 Utilities report, dated December 11, 2009, (EB-2009-0084).

14  
15 As set out above, Hydro One will update the equity cost of capital for the 2018 to 2020  
16 test years using the 2018 ROE based on the September 2017 Consensus Forecasts and  
17 Bank of Canada data which will be available in October 2017, and will update the equity  
18 cost of capital for the 2021 and 2022 test years based on the 2021 ROE to be calculated  
19 and released by the Board in the fall of 2020.

### 20 21 **4. DEEMED SHORT-TERM DEBT**

22  
23 The Board has determined that the deemed amount of short-term debt that should be  
24 factored into rate-setting be fixed at 4% of rate base. In Appendix D of the Cost of  
25 Capital for Ontario's Regulated Utilities report, dated December 11, 2009, the OEB has  
26 indicated that once a year, in January, it will obtain real market quotes from major banks

Witness: Samir Chhelavda

1 for issuing spreads over Bankers' Acceptance ("BA") rates to calculate an average  
2 spread. The short-term debt rate will be calculated by adding the average BA rates for the  
3 three months in advance of the effective date for the rates to the average spread. Variable  
4 rate debt pays interest based on the BA rate and as such has been included as part of the  
5 deemed short-term debt amount of 4% of rate base. The deemed short-term rate of  
6 1.76% is being used by Hydro One as a placeholder for 2018 to 2022, based on the  
7 OEB's Cost of Capital Parameters, dated October 27, 2016, for rates effective January 1,  
8 2017.

9  
10 Hydro One will update the short-term debt rate for the 2018 to 2020 test years based on  
11 the 2018 deemed short-term debt rate based on the September 2017 Bank of Canada data,  
12 and the average spread calculated by the OEB, to be released in the fall of 2017. As set  
13 out above, Hydro One will update the short-term debt rate for the 2021 and 2022 test  
14 years based on the 2021 short-term debt rate to be calculated and released by the Board in  
15 the fall of 2020.

## 16 17 **5. LONG-TERM DEBT**

18  
19 The Board has determined that the deemed amount of long-term debt that should be  
20 factored into rate-setting be fixed at 56% of rate base. The long-term debt rate is  
21 calculated to be 4.32% for 2018 and is a placeholder for 2018 to 2022. The long-term  
22 debt rate is calculated as the weighted average rate on embedded debt, new debt, and  
23 forecast debt planned to be issued in 2017 and 2018, as discussed in Exhibit D1, Tab 2,  
24 Schedule 2. Details of Hydro One Distribution's long-term debt rate calculation for the  
25 2018 rebasing year are identified at Exhibit D2, Tab 2, Schedule 2. A detailed discussion  
26 of Hydro One Distribution's debt and forecast interest rate is provided at Exhibit D1, Tab  
27 2, Schedule 2.

Witness: Samir Chhelavda

1 Historical long-term debt cost information is available at Exhibit D2, Tab 2, Schedule 2,  
2 pages 1 to 4.

3  
4 As discussed in this Exhibit, Hydro One proposes updating the long-term debt rate for  
5 2018 to 2020 based on Hydro One's actual 2017 debt issuances to-date and the  
6 September 2017 Consensus Forecast, consistent with the proposed update of the return on  
7 common equity and deemed short-term interest rate. Hydro One is also proposing to  
8 update the long-term debt rate for 2021 and 2020 based on Hydro One's actual 2020 debt  
9 issuances to-date and the September 2020 Consensus Forecast.

10  
11 In addition, Hydro One assumes that the long-term debt rate will be updated to reflect  
12 the actual issuances of debt since the time of original application and changes in the  
13 interest rate forecast, consistent with the OEB Decision on Hydro One Distribution 2015  
14 to 2017 rate application in EB-2013-0416.

15  
16 As Hydro One Distribution has a market-determined cost of debt, the weighted average  
17 long-term debt rate is also applied to any notional debt that is required to match the actual  
18 amount of long-term debt to the deemed amount of long-term debt, consistent with the  
19 Board's Decision in EB-2013-0416.

**6. COST OF CAPITAL SUMMARY**

Table 1 below summarizes the return of capital for the rebasing year 2018:

**Table 1: 2018 Cost of Capital**

<b>Amount of Deemed</b>	<b>(\$M)</b>	<b>%</b>	<b>Cost Rate (%)</b>	<b>Return (\$M)</b>
<b>Long-term debt</b>	4,246.3	55.3	4.32	183.4
<b>Short-term debt</b>	306.9	4.0	1.76	5.4
<b>Deemed Long-Term debt</b>	50.2	0.7	4.32	2.2
<b>Common equity</b>	3,068.9	40.0	8.78	269.5
<b>Total</b>	7,672.3	100.0	6.00	460.4

Historical, bridge and test year debt, and equity summary schedules are available at Exhibit D2, Tab 2, Schedule 1.



## **COST OF LONG-TERM DEBT**

### **1. HYDRO ONE DISTRIBUTION LONG-TERM DEBT**

The debt portfolio for Hydro One Distribution is detailed in Exhibit D2, Tab 2, Schedule 2. Hydro One Distribution is allocated a portion of the debt issued by Hydro One Networks Inc. to Hydro One Inc. Hydro One Networks Inc. issues debt to Hydro One Inc. to reflect debt issued by Hydro One Inc. to third-party public debt investors.

Third-party public debt investors hold all of the long-term debt issued by Hydro One Inc. Hydro One Inc.'s debt financing strategy takes into consideration the objectives of cost effectiveness, distributing debt maturities evenly over time, and ensuring the term of the debt portfolio is compatible with the long life of the Company's assets.

Hydro One Inc. has a Medium Term Note ("MTN") Program that provides ready access to issue debt with a term greater than one year into the Canadian debt capital markets. The standard maturity terms of five, 10 and 30 years are preferred by investors and represent the main financing that Hydro One Inc. utilizes to execute its financing strategy and raise the required funds. The short form base shelf prospectus for the current \$3.0 billion MTN Program is provided in Exhibit A, Tab 6, Schedule 8.

### **2. CREDIT RATINGS**

Credit ratings are a requirement because Hydro One Inc. issues medium term notes in the Canadian public debt markets. Table 1 lists the credit ratings of Hydro One Inc.'s debt obligations by DBRS, Moody's Investors Service and Standard & Poor's Rating Services:

Witness: Samir Chhelavda

**Table 1: Credit Ratings for Hydro One Inc.**

Rating Agency	Short-term Debt	Long-term Debt
Standard & Poor's Rating Services (S&P)	A-1	A
DBRS	R-1(low)	A(high)
Moody's Investors Service (Moody's)	Prime-2	A3

The most recent rating agency reports are provided in Exhibit A, Tab 6, Schedule 7.

### **3. COST OF LONG-TERM DEBT**

The long-term debt rate is calculated as the weighted average cost rate on embedded debt, new debt (debt issued after the last OEB-approved rate application) and forecast debt planned to be issued in 2017 and 2018. The weighted average rate on long-term debt is 4.45% for 2017 and 4.32% for 2018. Details of Hydro One Distribution's long-term debt rate calculation for the 2017 bridge year and 2018 test year are identified at Exhibit D2, Tab 2, Schedule 2.

The amount of each Hydro One Networks Inc. debt issue that is allocated to the Distribution business is based on its most recent forecast of borrowing requirements. Borrowing requirements are driven mainly by debt retirement, capital expenditures net of internally generated funds, and the maintenance of its capital structure. For example, in November 2016, Hydro One Inc. issued \$450 million of 30-year notes with a 3.72% coupon rate. Hydro One was allocated \$180 million, as shown on line 36 of Exhibit D2, Tab 2, Schedule 2, page 4. The coupon rates of debt issues allocated to the Distribution business, as shown in Exhibit D2, Tab 2, Schedule 2, are equal to the actual interest rates on debt issued by Hydro One Networks Inc. to Hydro One Inc., and by Hydro One Inc. to third-party public debt investors.

Witness: Samir Chhelavda

1   **3.1   EMBEDDED DEBT**

2  
3   The Board has determined in its Cost of Capital Report that for embedded debt, the rate  
4   approved in prior Board decisions shall be maintained for the life of each active  
5   instrument, unless a new rate is negotiated, in which case it will be treated as new debt.  
6   Hydro One Distribution's embedded long-term debt, which was issued during the period  
7   from 2000 to 2016, is shown on lines 1 to 36 of Exhibit D2, Tab 2, Schedule 2, page 4.  
8   The effective cost rates on these embedded debt issues were approved by the Board as  
9   part of EB-2013-0416/EB-2016-0081.

10  
11   **3.2   NEW DEBT**

12  
13   The Board has determined in its Cost of Capital Report that the rate for new debt that is  
14   held by a third-party public debt investor will be the prudently negotiated contract rate.  
15   This would include recognition of premiums and discounts.

16  
17   In November of 2016, Hydro One Inc. issued \$450 million of thirty-year notes with a  
18   3.72% coupon rate, of which \$180 million was mapped to Hydro One Distribution, as  
19   shown on line 36 of Exhibit D2, Tab 2, Schedule 2, page 4.

20  
21   In November 2016, Hydro One Inc. also issued three-year notes worth \$500 million, of  
22   which \$200 million was allocated to Hydro One Distribution. At the time of the issue,  
23   Hydro One entered into a \$500 million notional principal amount fixed to floating  
24   interest rate swap to convert this note into floating rate or short-term debt paying an  
25   effective interest rate of three-month bankers' acceptance plus a spread. This short-term  
26   debt is being used to finance the deemed short-term debt amount equal to 4% of rate  
27   base.

Witness: Samir Chhelavda

### 3.3 FORECAST DEBT

Hydro One Distribution's forecast borrowing requirements are \$472.0 million for 2017 and \$607.8 million for 2018.

Table 2 lists the fixed rate MTN's that Hydro One Distribution plans to issue in 2017, as shown in lines 35 to 38 of Exhibit D2, Tab 2, Schedule 2, page 5.

**Table 2: Forecast Debt Issues for 2017**

Year	Principal Amount (\$Millions)	Term (Years)	Coupon
2017	78.7	10	2.61%
	157.3	10	2.61%
	78.7	30	3.67%
	157.3	30	3.67%

Table 3 lists the fixed rate MTN's which Hydro One Distribution plans to issue in 2018, as shown on lines 37 to 39 of Exhibit D2, Tab 2, Schedule 2, page 6.

**Table 3: Forecast Debt Issues for 2018**

Year	Principal Amount (\$Millions)	Term (Years)	Coupon
2018	202.6	5	2.54%
	202.6	10	3.31%
	202.6	30	4.37%

### 3.4 INTEREST RATES FOR 2017 AND 2018 FORECAST DEBT ISSUES

Distribution business borrowing will be financed at market rates applicable to Hydro One Inc. Table 4 summarizes the derivation of the forecast Hydro One Inc. yield for each of the planned issuance terms for 2017 and 2018.

Witness: Samir Chhelavda

**Table 4: Forecast Yield for 2017-2018 Issuance Terms**

	<b>2017</b>			<b>2018</b>		
	<b>5- year</b>	<b>10- year</b>	<b>30- year</b>	<b>5- year</b>	<b>10- year</b>	<b>30- year</b>
<b>Government of Canada</b>	0.98%	1.40%	2.04%	1.68%	2.10%	2.74%
<b>Hydro One Spread</b>	0.86%	1.21%	1.63%	0.86%	1.21%	1.63%
<b>Forecast Hydro One Yield</b>	1.84%	2.61%	3.67%	2.54%	3.31%	4.37%

Each rate is comprised of the forecast Government of Canada bond yield plus the Hydro One Inc. credit spread applicable to that term. The ten-year Government of Canada bond yield forecast for 2017 is based on the average of the three-month and 12-month forecast from the September 2016 Consensus Forecast. The ten-year Government of Canada bond yield forecast for 2018 is based on the average of the October 2016 Long Term Consensus Forecast. The five and 30-year Government of Canada bond yield forecasts are derived by adding the September 2016 average spreads (five-year to ten-year for the five-year forecast, and 30-year to ten-year for the 30-year forecast) to the ten-year Government of Canada bond yield forecast. Hydro One's credit spreads over the Government of Canada bonds are based on the average of indicative new issue spreads for September 2016 obtained from the Company's MTN dealer group for each planned issuance term.

Hydro One assumes that, for rates effective January 1, 2018, the forecast interest rate for Hydro One Distribution debt issues will be based on the September 2017 Consensus Forecasts and the average of indicative new issue spreads for September 2017 that will be obtained from the Company's MTN dealer group for each planned issuance term. In addition, Hydro One assumes that long-term debt rate will be updated to reflect the actual issuances of debt since the time of original application, consistent with the OEB's

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Decision on Hydro One Distribution's 2015 to 2017 rate application in EB-2013-0416, and changes in the interest rate forecast.

### **3.5 TREASURY OM&A COSTS**

Treasury OM&A costs are incurred to:

- execute borrowing plans and issue commercial paper and long-term debt;
- ensure compliance with securities regulations, bank and debt covenants;
- manage Hydro One's daily liquidity position, control cash, and manage the company's bank accounts;
- settle all transactions and manage relationships with creditors; and
- communicate with debt investors, banks and credit rating agencies.

Treasury OM&A costs are provided in the long-term debt schedules for the bridge and test years in Exhibit D2, Tab 2, Schedule 2 and are summarized in Table 5:

**Table 5: Forecast Treasury OM&A Costs**

<b>Year</b>	<b>Amount (\$Millions)</b>	<b>Line</b>	<b>Page</b>
2017	1.1	40	5
2018	1.1	41	6

### **3.6 OTHER FINANCING-RELATED FEES**

Column (e) of Exhibit D2, Tab 2, Schedule 2 ("Premium, Discount and Expenses") represents the costs of issuing debt. These costs are specific to each debt issue and include commissions, legal fees, debt discounts or premiums on issues or re-openings of issues relative to par, and hedge gains or losses.

