OEB Wireline Pole Attachment Rates and Policy Framework

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Ontario Energy Board (OEB)

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Executive Summary

This report has been prepared for the Ontario Energy Board (OEB or Board), to establish a pole attachment rate framework for the Province of Ontario. The main objective of this report is to address the technical and policy issues associated with determining the rate for pole attachments by third parties to the wireline poles owned and operated by the Local Electricity Distribution Companies (LDCs) in the province.

In March 2005, the OEB established the pole attachment rate at $22.35 per year per pole attachment. Since then, the rate has not been updated. Recently (2014-15), however, as part of applications for electricity distribution rate approvals, three of the major LDCs in the province requested and were granted approval for a significant increase in the pole attachment rate, including Toronto Hydro ($42.00), Hydro One ($41.28), and Hydro Ottawa ($53.00). The third party attachers, such as telecom carriers, filed interventions and raised several issues associated with the cost estimation and rate calculation methodology. Given the significant differences in the position of LDCs versus carriers on those different issues, the OEB initiated the policy review process. Accordingly, in its November 5, 2015 letter the OEB invited different stakeholders to participate in a Pole Attachment Working Group (PAWG) as part of a consultation process. Based on the nominations received, the OEB formed the PAWG, which comprises representatives from three different types of stakeholder groups: LDCs, carriers, and rate payers. In May 2016, Nordicity was contracted to facilitate the PAWG process, which included facilitation of four PAWG meetings, and develop an expert report.

In the first PAWG meeting, held on May 20, 2015, Nordicity presented an overarching "pole attachment rate framework", which comprised the following three key elements:

- Costing approach (methodology)
- Cost Allocation methodology
- Rate Calculation Methodology

Nordicity has proposed a rate calculation framework, and the rates based on this framework are presented in Section 4. In terms of developing this framework, data was collected from LDCs during the PAWG process. Based on the data received from LDCs, detailed analysis was presented for discussion and feedback in the three PAWG meetings held on July 27, 2016, November 20, 2016 and January 31, 2017.

Based on the final analysis, a pole attachment rate of $42.19 per attacher was calculated using the OEB's current equal-sharing methodology to allocate indirect costs. This rate represents an increase of 88.8% from the $22.35 rate determined in the 2005 OEB Decision. This increase is due to the following two reasons:

- Increase in cost per pole including (a) 15.8% increase in the indirect cost per pole from $93.31 (2005) to $108.06, and (b) increase in direct (administration) cost from $0.69 (2005) to $3.63.
- Decrease in average number of telecom attachers per pole from 2.5 (2005) to current average of 1.3.

It is worth noting that the calculation of the new $42.19 rate is based on the most comprehensive data

and analysis of pole-related costs and specifications to date, covering a 10-year period (2005-15). The analysis encompasses all major LDCs that represent over 95% of the pole population in the province.

If Nordicity's proposed equal-sharing approach were used, this would result in an updated pole attachment rate of $38.70 per telecom attacher, instead of $42.19. This report provides a detailed rationale for use of the equal sharing methodology (both the OEB's current approach and Nordicity's proposed approach) instead of the other commonly-used approach of proportionate use.

The report provides recommendations for improving LDCs' reporting process. Nordicity believes that the improved process will facilitate automatic updates to the pole attachment rate model based on LDCs' annual general submissions to the OEB.

1 Introduction

This report attempts to address the technical and policy issues associated with determining the charges for "***pole attachments***" by third parties to the wireline poles owned and operated by LDCs (also referred to as "utilities") in the Province of Ontario. For this report, the term "***utilities***" refers to the entities such as LDCs and ILECs – Incumbent Local Exchange Carriers, which own and control poles and associated rights-of-way used, in whole or in part, for any wire communications. Accordingly, the term "attachment" (referred to as "pole attachment") typically means any attachment by a cable television or telecommunications service provider to a utility pole. Figure 1 below illustrates structure of a typical joint use utility pole used by two or more entities (referred to as "**attachers**").