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Other financing-related fees include the Distribution allocation of Hydro One Inc.'s annual credit rating agency, filing fees to security regulators, letter of credit, banking, custodial and trustee fees. The amount of these fees are summarized in Table 6 below and are also provided in the long term debt schedules for the bridge and test years in Exhibit D2, Tab 2, Schedule 2:

**Table 6: Forecast Other Financing-Related Fees**

<b>Year</b>	<b>Amount (\$Millions)</b>	<b>Line</b>	<b>Page</b>
2017	2.8	41	5
2018	2.8	42	6

## **OVERHEAD CAPITALIZATION**

This Exhibit describes the methodology used to allocate Common Corporate Costs (which includes Corporate Functions and Services, Asset Management Planning, Customer Services and Grid Operations) to capital projects.

Hydro One capitalizes costs that are directly attributable to capital projects and also capitalizes overhead costs supporting capital projects. The overhead capitalization rate is a calculated percentage representing the amount of overhead costs that are required to support capital projects in a given year.

In its April 9, 2010, Decision on Hydro One's 2010 and 2011 distribution rates (EB-2009-0096), the Board accepted the methodology, recommendations and the allocation of costs from a study by Black & Veatch (B&V, formerly RJ Rudden Associates). The study derived an overhead capitalization rate for Hydro One Distribution's common corporate costs. The accepted methodology was used in the 2015-2016 transmission rate application EB-2014-0140 and the 2017-2018 transmission rate application EB-2016-0160.

In 2007, Hydro One Networks began reviewing the overhead capitalization rate on a quarterly basis to determine if the rate needed to be changed to reflect in-year changes in capital spending and associated support costs. At year-end, capitalized overheads are trued-up to reflect actual results. This results in a better alignment of overhead costs with the capital projects that they support and removes the need for an e-factor adjustment.

Hydro One proposes that the overhead capitalization rate, as calculated in the B&V study in 2016, continues to be a reasonable method of distributing common corporate costs to

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capital projects. Hydro One's submissions in this Application reflect this overhead capitalization rate.

Table 1 below summarizes the overhead capitalization rates and amounts as reviewed by B&V. Appendix 2 to this Exhibit shows further detail.

**Table 1: Overhead Capitalization Rates & Amounts**

Overhead Cost Category	Test Years (%)					Test Years (\$ millions)				
	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Capitalized Administrative & General Costs	10%	9%	9%	9%	9%	70.7	74.4	73.5	74.2	78.4
Capitalized Planning, Customer and Operating Costs	2%	2%	2%	2%	2%	12.3	12.4	12.5	12.7	12.7
Total	12%	11%	11%	11%	11%	83.0	86.8	86.1	86.9	91.1

<sup>1</sup> Administrative & General Costs include all common corporate functions and services costs

<sup>2</sup> Operating costs include asset management, operating and customer care management costs

The capitalization rates are down slightly relative to the previous distribution study mainly due to higher planned capital expenditures.

In its EB-2011-0399 decision, the Board granted Hydro One Distribution approval to adopt United States Generally Accepted Accounting Principles ("US GAAP") in place of modified International Financial Reporting Standards ("IFRS") as its approved basis for rate setting, regulatory accounting, and reporting. In its decision, the Board required Hydro One Distribution to conduct a critical review of its then current and proposed capitalization policies, similar in nature to the capitalization review it directed Hydro One Transmission to perform in EB-2011-0268.

The Board stated that the review should not be a benchmarking study, but should include information, for comparison purposes, on what other Ontario distributors typically

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1 capitalize and capitalization methodologies employed by other distributors. (See page  
2 10 of the decision.)

3  
4 As documented in the review report, Hydro One critically reviewed its cost capitalization  
5 policy with a particular focus on the capitalization of overhead and indirect costs. In its  
6 review, Hydro One found that its treatment of capitalized overhead is generally consistent  
7 with other major US and Canadian industry participants. Hydro One's overhead  
8 capitalization rate when expressed as a percentage of gross operating costs is within the  
9 observed range and is essentially consistent with the median found in Hydro One's  
10 industry research of other Canadian and US utilities.

11  
12 Hydro One also concluded that its overhead and indirect cost capitalization methodology,  
13 as reviewed by Black and Veatch and previously approved by the Board, is consistent  
14 with: (a) legacy Canadian and existing US GAAP; and (b) regulatory principles,  
15 including the key goals of achieving intergenerational equity and avoiding cross  
16 subsidization.

# **REVIEW OF OVERHEAD CAPITALIZATION RATES (DISTRIBUTION) – 2018-2022**

**BLACK & VEATCH PROJECT NO. 188588**

**PREPARED FOR**

**Hydro One Networks Inc.**

December 21, 2016



**BLACK & VEATCH**  
Building a **world** of difference.®

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Appendix A: Distribution Overhead Capitalization Rates – BP 2018-2022

## I. Overview

### A. INTRODUCTION

Black & Veatch Canada Company (“Black & Veatch”) is pleased to submit to Hydro One Networks Inc. (“Hydro One”) this Report which describes our Review of Overhead Capitalization Rates (Distribution) - 2018-2022. The Overhead Capitalization Rates (“OH Cap Rates”) developed by Hydro One are percentages that are applied to the cost of Transmission and Distribution capital expenditures; the results are the amounts of Common Corporate Costs that are capitalized to those capital expenditures for the year.

The methodology was developed for Hydro One by Black & Veatch, first presented in our report *Distribution Overhead Capitalization Rate Method* dated May 20, 2005 and accepted by the Ontario Energy Board (“OEB”).

The OEB-accepted methodology for development of the OH Cap Rates has been applied to Hydro One’s Business Plans, and reviewed by Black & Veatch with reports issued, as follows:

**Table 1 - History of Black & Veatch’s Cost Allocation Reviews for Hydro One**

BLACK & VEATCH REVIEW	HYDRO ONE FILING	BLACK & VEATCH REPORT
2006 Review	2006 Transmission Rates	Transmission Overhead Capitalization Rate Method dated April 30, 2006
2008 Review	2008 Transmission Rates	Implementation of Transmission Overhead Rate Capitalization Methodology – 2009 / 2010 dated September 10, 2008
2009 Review (Distribution)	2010/2011 Distribution Rates	Review of Overhead Capitalization Rates dated June 29, 2009
2009 Review (Transmission)	2011/2012 Transmission Rates	Review of Overhead Capitalization Rates (Transmission) – 2011/2012 dated February 26, 2010
2011 Review (Transmission)	2013/2014 Transmission Rates	Review of Overhead Capitalization Rates (Transmission)– 2013-2014 dated February 1, 2012
2013 Review (Distribution)	2015-2019 Distribution Rates	Review of Overhead Capitalization Rates (Distribution)– 2015-2019 dated September 19, 2013
2013 Review (Transmission)	2015/2016 Distribution Rates	Review of Overhead Capitalization Rates (Transmission)– 2015-2016 dated March 17, 2014
2015 Review (Transmission)	2017/2018 Transmission Rates	Review of Overhead Capitalization Rates (Transmission)– 2017-2018 dated May 4, 2016

Hydro One computed the **Distribution OH Cap Rate to be 12% for 2018, 11% for 2019-2022** (*Appendix A, row 92*). The calculation of the rates is described in Section II of this report and shown in Appendix A.

Based on the work performed, Black & Veatch believes that Hydro One’s implementation of the

Overhead Capitalization Rate methodology and computation of the Distribution OH Cap Rates for 2018-2022 are appropriate and conform to the OEB-accepted methodology.

## **B. BACKGROUND**

Hydro One's capital spending program is a major focus for the utility in terms of time and cost. Distribution Capital spending is budgeted to increase from \$634M in 2018 to \$818M in 2022, representing approximately 8% of the Distribution Net utility plant

Most of Hydro One's capital program is performed by Hydro One employees, and not contracted out. Hydro One's capital program requires significant support from all areas of the utility, including engineering, management, administration and infrastructure resources. These resources support Distribution Operations and Maintenance ("Dx OMA") and Distribution Capital Expenditures work.

## **C. CRITERIA FOR COST ALLOCATION METHODS**

The portion of Common Corporate Costs attributed to Distribution was determined based on the OEB-accepted methodology, as described in the Black & Veatch's *Review of Allocation of Common Corporate Costs (Distribution)*- dated December 21, 2016 ("Common Corporate Costs Report-Distribution - 2016").

The Distribution OH Cap Rate is used to distribute the Distribution portion of Common Corporate Costs, between Distribution OMA and Distribution Capital Expenditures. Following are the criteria that Black & Veatch used in selecting and evaluating methods to develop the OH Cap Rates methodology:

- The method should be based on cost causation. Cost causation means that there is a causal relationship between the basis used to allocate a cost, and the costs that has been incurred.
- If cost causation cannot be used or is determined to be inappropriate in the circumstances, the method usually considered next is benefits received (i.e., allocated to the business that received the benefits).
- The method should be based on data that can be obtained at reasonable cost and are objectively verifiable, in the initial year as well as in subsequent years.
- If the method uses estimates, results should be unbiased and reasonably consistent with the results that would be obtained from using actual data.

## **D. DESCRIPTION OF OH CAP RATE METHOD**

Approximately \$105 million of labour costs, representing approximately 34% of the annual total Common Corporate Costs (and approximately 50% of annual labour costs), were directly assigned between OMA and capital based on a time study performed for the four-week period ending June 12, 2015 ("2015 Time Study"). The 2015 Time Study included the following departments:

**Table 2 – Departments in Time Study**

<b>Operations</b> <ul style="list-style-type: none"> <li>■ Distribution Asset Management</li> <li>■ Planning and Optimization</li> <li>■ Reliability, Strategies, and Compliance</li> <li>■ System Planning</li> <li>■ Network Connections and Development</li> <li>■ Network Operations</li> <li>■ Transmission Asset Management</li> <li>■ VP Planning</li> <li>■ EVP Operations</li> <li>■ Key Account Management</li> </ul>	<b>Customer and Corporate Relations</b> <ul style="list-style-type: none"> <li>■ Customer Care Services</li> <li>■ Customer Strategy and Conservation</li> <li>■ Customer Program Delivery</li> <li>■ VP Customer Service</li> <li>■ Meter to Bill</li> </ul>
---	---

A properly performed time study measures cost causation and is widely accepted as a basis for assigning costs. Hydro One personnel administered the 2015 Time Study using the same design and communication material designed by Black & Veatch and utilized in the time study that occurred in 2013. Black & Veatch's responsibilities included reviewing time study results and the consolidation of the results, and confirming the completeness of the time study and its consistency with the study design. The methodology was the same as used in prior time studies conducted by Black & Veatch for Hydro One. Black & Veatch found that the 2015 Time Study was properly conducted, and therefore is a proper basis to determine the portion of the costs of the participating departments to be capitalized to Distribution capital expenditures.

While the remaining Common Corporate Costs departments can determine with reasonable accuracy the portions of time spent on Transmission, Distribution and the other business units, they are unable to determine with reasonable accuracy the time spent on OMA versus capital projects. Therefore, the amount of costs to be capitalized must be computed using allocators based on cost causation or benefits received.

In traditional utility cost allocation studies, administrative and general costs are allocated based on one or more factors such as Labor costs, OMA, Investment in Plant or a weighted combination of two or more. Black & Veatch considered the following two bases for allocating Common Corporate Costs between OMA and capital projects:

- **Labor Content Method-** Labor Content of Distribution (Dx) OMA versus Dx capital expenditures
- **Total Spending Method-** Total Spending on Dx OMA versus Dx capital expenditures

The Common Corporate Costs to be allocated are causally related to both Labor Content and Total Spending. Therefore the OH Cap Rate method for Common Corporate Costs recommended by Black & Veatch uses a weighting of 50% Labor Content and 50% Total Spending, as there is no evidence that either the Labor Content method or the Total

Spending method is meaningfully more appropriate.

- The formula for Distribution (Dx) Labor Content is:

$$\text{Dx Labor Content} = \text{Dx Labor \$ in Dx Capital Expenditures} / (\text{Labor \$ in Dx Capital Expenditures} + \text{Labor \$ in Dx OMA})$$

- The formula for Dx Total Spending is:

$$\text{Dx Total Spending} = \text{Dx Capital Expenditures} / (\text{Dx Capital Expenditures} + \text{Dx OMA})$$
 The table below shows the results of the computations for 2018-2022.

**Table 3 – Total Spending Method Labour and Spending Breakdown**

PORTION OF COMMON CORPORATE COSTS SERVICES CAPITALIZED- DISTRIBUTION	2018	2019	2020	2021	2022
Labor Content- Capital	49.96%	53.30%	53.11%	53.15%	55.84%
Total Spending- Capital	61.51%	64.95%	63.49%	63.41%	65.37%
50/50 Average	55.74%	59.13%	58.30%	58.28%	60.60%

### Sensitivity Analysis

As a sensitivity analysis, Black & Veatch analyzed two sensitivity cases - the highest Labor Content weight considered (75%) and the lowest Labor Content weight considered (25%). The results, shown below, indicate the total OH Cap Rates would not change materially.

**Table 4 – Sensitivity Analysis**

CASES		LABOR CONTENT / TOTAL	DISTRIBUTION-2018		DISTRIBUTION-2019	
			% costs Capitalized	2018 OH Cap Rate	% costs Capitalized	2019 OH Cap Rate
Recommended		50%/50%	55.74%	12.00%	59.13%	11.00%
High Labor Case		75%/25%	67.17%	11.00%	70.79%	10.00%
Low Labor Case		25%/75%	58.40%	12.00%	61.84%	11.00%

Black & Veatch also considered the following:

1. The same rate is applied to capitalized assets regardless of their actual usage of Common Corporate Costs services. For example, a transformer that is purchased for use in a capital project from a pre-approved vendor requires very little of these services, but receives the same rate of overhead capitalization as a project requiring substantial support. In applying the OH Cap Rates, there will be differences compared to performing a specific analysis for each project. However, the Black & Veatch method is appropriate because:



- Black & Veatch's recommended Labor / Total Content method correctly computes the total Common Corporate Costs dollars to be capitalized, and the amount charged to specific expenditures has virtually no effect on the financial statements or on ratepayers.
  - Most assets purchased for stand-alone use are Minor Fixed Assets and the OH Cap Rates are computed without them, and not applied to these minor assets. Other assets (i.e., non-Minor Fixed Assets) are usually parts of larger projects, therefore the use of average OH Cap Rates is appropriate, because larger expenditures are more likely to have an average usage of Shared Services.
  - It is impractical to perform an analysis for each project.
2. The OH Cap Rates are developed based on the weighted Labor Content and Total Spending, but are applied to Total Capital Cost.

It is appropriate to compute the total costs to be capitalized based on the weighted Labor Content / Total Spending. Once the amount to be capitalized is computed, it can be applied based on either Total Cost or Labor Content. Black & Veatch recommends stating the capitalization rate based on Total cost, and applying it to Total cost dollars, as Hydro One has done, because it is easier to plan and implement based on Total cost than Labor content.

Black & Veatch believes that allocating Common Corporate Costs to capital expenditures based on 50% Labor Content/50% Total Spending is the most appropriate method for Hydro One, and is consistent with industry practice and with the nature of the costs being capitalized.

## **E. USE OF BUDGETED NUMBERS**

The OH Cap Rates are developed based on Business Plan numbers and other estimates. Hydro One reviews and adjusts the OH Cap Rates quarterly to reflect changes in capital spending and associated support costs. At year-end, capitalized overheads are trued-up (in-year) to reflect actual results. Therefore, no adjustment is needed in subsequent years.

## II. Computation of Distribution OH Cap Rate

This Section presents, as an example, the computation of the Transmission OH Cap Rate for 2018. The calculation of the rate uses the same method for all years in BP 2018-2022.

### A. FORMULA

The following formula is used to compute the 2018-2022 Transmission OH Cap Rates:

- a. *Distribution OH Cap Rate* = (Capitalized Distribution CCC-A&G Costs + Capitalized Distribution CCC-Operating Costs) / Distribution Capital Expenditures

Note: A&G = Administrative & General

Where

- b. *Capitalized Distribution CCC-A&G Costs* = Distribution CCC-A&G Costs capitalized = (Distribution Labor Content Ratio X 50% + Distribution Total Spending Ratio X 50%) X Distribution CCC-A&G Costs
- c. *Distribution CCC-A&G Costs* = Total Distribution CCC Costs less Distribution CCC-Operating Costs departments
- d. *Capitalized Distribution CCC-Operating Costs* = Distribution CCC-Operating Costs capitalized, based on the results of the 2015 Time Study
- e. *Distribution CCC-Operating Costs* = The budgets for departments, included in the 2015 Time Study
- f. *Distribution Capital* = Cost of Distribution capital expenditures supported by Common Corporate Costs (i.e., CCC-A&G Costs plus CCC-Operating Costs); also, total cost of Distribution capital expenditures to which the Distribution OH Cap Rate is applied
- g. *Distribution Labor Content Ratio* = Distribution Labor \$ in Distribution Capital Expenditures / (Labor \$ in Distribution Capital Expenditures + Labor \$ in Distribution OMA)
- h. *Distribution Total Spending Ratio* = Distribution Capital Expenditures / (Distribution Capital Expenditures + Distribution OMA)

These terms are further discussed below.

### B. RECOMMENDED METHOD

This section discusses the method recommended by Black & Veatch to compute the Distribution OH Cap Rate. References below are to Appendix A, and the amounts and percentages cited are for 2018. The calculations use projected data. Because the methodology includes a true-up at the end of the year (Section I.E), the amounts recorded by Hydro One reflect actual data.

#### 1. DISTRIBUTION CAPITAL

(Appendix A, rows 1-8)

Distribution Capital (Formula f in Section II.A) represents the cost of Distribution business Capital Expenditures that are supported by Distribution business CCC activities (CCC-A&G activities and CCC-Operating activities), and is the total cost of Distribution business Capital Expenditures to which the Distribution OH Cap Rate is applied. Distribution Capital equals total spending for Distribution Capital Expenditures reported for financial accounting, adjusted as follows:

- Minor Fixed Assets (such as vehicles) and Interest Capitalized are removed because they require little CCC-A&G or CCC-Operating support.
- Capitalized Overhead is removed to avoid redundancy.
- Capital Contributions by Customers are added because the CCC-A&G and CCC-Operating effort required is related to gross capital cost, not net capital cost.
- Removal Costs are added because removal of capital assets requires support from CCC-A&G and CCC-Operating.

## 2. DISTRIBUTION SPENDING FOR OMA

(Appendix A, rows 9-15)

Distribution Spending for OMA is used in computing the portion of Total Spending (capital plus OMA) related to capital (rows 39-43). The amounts are based on the BP 2018-2022, with adjustments to remove those costs which are included in Applicable CCC-A&G costs (row 31).

## 3. APPLICABLE DISTRIBUTION CCC-A&G COSTS

(Appendix A, rows 16-31)

Applicable Distribution CCC-A&G Costs (Formula c) (row 31) represents the Distribution CCC- A&G Costs subject to capitalization, and equals total Common Corporate Costs distributed to the Distribution Business in the Common Corporate Costs Model, adjusted as follows:

- Distribution CCC-Operating Costs (Formula e) are removed because the capitalization ratios for those departments were determined in the 2015 Time Study.
- Distribution Facilities costs that are removed from the CCC-A&G Costs, relating to Operations facilities, are added back, because they are used to support activities that support Capital Expenditures.
- Distribution CCC-A&G Costs for the following departments that do not support capital expenditures are removed: Inergi- Customer Support Operations (CSO), Inergi-ETS to support CSO Applications, Inergi-ETS to support market transition costs and Inergi- Settlements (Note- No costs of CSO or Inergi-ETS-CSO were allocated to Distribution in the Corporate Common Costs model.)

## 4. DISTRIBUTION LABOR CONTENT- CAPITAL RATIO

(Appendix A, rows 33-37)

Distribution Labor Content-Capital Ratio is the portion of total Distribution labor costs included in Transmission Capital Expenditures (Formula g). The Labor \$ on Rows 34-35 were developed by Hydro One. The Labor \$ are fully burdened labor costs (salary plus benefits).

## 5. DISTRIBUTION TOTAL SPENDING- CAPITAL RATIO

(Appendix A, rows 39-43)

Distribution Total Spending-Capital Ratio is the portion of Distribution total spending included in Distribution Capital Expenditures (Formula h). In the formula, Distribution spending for OMA (row 40) is from row 15 and Distribution spending for capital expenditures (row 41) is from row 8.

## 6. CAPITALIZED DISTRIBUTION CCC-A&G

Capitalized CCC-A&G Costs (Formula b) is the portion of Distribution CCC-A&G Costs to be capitalized. The portion of Distribution CCC-A&G Costs to be capitalized (row 49) is the average of Distribution Labor Content-Capital Ratio (from row 37) and Total Spending Capital Ratio (from row 43), using the appropriate weights (rows 46-47). This portion is multiplied by the Applicable CCC-A&G Costs (row 31) to compute Capitalized CCC-A&G Costs (row 53).

## 7. CAPITALIZED DISTRIBUTION CCC-OPERATING

(Appendix A, rows 62-81)

Capitalized Distribution CCC-Operating Costs (Formula d) represents the amount of Distribution CCC- Operating Costs capitalized to Distribution Capital Expenditures. The 2015 Time Study showed that 38.9% of Asset Development and Management time, 22.2% of Network Operations time and 0.4% of Customer Care time, are related to Distribution Capital Expenditures. These percentages are applied to the BP 2018-2022 annual budgeted amounts for those groups, and the results are the amounts of CCC-Operating Costs to be capitalized (rows 72-76).

## 8. DISTRIBUTION OH CAP RATE

(Appendix A, rows 83-92)

The Distribution OH Cap Rate (Formula a) equals (A) the sum of items 6 and 7 above, divided by (B) Capital spending. The Distribution OH Cap Rates for 2018-2022 (row 92) are in the table below.

DISTRIBUTION OVERHEAD CAPITALIZATION RATE	2018	2019	2020	2021	2022
Rate	12.0%	11.0%	11.0%	11.0%	11.0%

## Appendix A - Distribution Overhead Capitalization Rates – BP 2018-2022

	(\$ millions)	2018	2019	2020	2021	2022
1	<b>Capital Expenditures</b>					
2	Total capexp	633.9	756.8	719.0	731.3	817.7
3	Less: Minor fixed assets	(46.3)	(49.8)	(50.9)	(52.5)	(54.6)
4	Less: Capitalized overhead	(83.0)	(86.8)	(86.1)	(86.9)	(91.1)
5	Less: Capitalized interest	(14.4)	(13.9)	(12.5)	(11.8)	(12.5)
6	Add: Capital contributions	147.6	141.2	135.3	133.7	135.2
7	Add: Removal costs	58.7	69.5	70.1	69.2	70.1
8		696.6	817.0	774.9	783.0	864.7
9	<b>OM&amp;A</b>					
10	Total OM&A	604.3	604.8	612.0	619.3	624.3
11	Less: CCFS costs	(156.0)	(154.2)	(155.6)	(157.5)	(160.2)
12	Less: Facility costs	(24.8)	(25.9)	(25.9)	(25.9)	(25.9)
13	Less: Asset Management costs (excl. facility costs)	(70.5)	(70.7)	(71.0)	(71.1)	(71.1)
14	Add: Capitalized overheads	83.0	86.8	86.1	86.9	91.1
15		435.9	440.8	445.6	451.7	458.1
16	<b>Capitalized CCFS Costs</b>					
17	Total Costs per CCCM	225.2	223.5	225.2	227.2	229.9
18	Less: Asset Development and Management	(12.5)	(12.7)	(12.8)	(12.9)	(12.9)
19	Less: Customer Care/CBR	(39.8)	(39.5)	(39.5)	(39.3)	(39.3)
20	Less: Operator	(17.0)	(17.1)	(17.3)	(17.5)	(17.5)
21	Net CCFS Costs	156.0	154.2	155.6	157.5	160.2
22	Add: Facility costs	24.8	25.9	25.9	25.9	25.9
23						
24	Less operating-type CCFS costs:					
25	Inergi - CSO	(40.2)	(40.8)	(41.5)	(42.1)	(42.7)
26	Inergi - ETS CSO Apps	(6.2)	(6.1)	(6.1)	(6.0)	(6.0)
27	Inergi - ETS Market Ready	(3.4)	(3.3)	(3.3)	(3.3)	(3.3)
28	Inergi - Settlements	(4.0)	(4.1)	(4.6)	(4.6)	(4.7)
29		(53.9)	(54.3)	(55.4)	(56.1)	(56.8)
30						
31	Applicable CCFS costs	126.9	125.8	126.1	127.3	129.3
32						
33	Portion capitalized based on labour content:					
34	Labour in OM&A	302.9	304.8	312.3	318.2	322.6
35	Labour in capexp	302.4	348.0	353.8	360.9	408.0
36		605.3	652.8	666.2	679.1	730.6
37	% capexp	50.0%	53.3%	53.1%	53.1%	55.8%
38						
39	Portion capitalized based on total spending:					
40	OM&A	435.9	440.8	445.6	451.7	458.1
41	Capexp	696.6	817.0	774.9	783.0	864.7
42		1132.5	1257.8	1220.5	1234.7	1322.9
43	% capexp	61.5%	65.0%	63.5%	63.4%	65.4%
44						
45	Weighting:					
46	Labour content	50.0%	50.0%	50.0%	50.0%	50.0%
47	Total spending	50.0%	50.0%	50.0%	50.0%	50.0%
48						
49	Portion capitalized based on weighting of two methods	55.7%	59.1%	58.3%	58.3%	60.6%
50						
51	Applicable CCFS costs	126.9	125.8	126.1	127.3	129.3
52						
53	Capitalized CCFS costs	70.7	74.4	73.5	74.2	78.4
54						

## Appendix A - Distribution Overhead Capitalization Rates – BP 2018-2022

	(\$ millions)	2018	2019	2020	2021	2022
55	<b>Capitalized Asset Management Costs</b>					
56	Network Asset Management Costs (Tx + Dx):					
57	Asset Management (excl. facility costs)	45.6	45.7	45.7	46.2	46.2
58	Operating	49.2	49.6	50.2	50.8	50.8
59	Customer Care Management/CBR	44.4	44.2	44.3	44.1	44.1
60		139.3	139.5	140.2	141.2	141.2
61						
62	Portion capitalized (per time study):					
63	Asset Management (excl. facility costs)	12.9%	13.1%	13.2%	13.2%	13.2%
64	Operating	11.9%	11.9%	11.9%	11.9%	11.9%
65	Customer Care Management/CBR	1.2%	1.2%	1.2%	1.2%	1.2%
66						
67	Portion to OM&A (per time study):					
68	Asset Management (excl. facility costs)	14.5%	14.7%	14.8%	14.7%	14.7%
69	Operating	22.6%	22.6%	22.6%	22.6%	22.6%
70	Customer Care Management/CBR	91.4%	91.3%	91.2%	91.1%	91.1%
71						
72	Capitalized Asset Management costs:					
73	Asset Management (excl. facility costs)	5.9	6.0	6.0	6.1	6.1
74	Operating	5.9	5.9	6.0	6.0	6.0
75	Customer Care Management/CBR	0.5	0.5	0.5	0.5	0.5
76		12.3	12.4	12.5	12.7	12.7
77						
78	Non-Capitalized Asset Management costs:					
79	Asset Management (excl. facility costs)	6.6	6.7	6.8	6.8	6.8
80	Operating	11.1	11.2	11.3	11.5	11.5
81	Customer Care Management/CBR	40.6	40.4	40.4	40.2	40.2
82		58.3	58.3	58.4	58.5	58.5
83	<b>Overhead Capitalization Rate</b>					
84	Capitalized CCFS costs	70.7	74.4	73.5	74.2	78.4
85	Capitalized Asset Management costs	12.3	12.4	12.5	12.7	12.7
86	E-Factor	0.0	0.0	0.0	0.0	0.0
87	<b>TOTAL OVERHEADS</b>	83.0	86.8	86.1	86.9	91.1
88		(83.0)	(86.8)	(86.1)	(86.9)	(91.1)
89	Capexp	696.6	817.0	774.9	783.0	864.7
90						
91	Calculated overhead capitalization rate	11.9%	10.6%	11.1%	11.1%	10.5%
92						
93	Rounded	12.0%	11.0%	11.0%	11.0%	11.0%