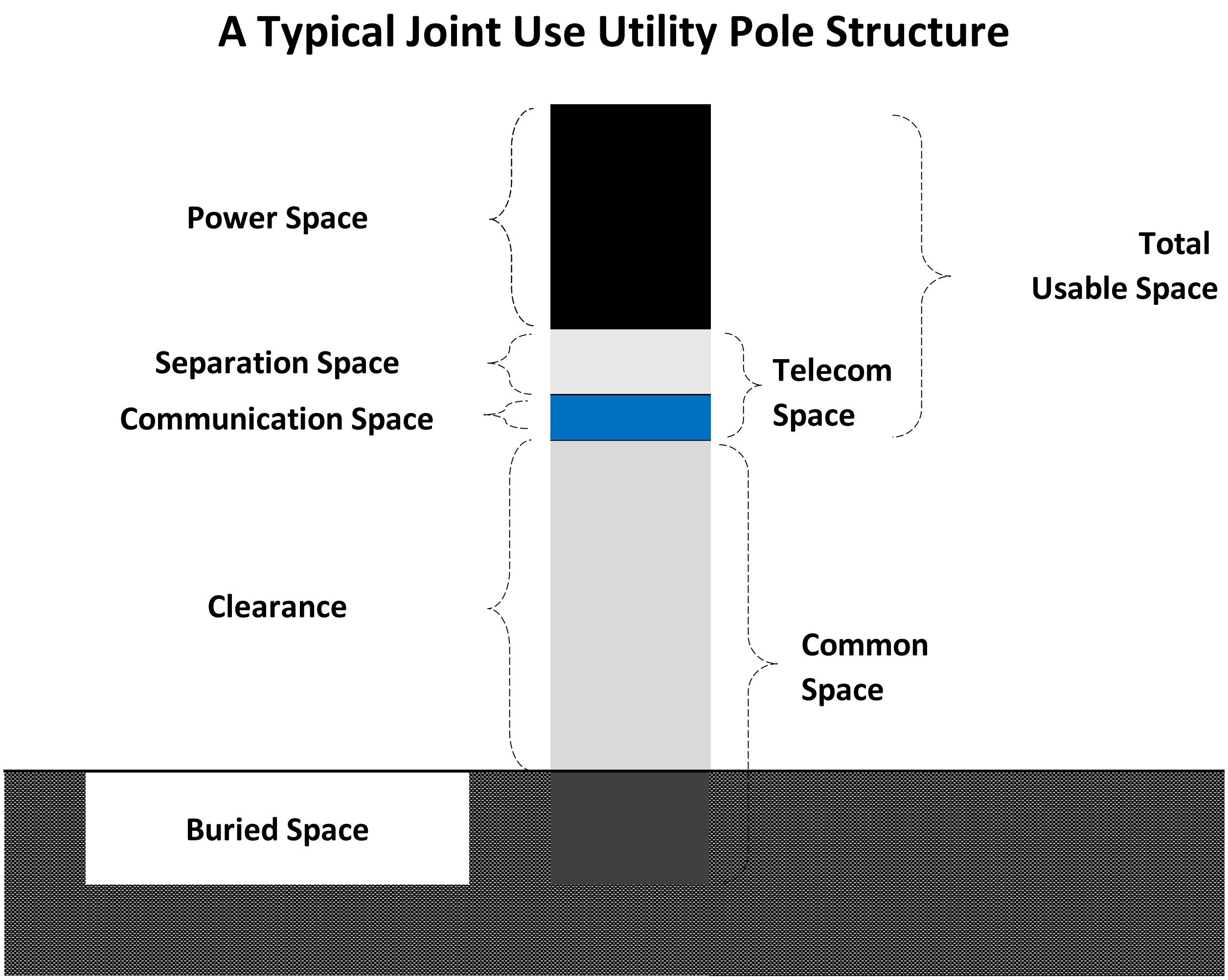

Figure 1: A Typical Joint-Use Utility Pole

A utility pole that is used by two or more attachers is referred to as a ***joint-use pole***. A typical joint-use pole supports three types of attachers: electric power, cable television, and telephone. Some joint-poles also support other attachers such as municipalities for street lights and traffic signals. The pole space allocated to cable television and telecommunications service providers is referred to as "communication space". In order for the utility (power attacher) and service providers (communications attachers) to share the space, the joint-use pole is required to meet the Electrical Distribution Safety requirement of *Ontario Regulation 22/04*. This includes provision for separation space between the communication attachers and power attachers. The existence of joint-use poles infrastructure was prompted by the broad socio-economic policy objectives of: (a) avoiding duplication of pole infrastructure to preserve the physical appearance and aesthetic value of communities; and (b) reducing the cost of service to consumers of both types of attachers. This implies that, to serve their customers, communication attachers are dependent on the poles owned and controlled by utilities. Moreover, utilities are mandated to deploy and maintain joint-use pole infrastructure according to required standards. Pole attachments are regulated by the energy boards to ensure (a) communication attachers have access to the utility poles, and (b) utilities recover the cost of poles, based on "**just and reasonable"** rates. Accordingly, this report provides a framework to determine pole attachment rates on a "just and reasonable" basis.