## Appendix 2-D Overhead Expense

Applicants are to provide a breakdown of OM&A before capitalization in the below table. OM&A before capitalization may be broken down by cost center, program, drivers

OM&A Before Capitalization	2014 Historical Year	2015 Historical Year	2016 Historical Year	2017 Bridge Year	2018 Test Year
Sustainment	\$ 325.7	\$ 304.6	\$ 326.6	\$ 334.5	\$ 346.7
Development	\$ 11.0	\$ 10.9	\$ 12.1	\$ 13.2	\$ 11.0
Operating	\$ 29.5	\$ 27.6	\$ 29.5	\$ 33.4	\$ 36.7
Customer	\$ 209.3	\$ 155.4	\$ 129.3	\$ 132.6	\$ 131.6
Planning / Asset Management	\$ 15.0	\$ 16.4	\$ 12.5	\$ 13.3	\$ 13.3
Information Technology (including Cornerstone)	\$ 109.3	\$ 85.8	\$ 89.2	\$ 85.6	\$ 80.4
Common Corporate Functions and Services	\$ 76.8	\$ 80.5	\$ 82.7	\$ 87.2	\$ 88.0
Internal + External Work COS	\$ 4.5	\$ 5.4	\$ 4.3	\$ 4.5	\$ 4.6
Property Taxes	\$ 4.6	\$ 4.8	\$ 4.6	\$ 4.7	\$ 4.9
Other	-\$ 32.3	-\$ 30.9	-\$ 22.3	-\$ 44.5	-\$ 42.2
<b>Total OM&amp;A Before Capitalization (B)</b>	<b>\$ 753.5</b>	<b>\$ 660.6</b>	<b>\$ 668.4</b>	<b>\$ 664.4</b>	<b>\$ 674.9</b>

Applicants are to provide a breakdown of capitalized OM&A in the below table. Capitalized OM&A may be broken down using the categories listed in the table below if possible. Otherwise, applicants are to provide its own break down of capitalized OM&A.

Capitalized OM&A	2014 Historical Year	2015 Historical Year	2016 Historical Year	2017 Bridge Year	2018 Test Year	Directly Attributable? (Yes/No)	Explanation for Change in Overhead Capitalized
Capitalized Administrative & General Costs	-\$ 67.7	-\$ 75.5	-\$ 72.3	-\$ 71.7	-\$ 70.7	No	No change
Capitalized Planning, Customer and Operating Costs	-\$ 11.3	-\$ 12.6	-\$ 12.5	-\$ 12.2	-\$ 12.3	No	No change
<b>Total Capitalized OM&amp;A (A)</b>	<b>-\$ 79.0</b>	<b>-\$ 88.1</b>	<b>-\$ 84.8</b>	<b>-\$ 83.9</b>	<b>-\$ 83.0</b>		
<b>% of Capitalized OM&amp;A (=A/B)</b>	<b>-10%</b>	<b>-13%</b>	<b>-13%</b>	<b>-13%</b>	<b>-12%</b>		

## COMMON ASSET ALLOCATION

### 1. INTRODUCTION

Hydro One consists of several business divisions. It provides customers with value for money by operating as one company and maximizing efficiencies through the centralization of the maintenance, management and purchase of Common Fixed Assets (“Shared Assets”) at the corporate level.

These assets include shared land and buildings, telecommunications equipment, computer equipment, applications software, tools, and transportation and work equipment (“T&WE”).

Hydro One is committed to ensuring its distribution customers are only paying for investments in distribution-related assets. Its rate application process reflects this commitment. Similar to the corporate common costs discussion in Exhibit C1, Tab 1, Schedule 6, this Exhibit will discuss the nature of Shared Assets and the method by which Hydro One allocates the costs of these assets to the Distribution and Transmission business units for determination of its revenue requirement.

### 2. SHARED ASSETS AND FACILITIES COSTS

Most fixed assets are directly assigned to the appropriate business unit. The remaining assets (6.0% of total assets) are considered shared assets, and are allocated to Transmission and Distribution as described later in this Exhibit. Table 1 summarizes the total gross fixed assets and identifies the proportion shared assets are allocated to Transmission and Distribution.

Witness: Joel Jodoin



**Table 1: Summary of Gross Fixed Assets as at June 30, 2015 (\$ Millions)**

Category	Transmission	Distribution	Total
Total Fixed Assets	15,923.2	10,651.6	26,574.7
Shared Assets (in Total)	612.0	822.4	1,434.3
<b>Shared Asset %</b>	<b>42.7%</b>	<b>57.3%</b>	<b>100.0%</b>

Shared assets are divided into two categories. Major Fixed Assets consist of land, buildings, applications software, and telecommunications equipment. Minor Fixed Assets include office furniture, computer equipment, tools and T&WE. Table 2 shows the proportion of major and minor shared fixed assets, accumulated depreciation and net book value.

**Table 2: Details of Shared Net Fixed Assets as at June 30, 2015 (\$ Millions)**

	Gross Asset Value	Accumulated Depreciation	Net Book Value
Shared Major Assets	643.6	410.2	233.4
Shared Minor Assets	790.8	473.9	316.9
<b>Total Shared Assets</b>	<b>1,434.3</b>	<b>884.1</b>	<b>550.2</b>

### 3. ALLOCATION OF SHARED ASSETS IN SERVICE

Due to the nature of Hydro One's business, shared assets are not directly or permanently attributable to either the Transmission or Distribution business units. From year to year, the use of these shared assets may change, depending on changes in the underlying transmission and distribution work programs. Consequently, the methodology by which shared assets are allocated to the Transmission and Distribution business units is subject to periodic review. The intent of such a review is to ensure that the assignment of assets is reflective of their use and that the costs are apportioned appropriately amongst the business units.

Witness: Joel Jodoin

1 In 2008, Hydro One commissioned a study by Black & Veatch (“B&V”) (Formerly R.J.  
2 Rudden Associates) to determine a methodology to allocate the assets which are not  
3 directly attributable to Transmission or Distribution. The methodology developed  
4 represents industry best practices, identifying appropriate cost drivers to reflect cost  
5 causality and benefits received. The B&V study determined that shared assets should be  
6 allocated based on the relative usage by Transmission and Distribution or by cost drivers,  
7 similar to those used for the common corporate functions and services.

8  
9 Hydro One has accepted the approach of the B&V study as a reasonable representation of  
10 the use of shared assets amongst the business units. This methodology was utilized and  
11 subsequently endorsed by the Board in the previous Distribution rate Decisions: RP-  
12 2005-0020/EB-2005-0378/EB-2007-0681/EB-2009-0096, and in the previous  
13 Transmission rate Decisions: EB-2006-0501/EB2008-0272/EB-2010-0002/EB-2012-  
14 0031/EB-2014-0140. The methodology was also used in Hydro One’s latest application  
15 for Distribution Rates for 2015 to 2017 (EB-2013-0416).

16  
17 The appropriate use of the common asset allocation methodology for the 2018 to 2022  
18 test years was reviewed and confirmed by B&V in 2016, and is provided as Attachment 1  
19 to this Exhibit.

20  
21 In order to account for the impact of its other Businesses, Hydro One has developed  
22 transfer price charge rates to allocate a portion of the revenue requirement related to  
23 certain Shared Assets to its Telecom and Remotes businesses. This is mainly due to the  
24 significance of a Shared Asset known as Cornerstone, which is software that integrates  
25 work management, finance, supply chain and customer service. The methodology and  
26 impact of the transfer price charges are described in more detail in Attachment 1 to this  
27 Exhibit.

Witness: Joel Jodoin

Hydro One has used the approved B&V Asset Allocation methodology in this proposed application. Table 3 below shows the Hydro One Common Asset allocation as at June 30, 2015.

**Table 3: Hydro One Common Asset Allocation as at June 30, 2015 (\$ Millions)**

<b>Total Gross Value</b>			
<b>All Hydro One Transmission &amp; Distribution Assets</b>			
<b>Transmission (Total)</b>	<b>\$15,923.2</b>	<b>Distribution (Total)</b>	<b>\$10,651.6</b>
Transmission (Direct)	\$15,311.2	Distribution (Direct)	\$9,829.2
Transmission (Common)	\$612.0	Distribution (Common)	\$822.4

# **REVIEW OF SHARED ASSETS ALLOCATION (DISTRIBUTION) – 2016**

**BLACK & VEATCH PROJECT NO. 188588**

**PREPARED FOR**

**Hydro One Networks Inc.**

**December 21, 2016**



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## I. Summary

### A. BACKGROUND AND PURPOSE

Black & Veatch Canada Company (“Black & Veatch”) is pleased to submit to Hydro One Networks Inc. (“Hydro One”) this Report which describes our Review of Shared Assets Allocation (Distribution) – 2016. This Report describes the review that Black & Veatch performed, at the request of Hydro One, of its allocation of the costs of Shared Assets in its 2018-2022 Distribution Rates filing before the Ontario Energy Board (“OEB”). In this Report, “cost” is the original cost (i.e., gross book value) derived as of June 30, 2015.

In 2005, Black & Veatch recommended, Hydro One adopted, and the OEB accepted a methodology for Hydro One to allocate the costs of Shared Assets between its Distribution and Transmission businesses, and issued our *Report on Shared Assets Methodology Review* dated June 15, 2005 (“2005 Assets Report”). Black & Veatch’s objective in allocating the Shared Assets was to ensure that the allocation was reasonable, reflected best practices and was consistent with the allocation of common corporate costs, as discussed in Black and Veatch’s *Review of Allocation of Common Corporate Costs (Transmission)*- dated December 21, 2016 (“Common Corporate Costs Report Distribution - 2016”).

The OEB-accepted methodology has been applied to Hydro One’s Business Plans, and reviewed by Black & Veatch with reports issued, as follows:

**Table 1 - History of Black & Veatch’s Cost Allocation Reviews for Hydro One**

BLACK & VEATCH REVIEW/ASSET VALUES	HYDRO ONE FILING	BLACK & VEATCH REPORT
2006 Review 12/31/2005	2006 Distribution Rates	Report on Common Assets Methodology 2006 dated May 31, 2006
2008 Review 12/31/2007	2008 Transmission Rates	Report on Common Assets Methodology 2008 dated September 10, 2008
2009 Review (Distribution) 12/31/2008	2010/2011 Distribution Rates	Report on Common Assets Allocation- 2009 dated June 29, 2009
2009 Review (Transmission) 12/31/2008	2011/2012 Transmission Rates	Report on Common Assets Allocation (Transmission) - 2010 dated February 26, 2010
2011 Review (Transmission) 12/31/2010	2013/2014 Transmission Rates	Report on Shared Assets Allocation (Transmission) 2012 dated February 1, 2012
2013 Review (Distribution) 12/31/2012	2015-2019 Distribution Rates	Report on Shared Assets Allocation (Distribution) 2013 dated September 19, 2013
2014 Review (Transmission) 12/31/2012	2015-2016 Transmission Rates	Report on Shared Assets Allocation (Transmission) 2013 dated March 17, 2014

2015 Review (Transmission) 6/30/2015	2017-2018 Transmission Rates	Report on Shared Assets Allocation (Transmission) 2015 dated May 4, 2016
---	---------------------------------	---

The OEB-accepted methodology has been applied by Hydro One to its Business Plan for 2018-2022 (“BP 2018-2022”) data for its 2018-2022 Distribution Rates filing. This Report describes the “Review of Shared Assets Allocation (Distribution)” that Black & Veatch performed, at Hydro One’s request, of its application of the methodology to its BP 2015-20, and presents Black & Veatch’s conclusions.

In its 2018-2022 Distribution Rates filing, Hydro One has allocated 42.7% of the cost of the Shared Assets to its Transmission business and 57.3% to its Distribution business. These ratios are similar to the ratios used in its 2015/2016 Transmission Rates filing which allocated 42.3% to its Transmission business and 57.7% to its Distribution business.

In addition, Hydro One has developed transfer price charge rates for its Telecom and Remotes businesses, to be used in allocating to those businesses a portion of the total revenue requirement related to the Shared Assets (e.g., depreciation expense and return). In the past, before Cornerstone assets had been placed in service, no Shared Assets were assigned to Telecom or Remotes. There is no impact from the divestiture of Brampton on the Shared Asset Allocation as no costs or transfer prices were charged to Brampton as Brampton did not use these assets.

## B. TYPES OF SHARED ASSETS

Hydro One provided Black & Veatch with a list of the Shared Assets, by Asset Group and Asset Subgroup, as shown in Table 2.