This report comprises eleven sections:

Section 1 is an introduction which first provides description of the "just and reasonable" principle, followed by a detailed background on the developments in pole attachment rates since the OEB's 2005 Decision on pole attachment rates in Ontario. This section also outlines the consultative process followed to complete this report, including the formation of a PAWG (Pole Attachment Working Group) Committee.

Section 2 outlines key objectives of this study report including explanation of why a policy framework is required, followed by detailed analysis of the OEB's 2005 Decision.

Section 3 provides a detailed analysis of wireline pole infrastructure in Ontario, including the overall pole population, key trends in the past 10 years, and a description of standard pole specifications for attachment rate calculations.

Section 4 discusses in detail the key elements of a policy framework for determining pole attachment rates;

Sections 5, 6, and 7 provide detailed discussions and analysis on different cost elements associated with poles, leading to the determination of the average cost per pole;

Section 8 details the pole attachment rate model;

Section 9 provides a discussion and analysis of the issue of "overlashing";

Section 10 presents the proposed rate calculation framework; and finally,

Section 11 contains the conclusions and key recommendations of the report.

1.1 *"Just and Reasonable"* Rate Principle

Section 78(3) of the *Ontario Energy Board Act* (OEBA) mandates the OEB to approve or fix "just and reasonable" rates for transmitting or distributing electricity. The principle of "just and reasonable" rates originates in the U.S. Supreme Court case: *Federal Power Commission et al v. Hope Natural Gas Co. ("Hope"), 320 U.S. 591, 603 (1944)*. In this case, the U.S. Supreme Court noted, "*Under the statutory standard of 'just and reasonable', it is the result reached, not the method employed, which is* *controlling….It is not theory, but the impact of the rate order, which counts*."

Drawing on the "*Hope*" case it can be argued that the principle entails consideration of two key elements of rate design:

- Recovery of cost: The rate should allow enough revenue not only to cover the operating cost of the utility but also yield a return for the capital cost of the utility[1]. That is, the return should be sufficient to assure confidence in the financial integrity of the utility so as to maintain its credit and to attract capital.[2]
- Rate payers' welfare: To protect the welfare of rate payers, the rate should allow the recovery of 'prudently incurrent costs'. That is, the rate must draw a balance between wealth and welfare. In this sense 'prudently incurred costs' should be interpreted as: *"the original cost minus any fraudulent, unwise, or extravagant expenditures that should not be a burden on the public."*[3]

In the context OEB's mandate to approve or fix "just and reasonable" rates requires a balancing of consumer and utility interests.[4]

1.2 Background

In March 2005, the OEB established a pole attachment rate of $22.35 per year per pole attacher. Since then, the rate has not been updated. In 2014, Toronto Hydro's application to increase its pole attachment rate led to OEB approval of an increase to $42 per year per pole attachment. Subsequently, in 2015 Hydro One (EB-2015-141), and Hydro Ottawa (EB-2015-004) also applied to increase their respective rates from the standard rate of $22.35 per year per pole attachment. The OEB approved rate increases to $41.28 for Hydro One and $53.00 for Hydro Ottawa.

On November 5, 2015 (EB-2015-0304), the OEB announced its initiative to undertake a generic policy review of electricity distributors' miscellaneous rates and charges[5]. As per the OEB's 2011 Accounting Procedures Handbook, the miscellaneous service charges (USoA # 4235) include the following items:

i) Fees for changing, connecting or disconnecting service, including reconnection charges and change of occupancy fees

[1] Capital carrying cost or cost of capital rate set by the OEB to determine regulated tariffs is an example of such rate of return

[2] See FPC v. Hope Nat. Gas Co. 320 U.S. 591 (1944)

[3] See C. Phillips, Jr., "The Regulation of Public Utilities 4 (1985).", as referenced by Sean P. Madden (1989), *Taking Clause Analysis of Utility Ratemaking Decisions: Measuring Hope's Investor Interest Factor*, Fordham Law Review, 58(3) Article 4, p. 427

[4] See http://www.ontarioenergyboard.ca/oeb/_Documents/Documents/Energy_Sector_Regulation-Overview.pdf