**Table 2 – Types of Shared Assets**

ASSET GROUP	ASSET SUBGROUPS
Major Assets	<ul style="list-style-type: none"> <li>■ Software</li> <li>■ Buildings and Telecommunications equipment</li> </ul>
Minor Fixed Assets (“MFA”)	<ul style="list-style-type: none"> <li>■ Aircraft</li> <li>■ Computer Hardware</li> <li>■ Office equipment</li> <li>■ Service equipment- Miscellaneous</li> <li>■ Service equipment- Measurement and Testing</li> <li>■ Service equipment- Storage</li> <li>■ Tools</li> <li>■ Transportation Work Equipment</li> <li>■ Transportation Work Equipment- Power equipment</li> </ul>

If an asset was estimated to be used at least 95% in either Transmission or Distribution, the cost of that asset was removed from Shared Assets and directly assigned to that business.



## C. SUMMARY OF APPROACH

### Allocation of Asset Costs to Transmission and Distribution

A cost driver was assigned to each asset (i.e., a building within Major Assets), asset type (i.e., Pickup Trucks within Transportation Work Equipment) or Asset Subgroup, based on discussions with Hydro One personnel to ascertain what cost driver was most closely related to the usage of the asset or the Asset Subgroup. The cost drivers used to allocate the Shared Assets were selected from among, or derived from, the cost drivers used to allocate the costs of the common corporate functions and services. The specific steps used for each Asset Group and Subgroup are discussed below. The amounts allocated to Transmission and Distribution are summarized in Table 2.

### Development of Transfer Price Charge Rates for Telecom and Remotes

The transfer price charge rates represent the usage of the Shared Assets by Hydro One's Telecom and Remotes businesses. Our approach to developing the transfer price charge rates was as follows:

- The portion of each asset that should be allocated to Telecom and Remotes based on the appropriate cost driver was determined.
- The total dollar amount allocated to Telecom, representing the Shared Asset cost, was computed for each asset by multiplying the Telecom share of usage by the asset cost; these dollar amounts were summed and divided by the category total cost to determine the Telecom share for the category. The same was done for Remotes. Table 3 presents the resulting Telecom and Remotes transfer price charges.
- The percentages should be applied to each component of the revenue requirement related to the Shared Assets (e.g., depreciation expense and return), to compute the dollar amount charged to Telecom and Remotes. The amounts charged to Telecom and Remotes should be applied to reduce the revenue requirement recovered from rate payers of the Transmission and Distribution businesses.

For example, the study determined that Telecom uses 0.51% (Table 3) of the shared Major Assets owned by Hydro One Networks. As such, 0.51% of the revenue requirement associated with major assets is charged to Telecom. The revenue requirement calculated for HONI will include 100% of the assets, however, the other revenues received from the Hydro One Inc. subsidiaries will reduce the revenue requirement which is used to derive the tariff rates.

## II. Descriptions of Asset Groups

### A. MAJOR ASSETS

#### Software

Most of the software included in Shared Assets was for Hydro One's Cornerstone project, an enterprise-wide system to support work management, asset management, human resources, financial and other functions. These costs were allocated using cost drivers that reflect the activities supported. Infrastructure costs related to each phase were allocated based on the activities those phases support. For example, the portion of the Cornerstone project related to Human Resources was allocated based on headcount.

#### Buildings and Telecommunications Equipment

Each asset included in Buildings and Telecommunications Shared Assets was discussed with Hydro One personnel, and allocated using one of the following methods:

- **Specific estimation for a building.** For example, Sudbury Service Centre has estimated usage of Transmission-20% and Distribution-80%.
- **Direct assignment based on type of usage.** For example, Hydro One summarized Fleet time charges (which are recorded to time sheets concurrently with usage) for years 2011-2014 and determined that Fleet usage was Transmission- 32.39% and Distribution- 67.61%; therefore the costs for buildings used for Fleet were allocated using these percentages.  
  
Buildings used for Training were allocated using the cost driver Headcount.
- **Cost drivers based on proxy.** For example, Buildings used to manage both Distribution and Transmission projects are allocated using the cost driver *Program Project Costs*, developed as part of the 2016 Common Corporate Costs Report- Distribution study.

### B. MINOR FIXED ASSETS

Each component of Minor Fixed Assets includes many individual items. Black & Veatch reviewed the lists of individual items and determined that the following allocations are appropriate:

- **Aircraft** – Helicopter and supporting components. Usage was based on an analysis of time charges (which are recorded to time sheets concurrently with usage) for years 2011-2014.
- **Computer Hardware** – Includes Laptops, Desktops, Network Equipment, Printers, etc. Allocated using a cost driver based on the number of *Workstations* (50% weight) and the cost driver *Headcount* (50% weight).
- **Office equipment** – Includes office furniture and other office equipment. Allocated using the cost driver *Headcount*.
- **Service equipment - Miscellaneous** – Includes miscellaneous equipment. Allocated using *Total Common Costs* cost driver, developed as part of the 2016 Common Corporate Costs Report- Distribution study.
- **Service equipment- Measurement and Testing** – Includes Meters, Splicers etc. used for Distribution. Directly assigned to *Distribution*.

- **Service equipment- Storage** – Includes Waste Storage and Other Storage equipment. Allocated using the cost driver based on spending for *Operating and Maintenance costs and Capital spending*.
- **Tools** – Includes Rental tools. Allocated Distribution-20% / Transmission-80% reflecting estimated usage based on information as to which business units are renting the tools.
- **Transportation & Work Equipment** – Includes primarily Vehicles. Allocated using the cost driver “Fleet”, which represents Fleet time charges (which are recorded to time sheets concurrently with usage) for years 2011-2014. Except for items representing less than 1.0% of cost, the usage for all of the Transportation & Work Equipment Shared Assets were recorded on time sheets and included in the computation of the Fleet cost driver.

The results are summarized in Table 2.

## Summary of Results

Table 3 presents the allocation of Shared Assets to Hydro One's Transmission and Distribution businesses.

Table 3 - Summary of Shared Assets Allocation

Type	Total	Transmission	Distribution	Transmission %	Distribution %
<b>Major Assets</b>					
Software	\$ 508.9	\$ 254.7	\$ 254.2	50.0%	50.0%
Building/Telecom	\$ 134.7	\$ 66.7	\$ 68.0	49.5%	50.5%
Total	\$ 643.6	\$ 321.4	\$ 322.2	49.9%	50.1%
<b>Minor Assets</b>					
Aircraft	\$ 24.1	\$ 17.5	\$ 6.7	72.4%	27.6%
Computer Hardware	\$ 98.0	\$ 52.1	\$ 45.8	53.2%	46.8%
Office Equipment	\$ 12.9	\$ 6.9	\$ 6.0	53.2%	46.8%
Service - Miscellaneous	\$ 6.9	\$ 3.0	\$ 3.8	44.2%	55.8%
Service - Measurement and Testing	\$ 16.3	\$ -	\$ 16.3	0.0%	100.0%
Service - Storage	\$ 2.7	\$ 1.4	\$ 1.3	52.1%	47.9%
Tools	\$ 11.9	\$ 9.5	\$ 2.4	80.0%	20.0%
Transportation Work Equipment	\$ 618.0	\$ 200.2	\$ 417.8	32.4%	67.6%
Total	\$ 790.8	\$ 290.6	\$ 500.2	36.7%	63.3%
Total - All Shared Assets	\$ 1,434.3	\$ 612.0	\$ 822.4	42.7%	57.3%

Table 4 presents the Shared Assets transfer price charges for Telecom and Remotes.

Table 4 - Transfer Price Charges for Other Businesses

Asset Group	Telecom	Remotes
Major Assets	0.51%	0.23%
Minor Fixed Assets	0.50%	0.14%
Total - All Shared Assets	0.40%	0.15%

**HYDRO ONE NETWORKS INC.**  
**DISTRIBUTION**  
**Statement of Utility Rate Base**  
Bridge Year (2017) and Test Years (2018 to 2022)  
Year Ending December 31  
(\$ Millions)

<b>Particulars</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
<u>Electric Utility Plant</u>						
Gross plant at cost	\$ 11,739.6	\$ 12,291.7	\$ 12,933.5	13,656.7	\$ 14,488.5	\$ 15,240.9
Less: non-regulatory	(64.4)	(69.6)	(73.6)	(77.0)	(79.9)	(82.5)
Gross plant at cost for rate base	11,675.2	12,222.1	12,859.9	13,579.6	14,408.6	15,158.4
Less: accumulated depreciation	(4,488.4)	(4,740.9)	(4,959.6)	(5,279.1)	(5,610.6)	(5,950.8)
Less: non-regulatory	10.9	15.0	19.3	23.9	28.6	33.5
Accumulated depreciation for rate base	(4,477.5)	(4,725.9)	(4,940.2)	(5,255.2)	(5,582.0)	(5,917.3)
Net plant for rate base	7,197.7	7,496.3	7,919.7	8,324.4	8,826.6	9,241.0
Average net plant for rate base <sup>(1)</sup>		7,347.0	7,708.0	8,122.0	8,651.0	9,033.8
Construction work in progress		0.0	0.0	0.0	0.0	0.0
Average net utility plant		\$ 7,347.0	\$ 7,708.0	\$ 8,122.0	\$ 8,651.0	\$ 9,033.8
<u>Working Capital</u>						
Cash working capital <sup>(2)</sup>		321.2	335.7	348.3	378.5	395.3
Materials and Supplies Inventory		4.1	5.5	6.5	5.9	5.5
Total working capital		325.3	341.2	354.7	384.4	400.9
Total rate base		\$ 7,672.3	\$ 8,049.1	\$ 8,476.8	\$ 9,035.4	\$ 9,434.7

<sup>(1)</sup> \$153.5M of the Average net plant for rate base for 2021 is related to the Integration of the acquired utilities

<sup>(2)</sup> \$14.9M of the cash working capital for 2021 is related to the Integration of the acquired utilities

**HYDRO ONE NETWORKS INC.**  
**DISTRIBUTION**  
**Continuity of Property, Plant and Equipment**  
Historical (2013 to 2016), Bridge (2017) & Test (2018 to 2022) Years  
Year Ending December 31  
Total - Gross Balances  
(\$ Millions)

<b>Line No.</b>	<b>Year</b>	<b>Opening Balance</b>	<b>Additions</b>	<b>Retirements</b>	<b>Sales</b>	<b>Transfers In/Out</b>	<b>Closing Balance</b>
		(a)	(b)	(c)	(d)	(e)	(f)
<u>Historical</u>							
1	2013	8,636.2	729.3	(93.8)	(15.6)	0.0	9,256.2
2	2014	9,256.2	623.7	(38.7)	(10.2)	1.0	9,832.0
3	2015	9,832.0	755.3	(36.1)	(18.5)	0.4	10,533.1
4	2016 (forecast)	10,533.1	657.1	(63.0)	0.0	0.5	11,127.7
<u>Bridge</u>							
5	2017	11,127.7	651.8	(39.9)	0.0	0.0	11,739.6
<u>Test</u>							
6	2018	11,739.6	640.9	(88.8)	-	0.0	12,291.7
7	2019	12,291.7	775.6	(133.8)	-	0.0	12,933.5
8	2020	12,933.5	768.1	(45.0)	-	0.0	13,656.7
9 <sup>(1)</sup>	2021	13,656.7	910.8	(79.0)	-	0.0	14,488.5
10	2022	14,488.5	815.1	(62.7)	-	0.0	15,240.9

<sup>(1)</sup> \$176.5M of the additions for 2021 are related to the integration of the Acquired Utilities Opening Balances for 2021.

Witness: Samir Chhelavda

**HYDRO ONE NETWORKS INC.**  
**DISTRIBUTION**  
**Continuity of Property, Plant and Equipment - Accumulated Depreciation**  
Historical (2013 to 2016), Bridge (2017) & Test (2018 to 2022) Years  
Year Ending December 31  
(\$ Millions)

<b>Line No.</b>	<b>Year</b>	<b>Opening Balance</b>	<b>Provision</b>	<b>Retirements</b>	<b>Sales</b>	<b>Transfers In/Out and Other</b>	<b>Closing Balance</b>
		(a)	(b)	(c)	(d)	(e)	(f)
<u>Historical</u>							
1	2013	3,254.0	277.7	(93.8)	(14.3)	0.0	3,423.6
2	2014	3,423.6	301.1	(33.2)	(9.5)	0.0	3,682.0
3 <sup>(1)</sup>	2015	3,682.0	308.0	(35.6)	(20.4)	4.7	3,938.6
4	2016 (forecast)	3,938.6	325.2	(63.0)	-	0.0	4,200.8
<u>Bridge</u>							
5	2017	4,200.8	328.1	(40.5)	-	0.0	4,488.4
<u>Test</u>							
6	2018	4,488.4	341.8	(89.4)	-	0.0	4,740.9
7	2019	4,740.9	353.1	(134.4)	-	0.0	4,959.6
8	2020	4,959.6	365.2	(45.6)	-	0.0	5,279.1
9 <sup>(2)</sup>	2021	5,279.1	411.1	(79.7)	-	0.0	5,610.6
10	2022	5,610.6	403.0	(62.7)	-	0.0	5,950.8

<sup>(1)</sup> \$4.7M in 2015 under Transfers In/Out and Other represents DSC Exemption and reserve redistribution.

<sup>(2)</sup> \$25.4M of the Provisions for 2021 is related to the Integration of the Acquired Utilities Opening Balances for 2021.

Witness: Samir Chhelavda

**HYDRO ONE NETWORKS INC.  
DISTRIBUTION**

**Continuity of Property, Plant and Equipment - Construction Work in Progress**

Historical (2013 to 2016), Bridge (2017) & Test (2018 to 2022) Years

Year Ending December 31

(\$ Millions)

<b>Line No.</b>	<b>Year</b>	<b>Opening Balance</b>	<b>Capital Expenditures</b>	<b>Transfers To Plant</b>	<b>Closing Balance</b>
		(a)	(b)	(c)	(d)
<u>Historical</u>					
1	2013	420.7	583.6	(680.2)	324.1
2	2014	324.1	581.8	(560.9)	345.0
3	2015	345.0	630.0	(705.0)	269.9
4	2016 (Forecast)	269.9	703.2	(657.1)	316.0
<u>Bridge</u>					
5	2017	316.0	633.5	(651.8)	297.7
<u>Test</u>					
6	2018	297.7	633.9	(640.9)	290.8
7	2019	290.8	756.8	(775.6)	272.0
8	2020	272.0	719.0	(768.1)	222.8
9	2021	222.8	731.3	(725.0)	229.2
10	2022	229.2	817.7	(805.6)	241.2

Witness: Samir Chhelavda



**HYDRO ONE NETWORKS INC.**  
**DISTRIBUTION**  
**Statement of Working Capital**  
Annual Average  
Test Years (2018 to 2022)  
(\$ Millions)

<b>Line No.</b>	<b>Particulars</b>	<b>2018</b> (a)	<b>2019</b> (b)	<b>2020</b> (c)	<b>2021</b> (d)	<b>2022</b> (e)
1	Cash Working Capital	\$ 321.2	\$ 335.7	348.3	\$ 378.5	395.3
2	Materials and Supply Inventory	<u>4.1</u>	<u>5.5</u>	<u>6.5</u>	<u>5.9</u>	<u>5.5</u>
3	<b>Total</b>	<b>\$ <u>325.3</u></b>	<b>\$ <u>341.2</u></b>	<b><u>354.7</u></b>	<b>\$ <u>384.4</u></b>	<b><u>400.9</u></b>

Witness: Joel Jodoin

**HYDRO ONE NETWORKS INC.**  
**DISTRIBUTION**  
**Debt and Equity Summary**  
Historical Years (2013, 2014, 2015, 2016) and Bridge Year (2017)  
As at December 31  
(\$ Millions)

Updated Line No.	Particulars	Amount Outstanding 2013  Actual (a)	Amount Outstanding 2014  Actual (a)	Amount Outstanding 2015  Actual (b)	Amount Outstanding 2016  Forecast (c)	Amount Outstanding 2017  Projection (d)
I	Long-term debt *	3,072.9	3,149.9	3,049.9	4,086.0	4,026.9
2	Short-term debt	195.7	457.1	781.1	207.5	182.0
3	Preference shares	137.0	137.0	-	-	-
4	Common equity	2,328.2	2,455.2	2,523.4	2,537.1	2,940.5

\* Includes debt payable within one year; excludes variable rate debt, unamortized debt premiums/discount, hedging gains/losses and marks to market

**HYDRO ONE NETWORKS INC.**

**DISTRIBUTION**

Summary of Cost of Capital

Test Year (2018)

Utility Capital Structure

Year Ending December 31

Line No.	Particulars	2018			
		(a)	(b)	Cost Rate (%)	Return (\$M)
I	Long-term debt	4,246.3	55.3%	4.32%	183.4
2	Short-term debt	306.9	4.0%	1.76%	5.4
3	Deemed long-term debt	50.2	0.7%	4.32%	2.2
4	Total debt	4,603.4	60.0%	4.15%	190.9
5	Common equity	3,068.9	40.0%	8.78%	269.5
6	Total rate base	7,672.3	100.0%	6.00%	460.4

HYDRO ONE NETWORKS INC.  
DISTRIBUTION  
Cost of Long-Term Debt Capital  
Historical Year (2013)  
Year ending December 31

Line No.	Offering Date	Coupon Rate	Maturity Date	Principal Amount Offered (\$Millions)	Premium Discount and Expenses (\$Millions)	Net Capital Employed		Effective Cost Rate	Total Amount Outstanding		Avg. Monthly Averages (\$Millions)	Carrying Cost (\$Millions)	Projected Average Embedded Cost Rates
						Total Amount (\$Millions)	Per \$100 Principal Amount (Dollars)		at 12/31/12 (\$Millions)	at 12/31/13 (\$Millions)			
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
1	3-Jun-00	7.350%	3-Jun-30	121.6	2.0	119.6	98.37	7.49%	121.6	121.6	121.6	9.1	
2	22-Jun-01	6.930%	1-Jun-32	47.7	0.6	47.1	98.78	7.03%	47.7	47.7	47.7	3.4	
3	17-Sep-02	6.930%	1-Jun-32	142.0	(5.1)	147.1	103.57	6.65%	142.0	142.0	142.0	9.4	
4	31-Jan-03	6.350%	31-Jan-34	74.0	0.6	73.4	99.21	6.41%	74.0	74.0	74.0	4.7	
5	22-Apr-03	6.590%	22-Apr-43	105.0	0.8	104.2	99.26	6.64%	105.0	105.0	105.0	7.0	
6	25-Jun-04	6.350%	31-Jan-34	48.0	(0.1)	48.1	100.22	6.33%	48.0	48.0	48.0	3.0	
7	20-Aug-04	6.590%	22-Apr-43	26.0	(2.1)	28.1	107.89	6.06%	26.0	26.0	26.0	1.6	
8	24-Aug-04	6.350%	31-Jan-34	26.0	(0.9)	26.9	103.48	6.09%	26.0	26.0	26.0	1.6	
9	19-May-05	5.360%	20-May-36	98.1	3.7	94.4	96.19	5.62%	98.1	98.1	98.1	5.5	
10	3-Mar-06	4.640%	3-Mar-16	90.0	0.4	89.6	99.52	4.70%	90.0	90.0	90.0	4.2	
11	24-Apr-06	5.360%	20-May-36	62.5	0.8	61.7	98.68	5.45%	62.5	62.5	62.5	3.4	
12	22-Aug-06	4.640%	3-Mar-16	90.0	1.1	88.9	98.75	4.80%	90.0	90.0	90.0	4.3	
13	19-Oct-06	5.000%	19-Oct-46	45.0	0.3	44.7	99.29	5.04%	45.0	45.0	45.0	2.3	
14	13-Mar-07	4.890%	13-Mar-37	160.0	0.9	159.1	99.45	4.93%	160.0	160.0	160.0	7.9	
15	18-Oct-07	5.180%	18-Oct-17	75.0	0.3	74.7	99.63	5.23%	75.0	75.0	75.0	3.9	
16	3-Mar-08	5.180%	18-Oct-17	120.0	(2.1)	122.1	101.73	4.95%	120.0	120.0	120.0	5.9	
17	10-Nov-08	5.000%	12-Nov-13	160.0	0.8	159.2	99.53	5.11%	160.0	0.0	135.4	6.9	
18	14-Jan-09	5.000%	12-Nov-13	70.0	(2.0)	72.0	102.85	4.34%	70.0	0.0	59.2	2.6	
19	3-Mar-09	6.030%	3-Mar-39	105.0	0.6	104.4	99.41	6.07%	105.0	105.0	105.0	6.4	
20	16-Jul-09	5.490%	16-Jul-40	90.0	0.6	89.4	99.36	5.53%	90.0	90.0	90.0	5.0	
21	19-Nov-09	3.130%	19-Nov-14	75.0	0.3	74.7	99.63	3.21%	75.0	75.0	75.0	2.4	
22	15-Mar-10	5.490%	24-Jul-40	80.0	(0.5)	80.5	100.58	5.45%	80.0	80.0	80.0	4.4	
23	15-Mar-10	4.400%	4-Jun-20	120.0	0.5	119.5	99.55	4.46%	120.0	120.0	120.0	5.3	
24	13-Sep-10	2.950%	11-Sep-15	100.0	0.4	99.6	99.62	3.03%	100.0	100.0	100.0	3.0	
25	13-Sep-10	5.000%	19-Oct-46	100.0	(0.2)	100.2	100.25	4.98%	100.0	100.0	100.0	5.0	
26	26-Sep-11	4.390%	26-Sep-41	75.0	0.5	74.5	99.35	4.43%	75.0	75.0	75.0	3.3	
27	22-Dec-11	4.000%	22-Dec-51	30.0	0.2	29.8	99.47	4.03%	30.0	30.0	30.0	1.2	
28	13-Jan-12	3.200%	13-Jan-22	126.0	0.7	125.3	99.47	3.26%	126.0	126.0	126.0	4.1	
29	22-May-12	3.200%	13-Jan-22	135.0	(1.3)	136.3	100.97	3.08%	135.0	135.0	135.0	4.2	
30	22-May-12	4.000%	22-Dec-51	56.3	0.3	56.0	99.51	4.02%	56.3	56.3	56.3	2.3	
31	31-Jul-12	3.790%	31-Jul-62	22.5	0.1	22.4	99.47	3.81%	22.5	22.5	22.5	0.9	
32	16-Aug-12	3.790%	31-Jul-62	94.0	0.8	93.2	99.20	3.83%	94.0	94.0	94.0	3.6	
33	9-Oct-13	4.590%	9-Oct-43	195.8	1.1	194.6	99.42	4.63%	0.0	195.8	45.2	2.1	
34	9-Oct-13	2.780%	9-Oct-18	337.5	1.4	336.1	99.59	2.87%	0.0	337.5	77.9	2.2	
35	<b>Subtotal</b>								2769.7	3072.9	2857.4	142.1	
36	Treasury OM&A costs											1.0	
37	Other financing-related fees											2.2	
38	<b>Total</b>								2769.7	3072.9	2857.4	145.2	5.08%

Witness: Samir Chhelavda

HYDRO ONE NETWORKS INC.  
DISTRIBUTION  
Cost of Long-Term Debt Capital  
Historical Year (2014)  
Year ending December 31

Line No.	Offering Date	Coupon Rate	Maturity Date	Principal Amount Offered (\$Millions)	Premium Discount and Expenses (\$Millions)	Net Capital Employed		Effective Cost Rate	Total Amount Outstanding		Avg. Monthly Averages (\$Millions)	Carrying Cost (\$Millions)	Projected Average Embedded Cost Rates
						Total Amount (\$Millions)	Per \$100 Principal Amount (Dollars)		at 12/31/13 (\$Millions)	at 12/31/14 (\$Millions)			
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
1	3-Jun-00	7.350%	3-Jun-30	121.6	2.0	119.6	98.37	7.49%	121.6	121.6	121.6	9.1	
2	22-Jun-01	6.930%	1-Jun-32	47.7	0.6	47.1	98.78	7.03%	47.7	47.7	47.7	3.4	
3	17-Sep-02	6.930%	1-Jun-32	142.0	(5.1)	147.1	103.57	6.65%	142.0	142.0	142.0	9.4	
4	31-Jan-03	6.350%	31-Jan-34	74.0	0.6	73.4	99.21	6.41%	74.0	74.0	74.0	4.7	
5	22-Apr-03	6.590%	22-Apr-43	105.0	0.8	104.2	99.26	6.64%	105.0	105.0	105.0	7.0	
6	25-Jun-04	6.350%	31-Jan-34	48.0	(0.1)	48.1	100.22	6.33%	48.0	48.0	48.0	3.0	
7	20-Aug-04	6.590%	22-Apr-43	26.0	(2.1)	28.1	107.89	6.06%	26.0	26.0	26.0	1.6	
8	24-Aug-04	6.350%	31-Jan-34	26.0	(0.9)	26.9	103.48	6.09%	26.0	26.0	26.0	1.6	
9	19-May-05	5.360%	20-May-36	98.1	3.7	94.4	96.19	5.62%	98.1	98.1	98.1	5.5	
10	3-Mar-06	4.640%	3-Mar-16	90.0	0.4	89.6	99.52	4.70%	90.0	90.0	90.0	4.2	
11	24-Apr-06	5.360%	20-May-36	62.5	0.8	61.7	98.68	5.45%	62.5	62.5	62.5	3.4	
12	22-Aug-06	4.640%	3-Mar-16	90.0	1.1	88.9	98.75	4.80%	90.0	90.0	90.0	4.3	
13	19-Oct-06	5.000%	19-Oct-46	45.0	0.3	44.7	99.29	5.04%	45.0	45.0	45.0	2.3	
14	13-Mar-07	4.890%	13-Mar-37	160.0	0.9	159.1	99.45	4.93%	160.0	160.0	160.0	7.9	
15	18-Oct-07	5.180%	18-Oct-17	75.0	0.3	74.7	99.63	5.23%	75.0	75.0	75.0	3.9	
16	3-Mar-08	5.180%	18-Oct-17	120.0	(2.1)	122.1	101.73	4.95%	120.0	120.0	120.0	5.9	
17	3-Mar-09	6.030%	3-Mar-39	105.0	0.6	104.4	99.41	6.07%	105.0	105.0	105.0	6.4	
18	16-Jul-09	5.490%	16-Jul-40	90.0	0.6	89.4	99.36	5.53%	90.0	90.0	90.0	5.0	
19	19-Nov-09	3.130%	19-Nov-14	75.0	0.3	74.7	99.63	3.21%	75.0	0.0	63.5	2.0	
20	15-Mar-10	5.490%	24-Jul-40	80.0	(0.5)	80.5	100.58	5.45%	80.0	80.0	80.0	4.4	
21	15-Mar-10	4.400%	4-Jun-20	120.0	0.5	119.5	99.55	4.46%	120.0	120.0	120.0	5.3	
22	13-Sep-10	2.950%	11-Sep-15	100.0	0.4	99.6	99.62	3.03%	100.0	100.0	100.0	3.0	
23	13-Sep-10	5.000%	19-Oct-46	100.0	(0.2)	100.2	100.25	4.98%	100.0	100.0	100.0	5.0	
24	26-Sep-11	4.390%	26-Sep-41	75.0	0.5	74.5	99.35	4.43%	75.0	75.0	75.0	3.3	
25	22-Dec-11	4.000%	22-Dec-51	30.0	0.2	29.8	99.47	4.03%	30.0	30.0	30.0	1.2	
26	13-Jan-12	3.200%	13-Jan-22	126.0	0.7	125.3	99.47	3.26%	126.0	126.0	126.0	4.1	
27	22-May-12	3.200%	13-Jan-22	135.0	(1.3)	136.3	100.97	3.08%	135.0	135.0	135.0	4.2	
28	22-May-12	4.000%	22-Dec-51	56.3	0.3	56.0	99.51	4.02%	56.3	56.3	56.3	2.3	
29	31-Jul-12	3.790%	31-Jul-62	22.5	0.1	22.4	99.47	3.81%	22.5	22.5	22.5	0.9	
30	16-Aug-12	3.790%	31-Jul-62	94.0	0.8	93.2	99.20	3.83%	94.0	94.0	94.0	3.6	
31	9-Oct-13	4.590%	9-Oct-43	195.8	1.1	194.6	99.42	4.63%	195.8	195.8	195.8	9.1	
32	9-Oct-13	2.780%	9-Oct-18	337.5	1.4	336.1	99.59	2.87%	337.5	337.5	337.5	9.7	
33	29-Jan-14	4.290%	29-Jan-64	20.0	0.1	19.9	99.44	4.32%	0.0	20.0	18.5	0.8	
34	6-Jun-14	4.170%	6-Jun-44	132.0	0.8	131.2	99.40	4.21%	0.0	132.0	71.1	3.0	
35	<b>Subtotal</b>								3072.9	3149.9	3150.9	150.5	
36	Treasury OM&A costs											0.9	
37	Other financing-related fees											2.0	
38	<b>Total</b>								<u>3072.9</u>	<u>3149.9</u>	<u>3150.9</u>	<u>153.3</u>	<u>4.87%</u>