[5] During the oral hearing phase of Hydro Ottawa's application for electricity distribution rates for the period from January 1, 2016 to December 31, 2020, the OEB also informed parties that it plans to undertake a generic policy review of electricity distributors' miscellaneous rates and charges (the Policy Review) – see OEB's Decision and Rate Order: EB-2015-0004, Hydro Ottawa Limited, February 25, 2016, p.2.

ii) Profit on maintenance of appliances, wiring, piping or other distribution related installations on customers' premises

iii) Net credit or debit (cost less net salvage and less payment from customers) on closing of work orders for plant installed for temporary service of less than one year

iv) Recovery of expenses in connection with current diversion cases (billing for the electricity consumed shall be included in the appropriate electric revenue account)

v) Dispute meter test charges

vi) Account history research charges

vii) Disconnect of electricity service

viii) Reconnection of electricity

ix) Dispute involvement charge

x) Temporary electricity service

xi) Account setup charge

xii) Return cheque charge

xiii) Other specific service charges as approved by the Board

Given the many different categories of miscellaneous rates and charges as listed above, the OEB is conducting the review in different phases. The first phase covers specific charges, item # xiii) above. As per the OEB's 2006 Electricity Distribution Rate Handbook, Specific Service Charges include the following six categories:

a) Customer Administration Charges

b) Non-Payment of Account Charges

c) Service Call Charges

d) Temporary Electricity Service Charges

e) Specific Charge for Access to the Power Poles of a Distributor

f) Other Services and Charges

Due to significant differences among stakeholders (i.e. telecom carriers, LDCs, and rate payer groups), the OEB separated the review of item e) above (referred to as wireline pole attachment charges) from the other specific service charges. Accordingly, in its November 5, 2015 letter the OEB invited different stakeholders to express their interest in participating in a Pole Attachment Working Group (PAWG) .

In response to the OEB's invitation, the following organizations, categorized into three stakeholder groups: ***LDCs*, *Carriers***, and ***Rate Payer Groups***, submitted their nominations for participation in the PAWG process as summarized in Table 1 below:

Table 1: Stakeholder Composition of the Pole Attachment Working Group (PAWG)

LDCs and Associations	Carriers	Rate Payer Groups
1) Horizon Utilities 2) Electricity Distributors Association 3) Burlington Hydro 4) Cornerstone Hydro Electric Concepts Association Inc 5) Hydro Ottawa 6) Toronto Hydro 7) Hydro One Networks 8) Enersource 9) London Hydro	1) Bragg Communications Inc. 2) Canadian Cable Systems Alliance 3) Cogeco Cable Canada LP 4) Independent Telecommunications Providers Association 5) Allstream Inc. 6) Niagara Regional Broadband Network 7) Packet-tel Corp. (o/a Packetworks) 8) Québecor Média Inc. 9) Rogers Communications Partnership 10) Shaw Communications Inc. 11) Tbaytel 12) TELUS Communications Company 13) BH Telecom	1) Energy Probe Research Foundation 2) Vulnerable Energy Consumers Coalition (VECC) 3) School Energy Coalition 4) Building Owners and Managers Association, Toronto 5) London Property Management Association

After review of all nominations, the OEB selected nine organizations to participate in the PAWG in order to keep the size of the group more conducive to discussion. Accordingly, the PAWG was formed with the parties summarized in Table 2 below.

To facilitate the PAWG process, in March 2016 the OEB issued a Request for Proposal (RFP) for expert consultancy services for the policy review of wireline pole attachment charges, with the following main objectives:

A. Assess a number of technical issues and details related to pole attachments;

B. Review of the current methodology for setting wireline rates for pole attachments in the province of Ontario;

C. Determine how to treat and allocate any revenues that wireline carriers may receive from third parties with respect to wireline pole attachments; and

D. Determine the appropriate treatment and allocation of other costs (e.g. vegetation removal).

Table 2: Nominations Submitted for the Pole Attachment Working Group (PAWG)