Witness: Samir Chhelavda

HYDRO ONE NETWORKS INC.  
DISTRIBUTION  
Cost of Long-Term Debt Capital  
Historical Year (2015)  
Year ending December 31

Line No.	Offering Date	Coupon Rate	Maturity Date	Principal Amount Offered (\$Millions)	Premium Discount and Expenses (\$Millions)	Net Capital Employed		Effective Cost Rate	Total Amount Outstanding		Avg. Monthly Averages (\$Millions)	Carrying Cost (\$Millions)	Projected Average Embedded Cost Rates
						Total Amount (\$Millions)	Per \$100 Principal Amount (Dollars)		at 12/31/14 (\$Millions)	at 12/31/15 (\$Millions)			
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
1	3-Jun-00	7.350%	3-Jun-30	121.6	2.0	119.6	98.37	7.49%	121.6	121.6	121.6	9.1	
2	22-Jun-01	6.930%	1-Jun-32	47.7	0.6	47.1	98.78	7.03%	47.7	47.7	47.7	3.4	
3	17-Sep-02	6.930%	1-Jun-32	142.0	(5.1)	147.1	103.57	6.65%	142.0	142.0	142.0	9.4	
4	31-Jan-03	6.350%	31-Jan-34	74.0	0.6	73.4	99.21	6.41%	74.0	74.0	74.0	4.7	
5	22-Apr-03	6.590%	22-Apr-43	105.0	0.8	104.2	99.26	6.64%	105.0	105.0	105.0	7.0	
6	25-Jun-04	6.350%	31-Jan-34	48.0	(0.1)	48.1	100.22	6.33%	48.0	48.0	48.0	3.0	
7	20-Aug-04	6.590%	22-Apr-43	26.0	(2.1)	28.1	107.89	6.06%	26.0	26.0	26.0	1.6	
8	24-Aug-04	6.350%	31-Jan-34	26.0	(0.9)	26.9	103.48	6.09%	26.0	26.0	26.0	1.6	
9	19-May-05	5.360%	20-May-36	98.1	3.7	94.4	96.19	5.62%	98.1	98.1	98.1	5.5	
10	3-Mar-06	4.640%	3-Mar-16	90.0	0.4	89.6	99.52	4.70%	90.0	90.0	90.0	4.2	
11	24-Apr-06	5.360%	20-May-36	62.5	0.8	61.7	98.68	5.45%	62.5	62.5	62.5	3.4	
12	22-Aug-06	4.640%	3-Mar-16	90.0	1.1	88.9	98.75	4.80%	90.0	90.0	90.0	4.3	
13	19-Oct-06	5.000%	19-Oct-46	45.0	0.3	44.7	99.29	5.04%	45.0	45.0	45.0	2.3	
14	13-Mar-07	4.890%	13-Mar-37	160.0	0.9	159.1	99.45	4.93%	160.0	160.0	160.0	7.9	
15	18-Oct-07	5.180%	18-Oct-17	75.0	0.3	74.7	99.63	5.23%	75.0	75.0	75.0	3.9	
16	3-Mar-08	5.180%	18-Oct-17	120.0	(2.1)	122.1	101.73	4.95%	120.0	120.0	120.0	5.9	
17	3-Mar-09	6.030%	3-Mar-39	105.0	0.6	104.4	99.41	6.07%	105.0	105.0	105.0	6.4	
18	16-Jul-09	5.490%	16-Jul-40	90.0	0.6	89.4	99.36	5.53%	90.0	90.0	90.0	5.0	
19	15-Mar-10	5.490%	24-Jul-40	80.0	(0.5)	80.5	100.58	5.45%	80.0	80.0	80.0	4.4	
20	15-Mar-10	4.400%	4-Jun-20	120.0	0.5	119.5	99.55	4.46%	120.0	120.0	120.0	5.3	
21	13-Sep-10	2.950%	11-Sep-15	100.0	0.4	99.6	99.62	3.03%	100.0	0.0	69.2	2.1	
22	13-Sep-10	5.000%	19-Oct-46	100.0	(0.2)	100.2	100.25	4.98%	100.0	100.0	100.0	5.0	
23	26-Sep-11	4.390%	26-Sep-41	75.0	0.5	74.5	99.35	4.43%	75.0	75.0	75.0	3.3	
24	22-Dec-11	4.000%	22-Dec-51	30.0	0.2	29.8	99.47	4.03%	30.0	30.0	30.0	1.2	
25	13-Jan-12	3.200%	13-Jan-22	126.0	0.7	125.3	99.47	3.26%	126.0	126.0	126.0	4.1	
26	22-May-12	3.200%	13-Jan-22	135.0	(1.3)	136.3	100.97	3.08%	135.0	135.0	135.0	4.2	
27	22-May-12	4.000%	22-Dec-51	56.3	0.3	56.0	99.51	4.02%	56.3	56.3	56.3	2.3	
28	31-Jul-12	3.790%	31-Jul-62	22.5	0.1	22.4	99.47	3.81%	22.5	22.5	22.5	0.9	
29	16-Aug-12	3.790%	31-Jul-62	94.0	0.8	93.2	99.20	3.83%	94.0	94.0	94.0	3.6	
30	9-Oct-13	4.590%	9-Oct-43	195.8	1.1	194.6	99.42	4.63%	195.8	195.8	195.8	9.1	
31	9-Oct-13	2.780%	9-Oct-18	337.5	1.4	336.1	99.59	2.87%	337.5	337.5	337.5	9.7	
32	29-Jan-14	4.290%	29-Jan-64	20.0	0.1	19.9	99.44	4.32%	20.0	20.0	20.0	0.9	
33	6-Jun-14	4.170%	6-Jun-44	132.0	0.8	131.2	99.40	4.21%	132.0	132.0	132.0	5.6	
34	<b>Subtotal</b>								3149.9	3049.9	3119.2	150.1	
35	Treasury OM&A costs											0.9	
36	Other financing-related fees											2.2	
37	<b>Total</b>								3149.9	3049.9	3119.2	153.2	4.91%

Witness: Samir Chhelavda

HYDRO ONE NETWORKS INC.  
DISTRIBUTION  
Cost of Long-Term Debt Capital  
Historical Year (2016)  
Year ending December 31

Line No.	Offering Date (a)	Coupon Rate (b)	Maturity Date (c)	Principal Amount Offered (\$Millions) (d)	Premium Discount and Expenses (\$Millions) (e)	Net Capital Employed		Effective Cost Rate (h)	Total Amount Outstanding		Avg. Monthly Averages (\$Millions) (k)	Carrying Cost (\$Millions) (l)	Projected Average Embedded Cost Rates (m)
						Total Amount (\$Millions) (f)	Per \$100 Principal Amount (Dollars) (g)		at 12/31/15 (\$Millions) (i)	at 12/31/16 (\$Millions) (j)			
1	3-Jun-00	7.350%	3-Jun-30	121.6	2.0	119.6	98.37	7.49%	121.6	121.6	121.6	9.1	
2	22-Jun-01	6.930%	1-Jun-32	47.7	0.6	47.1	98.78	7.03%	47.7	47.7	47.7	3.4	
3	17-Sep-02	6.930%	1-Jun-32	142.0	(5.1)	147.1	103.57	6.65%	142.0	142.0	142.0	9.4	
4	31-Jan-03	6.350%	31-Jan-34	74.0	0.6	73.4	99.21	6.41%	74.0	74.0	74.0	4.7	
5	22-Apr-03	6.590%	22-Apr-43	105.0	0.8	104.2	99.26	6.64%	105.0	105.0	105.0	7.0	
6	25-Jun-04	6.350%	31-Jan-34	48.0	(0.1)	48.1	100.22	6.33%	48.0	48.0	48.0	3.0	
7	20-Aug-04	6.590%	22-Apr-43	26.0	(2.1)	28.1	107.89	6.06%	26.0	26.0	26.0	1.6	
8	24-Aug-04	6.350%	31-Jan-34	26.0	(0.9)	26.9	103.48	6.09%	26.0	26.0	26.0	1.6	
9	19-May-05	5.360%	20-May-36	98.1	3.7	94.4	96.19	5.62%	98.1	98.1	98.1	5.5	
10	3-Mar-06	4.640%	3-Mar-16	90.0	0.4	89.6	99.52	4.70%	90.0	0.0	20.8	1.0	
11	24-Apr-06	5.360%	20-May-36	62.5	0.8	61.7	98.68	5.45%	62.5	62.5	62.5	3.4	
12	22-Aug-06	4.640%	3-Mar-16	90.0	1.1	88.9	98.75	4.80%	90.0	0.0	20.8	1.0	
13	19-Oct-06	5.000%	19-Oct-46	45.0	0.3	44.7	99.29	5.04%	45.0	45.0	45.0	2.3	
14	13-Mar-07	4.890%	13-Mar-37	160.0	0.9	159.1	99.45	4.93%	160.0	160.0	160.0	7.9	
15	18-Oct-07	5.180%	18-Oct-17	75.0	0.3	74.7	99.63	5.23%	75.0	75.0	75.0	3.9	
16	3-Mar-08	5.180%	18-Oct-17	120.0	(2.1)	122.1	101.73	4.95%	120.0	120.0	120.0	5.9	
17	3-Mar-09	6.030%	3-Mar-39	105.0	0.6	104.4	99.41	6.07%	105.0	105.0	105.0	6.4	
18	16-Jul-09	5.490%	16-Jul-40	90.0	0.6	89.4	99.36	5.53%	90.0	90.0	90.0	5.0	
19	15-Mar-10	5.490%	24-Jul-40	80.0	(0.5)	80.5	100.58	5.45%	80.0	80.0	80.0	4.4	
20	15-Mar-10	4.400%	4-Jun-20	120.0	0.5	119.5	99.55	4.46%	120.0	120.0	120.0	5.3	
21	13-Sep-10	5.000%	19-Oct-46	100.0	(0.2)	100.2	100.25	4.98%	100.0	100.0	100.0	5.0	
22	26-Sep-11	4.390%	26-Sep-41	75.0	0.5	74.5	99.35	4.43%	75.0	75.0	75.0	3.3	
23	22-Dec-11	4.000%	22-Dec-51	30.0	0.2	29.8	99.47	4.03%	30.0	30.0	30.0	1.2	
24	13-Jan-12	3.200%	13-Jan-22	126.0	0.7	125.3	99.47	3.26%	126.0	126.0	126.0	4.1	
25	22-May-12	3.200%	13-Jan-22	135.0	(1.3)	136.3	100.97	3.08%	135.0	135.0	135.0	4.2	
26	22-May-12	4.000%	22-Dec-51	56.3	0.3	56.0	99.51	4.02%	56.3	56.3	56.3	2.3	
27	31-Jul-12	3.790%	31-Jul-62	22.5	0.1	22.4	99.47	3.81%	22.5	22.5	22.5	0.9	
28	16-Aug-12	3.790%	31-Jul-62	94.0	0.8	93.2	99.20	3.83%	94.0	94.0	94.0	3.6	
29	9-Oct-13	4.590%	9-Oct-43	195.8	1.1	194.6	99.42	4.63%	195.8	195.8	195.8	9.1	
30	9-Oct-13	2.780%	9-Oct-18	337.5	1.4	336.1	99.59	2.87%	337.5	337.5	337.5	9.7	
31	29-Jan-14	4.290%	29-Jan-64	20.0	0.1	19.9	99.44	4.32%	20.0	20.0	20.0	0.9	
32	6-Jun-14	4.170%	6-Jun-44	132.0	0.8	131.2	99.40	4.21%	132.0	132.0	132.0	5.6	
33	24-Feb-16	3.910%	23-Feb-46	175.0	1.1	173.9	99.36	3.95%	0.0	175.0	148.1	5.8	
34	24-Feb-16	2.770%	24-Feb-26	245.0	1.1	243.9	99.56	2.82%	0.0	245.0	207.3	5.8	
35	24-Feb-16	1.840%	24-Feb-21	250.0	0.9	249.1	99.63	1.92%	0.0	250.0	211.5	4.1	
36	18-Nov-16	3.720%	18-Nov-47	180.0	0.9	179.1	99.50	3.75%	0.0	160.0	27.7	1.0	
37	<b>Subtotal</b>								3049.9	3699.9	3506.1	158.2	
38	Treasury OM&A costs											1.1	
39	Other financing-related fees											3.0	
40	<b>Total</b>								3049.9	3699.9	3506.1	162.3	4.63%

Witness: Samir Chhelavda

**HYDRO ONE NETWORKS INC.**  
**DISTRIBUTION**  
**Cost of Long-Term Debt Capital**  
Bridge Year (2017)  
Year ending December 31

Line No.	Offering Date	Coupon Rate	Maturity Date	Principal Amount Offered (\$Millions)	Premium Discount and Expenses (\$Millions)	Net Capital Employed		Effective Cost Rate	Total Amount Outstanding		Avg. Monthly Averages (\$Millions)	Carrying Cost (\$Millions)	Projected Average Embedded Cost Rates (m)
						Total Amount (\$Millions)	Per \$100 Principal Amount (Dollars)		at 12/31/2016 (\$Millions)	at 12/31/2017 (\$Millions)			
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	
1	3-Jun-00	7.350%	3-Jun-30	121.6	2.0	119.6	98.37	7.49%	121.6	121.6	121.6	9.1	
2	22-Jun-01	6.930%	1-Jun-32	47.7	0.6	47.1	98.78	7.03%	47.7	47.7	47.7	3.4	
3	17-Sep-02	6.930%	1-Jun-32	142.0	(5.1)	147.1	103.57	6.65%	142.0	142.0	142.0	9.4	
4	31-Jan-03	6.350%	31-Jan-34	74.0	0.6	73.4	99.21	6.41%	74.0	74.0	74.0	4.7	
5	22-Apr-03	6.590%	22-Apr-43	105.0	0.8	104.2	99.26	6.64%	105.0	105.0	105.0	7.0	
6	25-Jun-04	6.350%	31-Jan-34	48.0	(0.1)	48.1	100.22	6.33%	48.0	48.0	48.0	3.0	
7	20-Aug-04	6.590%	22-Apr-43	26.0	(2.1)	28.1	107.89	6.06%	26.0	26.0	26.0	1.6	
8	24-Aug-04	6.350%	31-Jan-34	26.0	(0.9)	26.9	103.48	6.09%	26.0	26.0	26.0	1.6	
9	19-May-05	5.360%	20-May-36	98.1	3.7	94.4	96.19	5.62%	98.1	98.1	98.1	5.5	
10	24-Apr-06	5.360%	20-May-36	62.5	0.8	61.7	98.68	5.45%	62.5	62.5	62.5	3.4	
11	19-Oct-06	5.000%	19-Oct-46	45.0	0.3	44.7	99.29	5.04%	45.0	45.0	45.0	2.3	
12	13-Mar-07	4.890%	13-Mar-37	160.0	0.9	159.1	99.45	4.93%	160.0	160.0	160.0	7.9	
13	18-Oct-07	5.180%	18-Oct-17	75.0	0.3	74.7	99.63	5.23%	75.0	0.0	57.7	3.0	
14	3-Mar-08	5.180%	18-Oct-17	120.0	(2.1)	122.1	101.73	4.95%	120.0	0.0	92.3	4.6	
15	3-Mar-09	6.030%	3-Mar-39	105.0	0.6	104.4	99.41	6.07%	105.0	105.0	105.0	6.4	
16	16-Jul-09	5.490%	16-Jul-40	90.0	0.6	89.4	99.36	5.53%	90.0	90.0	90.0	5.0	
17	15-Mar-10	5.490%	24-Jul-40	80.0	(0.5)	80.5	100.58	5.45%	80.0	80.0	80.0	4.4	
18	15-Mar-10	4.400%	4-Jun-20	120.0	0.5	119.5	99.55	4.46%	120.0	120.0	120.0	5.3	
19	13-Sep-10	5.000%	19-Oct-46	100.0	(0.2)	100.2	100.25	4.98%	100.0	100.0	100.0	5.0	
20	26-Sep-11	4.390%	26-Sep-41	75.0	0.5	74.5	99.35	4.43%	75.0	75.0	75.0	3.3	
21	22-Dec-11	4.000%	22-Dec-51	30.0	0.2	29.8	99.47	4.03%	30.0	30.0	30.0	1.2	
22	13-Jan-12	3.200%	13-Jan-22	126.0	0.7	125.3	99.47	3.26%	126.0	126.0	126.0	4.1	
23	22-May-12	3.200%	13-Jan-22	135.0	(1.3)	136.3	100.97	3.08%	135.0	135.0	135.0	4.2	
24	22-May-12	4.000%	22-Dec-51	56.3	0.3	56.0	99.51	4.02%	56.3	56.3	56.3	2.3	
25	31-Jul-12	3.790%	31-Jul-62	22.5	0.1	22.4	99.47	3.81%	22.5	22.5	22.5	0.9	
26	16-Aug-12	3.790%	31-Jul-62	94.0	0.8	93.2	99.20	3.83%	94.0	94.0	94.0	3.6	
27	9-Oct-13	4.590%	9-Oct-43	195.8	1.1	194.6	99.42	4.63%	195.8	195.8	195.8	9.1	
28	9-Oct-13	2.780%	9-Oct-18	337.5	1.4	336.1	99.59	2.87%	337.5	337.5	337.5	9.7	
29	29-Jan-14	4.310%	29-Jan-64	20.0	0.1	19.9	99.44	4.34%	20.0	20.0	20.0	0.9	
30	6-Jun-14	4.170%	6-Jun-44	132.0	0.8	131.2	99.40	4.21%	132.0	132.0	132.0	5.6	
31	24-Feb-16	3.910%	24-Feb-46	175.0	1.1	173.9	99.36	3.95%	175.0	175.0	175.0	6.9	
32	24-Feb-16	2.770%	24-Feb-26	245.0	1.1	243.9	99.56	2.82%	245.0	245.0	245.0	6.9	
33	24-Feb-16	1.840%	24-Feb-21	250.0	0.9	249.1	99.63	1.92%	250.0	250.0	250.0	4.8	
34	18-Nov-16	3.720%	18-Nov-47	180.0	0.9	179.1	99.50	3.75%	180.0	180.0	180.0	6.7	
35	15-Mar-17	3.670%	15-Mar-47	157.3	0.8	156.6	99.50	3.70%	0.0	157.3	121.0	4.5	
36	15-Jun-17	2.606%	15-Jun-27	78.7	0.4	78.3	99.50	2.66%	0.0	78.7	42.4	1.1	
37	15-Jun-17	3.670%	15-Jun-47	78.7	0.4	78.3	99.50	3.70%	0.0	78.7	42.4	1.6	
38	15-Sep-17	2.606%	15-Sep-27	157.3	0.8	156.6	99.50	2.66%	0.0	157.3	48.4	1.3	
39	<b>Subtotal</b>								3719.9	3996.9	3929.1	171.0	
40	Treasury OM&A costs											1.1	
41	Other financing-related fees											2.8	
42	<b>Total</b>								<b>3719.9</b>	<b>3996.9</b>	<b>3929.1</b>	<b>175.0</b>	<b>4.45%</b>

Witness: Samir Chhelavda

Witness: Samir Chhelavda



HYDRO ONE NETWORKS INC.  
DISTRIBUTION  
Cost of Long-Term Debt Capital  
Test Year (2018)  
Year ending December 31

Line No.	Offering Date	Coupon Rate	Maturity Date	Principal Amount Offered (\$Millions)	Premium Discount and Expenses (\$Millions)	Net Capital Employed		Effective Cost Rate	Total Amount Outstanding		Avg. Monthly Averages (\$Millions)	Carrying Cost (\$Millions)	Projected Average Embedded Cost Rates
						Total Amount (\$Millions)	Per \$100 Principal Amount (Dollars)		at 12/31/2017 (\$Millions)	at 12/31/2018 (\$Millions)			
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
1	3-Jun-00	7.350%	3-Jun-30	121.6	2.0	119.6	98.37	7.49%	121.6	121.6	121.6	9.1	
2	22-Jun-01	6.930%	1-Jun-32	47.7	0.6	47.1	98.78	7.03%	47.7	47.7	47.7	3.4	
3	17-Sep-02	6.930%	1-Jun-32	142.0	(5.1)	147.1	103.57	6.65%	142.0	142.0	142.0	9.4	
4	31-Jan-03	6.350%	31-Jan-34	74.0	0.6	73.4	99.21	6.41%	74.0	74.0	74.0	4.7	
5	22-Apr-03	6.590%	22-Apr-43	105.0	0.8	104.2	99.26	6.64%	105.0	105.0	105.0	7.0	
6	25-Jun-04	6.350%	31-Jan-34	48.0	(0.1)	48.1	100.22	6.33%	48.0	48.0	48.0	3.0	
7	20-Aug-04	6.590%	22-Apr-43	26.0	(2.1)	28.1	107.89	6.06%	26.0	26.0	26.0	1.6	
8	24-Aug-04	6.350%	31-Jan-34	26.0	(0.9)	26.9	103.48	6.09%	26.0	26.0	26.0	1.6	
9	19-May-05	5.360%	20-May-36	98.1	3.7	94.4	96.19	5.62%	98.1	98.1	98.1	5.5	
10	24-Apr-06	5.360%	20-May-36	62.5	0.8	61.7	98.68	5.45%	62.5	62.5	62.5	3.4	
11	19-Oct-06	5.000%	19-Oct-46	45.0	0.3	44.7	99.29	5.04%	45.0	45.0	45.0	2.3	
12	13-Mar-07	4.890%	13-Mar-37	160.0	0.9	159.1	99.45	4.93%	160.0	160.0	160.0	7.9	
13	3-Mar-09	6.030%	3-Mar-39	105.0	0.6	104.4	99.41	6.07%	105.0	105.0	105.0	6.4	
14	16-Jul-09	5.490%	16-Jul-40	90.0	0.6	89.4	99.36	5.53%	90.0	90.0	90.0	5.0	
15	15-Mar-10	5.490%	24-Jul-40	80.0	(0.5)	80.5	100.58	5.45%	80.0	80.0	80.0	4.4	
16	15-Mar-10	4.400%	4-Jun-20	120.0	0.5	119.5	99.55	4.46%	120.0	120.0	120.0	5.3	
17	13-Sep-10	5.000%	19-Oct-46	100.0	(0.2)	100.2	100.25	4.98%	100.0	100.0	100.0	5.0	
18	26-Sep-11	4.390%	26-Sep-41	75.0	0.5	74.5	99.35	4.43%	75.0	75.0	75.0	3.3	
19	22-Dec-11	4.000%	22-Dec-51	30.0	0.2	29.8	99.47	4.03%	30.0	30.0	30.0	1.2	
20	13-Jan-12	3.200%	13-Jan-22	126.0	0.7	125.3	99.47	3.26%	126.0	126.0	126.0	4.1	
21	22-May-12	3.200%	13-Jan-22	135.0	(1.3)	136.3	100.97	3.08%	135.0	135.0	135.0	4.2	
22	22-May-12	4.000%	22-Dec-51	56.3	0.3	56.0	99.51	4.02%	56.3	56.3	56.3	2.3	
23	31-Jul-12	3.790%	31-Jul-62	22.5	0.1	22.4	99.47	3.81%	22.5	22.5	22.5	0.9	
24	16-Aug-12	3.790%	31-Jul-62	94.0	0.8	93.2	99.20	3.83%	94.0	94.0	94.0	3.6	
25	9-Oct-13	4.590%	9-Oct-43	195.8	1.1	194.6	99.42	4.63%	195.8	195.8	195.8	9.1	
26	9-Oct-13	2.780%	9-Oct-18	337.5	1.4	336.1	99.59	2.87%	337.5	0.0	259.6	7.4	
27	29-Jan-14	4.310%	29-Jan-64	20.0	0.1	19.9	99.44	4.34%	20.0	20.0	20.0	0.9	
28	6-Jun-14	4.170%	3-Jun-44	132.0	0.8	131.2	99.40	4.21%	132.0	132.0	132.0	5.6	
29	24-Feb-16	3.910%	24-Feb-46	175.0	1.1	173.9	99.36	3.95%	175.0	175.0	175.0	6.9	
30	24-Feb-16	2.770%	24-Feb-26	245.0	1.1	243.9	99.56	2.82%	245.0	245.0	245.0	6.9	
31	24-Feb-16	1.840%	24-Feb-21	250.0	0.9	249.1	99.63	1.92%	250.0	250.0	250.0	4.8	
32	18-Nov-16	3.720%	18-Nov-47	180.0	0.9	179.1	99.50	3.75%	180.0	180.0	180.0	6.7	
33	15-Mar-17	3.670%	15-Mar-47	157.3	0.8	156.6	99.50	3.70%	157.3	157.3	157.3	5.8	
34	15-Jun-17	2.606%	15-Jun-27	78.7	0.4	78.3	99.50	2.66%	78.7	78.7	78.7	2.1	
35	15-Jun-17	3.670%	15-Jun-47	78.7	0.4	78.3	99.50	3.70%	78.7	78.7	78.7	2.9	
36	15-Sep-17	2.606%	15-Sep-27	157.3	0.8	156.6	99.50	2.66%	157.3	157.3	157.3	4.2	
37	15-Mar-18	4.370%	15-Mar-48	202.6	1.0	201.6	99.50	4.40%	0.0	202.6	155.9	6.9	
38	15-Jun-18	3.306%	15-Jun-28	202.6	1.0	201.6	99.50	3.37%	0.0	202.6	109.1	3.7	
39	15-Sep-18	2.545%	15-Sep-23	202.6	1.0	201.6	99.50	2.65%	0.0	202.6	62.3	1.7	
40	<b>Subtotal</b>								3996.9	4267.3	4246.3	179.9	
41	Treasury OM&A costs											1.1	
42	Other financing-related fees											2.8	
43	<b>Total</b>								<u>3996.9</u>	<u>4267.3</u>	<u>4246.3</u>	<u>183.8</u>	<u>4.3%</u>