Organization	Primary Representative(s)
LDCs and Associations	
1) Hydro One Networks Inc.	John Boldt
2) CHEC - Cornerstone Hydro Electric Concepts Association Inc. Representing a group of fifteen (15) distributors: • Centre Wellington Hydro • InnPower Corporation • Orangeville Hydro • Rideau St. Lawrence Distribution • Wellington North Power • COLLUS PowerStream • Lakefront Utilities • Midland Power Utility • Lakeland Power • Wasaga Distribution • Orillia Power • Renfrew Hydro • Ottawa River Power • Niagara-on-the-Lake Hydro • West Coast Huron Energy	Roy Rogers (Midland Power)
3) Hydro Ottawa Limited	Casey Malone
4) London Hydro	Jagoda Borovickic
5) Horizon Utilities	David Haddock
6) Canadian Electricity Association	Arjun Devdas (Toronto Hydro)
Rate Payers Groups	
7) School Energy Coalition	Mark Rubenstein
8) Vulnerable Energy Consumers Coalition	William Harper
Carrier Companies	
9) BH Telecom	Kris Eby
10) The Carriers Representing a group of twelve (12) distributors: • Bragg Communications Inc. • Canadian Cable Systems Alliance Inc. • Cogeco Cable Canada LP • Independent Telecommunications Providers Association • Allstream Inc. • Niagara Regional Broadband Network • Packet-tel Corp. (o/a Packetworks) • Québecor Média Inc. • Rogers Communications Partnership • Shaw Communications Inc. • Tbaytel • TELUS Communications Company	Michael Piaskoski (Rogers) Tim Brown (Cogeco) David Willkie (Tbaytel)

In response to the RFP, Nordicity submitted its proposal and was selected to deliver the following two specific tasks:

Task 1: Facilitate four (4) Pole Attachment Working Group meetings along with OEB staff. Nordicity's role was to provide expert input and analysis of the key issues for discussion, and feedback of the group members.

Task 2: Produce an expert report, including at least the following items:

a) A detailed description on what wireline pole attachments are, including what makes up the charge and what kinds of attachments are considered wireline pole attachments;

b) Review of current methodologies used by Ontario distributors that have applied to the OEB for an increase in the wireline pole attachments charge (Toronto Hydro, Hydro One, Hydro Ottawa);

c) Identify and discuss any technical issues that should be taken into consideration in determining the wireline pole attachment charge;

d) In addition to distributors and carrier companies, a detailed description of what other parties have access to the poles and any related conditions to access;

e) A discussion and findings related to the treatment and allocation of various wireline costs (including, at a minimum, vegetation removal costs etc.)

f) A discussion and findings with respect to whether differences between distributors or regions would affect the setting of a province-wide wireline pole attachment charge;

g) A discussion and findings related to the direct and indirect cost used in calculating the wireline pole attachment charge, including, at a minimum, analysis related to the use of historical or forecasted costs;

h) Analysis and finding related to the appropriate treatment of any revenues that wireline carriers may receive from third parties;

i) Development of an appropriate methodology for setting wireline pole attachment charges by all electricity distributors;

j) Analysis related to parties wishing to use electricity distributor poles, including, at a minimum, the appropriate number of attachers, and the standard wireline attachment charge related to the number of attachers; and

k) Inclusion of any other issues to the objectives and scope of the project.

1.3 PAWG Meetings

As part of the PAWG process, four meetings of the participating members were held at the OEB's offices in Toronto, jointly facilitated by the Nordicity team and OEB staff. The meetings were held on the following dates:

a) PAWG Meeting # 1: May 20, 2016

b) PAWG Meeting # 2: July 27, 2016

c) PAWG Meeting # 3: November 24, 2016

d) PAWG Meeting # 4: January 31, 2017

Detailed minutes of each meeting were recorded and circulated among members for their review, comment, and sign off. The final minutes of the four meetings are available on the OEB website[6].

In the 1st PAWG meeting, the following key elements of the consultation process were discussed and agreed upon:

- Objectives of the process, which were to (a) develop a pole attachment rate model that is "just and reasonable" and based on best practice principles; and (b) clarify the OEB's mandate with reference to the outcome of this consultation process;
- A Typical Pole Structure, with pole height, power space, telecom space, separation space between power and telecom space, clearance space, buried space identified;
- Key Elements of the Pole Attachment Rate Model (Regulatory Framework; Costing Approaches; Allocation Methodologies; and Rate Methodologies; and,
- Relevant decisions: OEB (2015 and 2016; NBEUB-New Brunswick Energy and Utility Board (2016); and; CRTC (2010).

As an outcome of the roundtable discussion, the members agreed on the following four action items:

a) Utilities were to provide the following data: specifications of poles in use, distribution of total pole population, volume of attachments, and item-wise breakdown of cost base;

b) Nordicity was to develop a data template for utilities to populate;

c) Participants (PAWG members) could submit additional written comments on their positions on the key issues before the next meeting; and,

d) Nordicity was to present further literature review on best practices in the next meeting.

[6] See https://www.oeb.ca/industry/policy-initiatives-and-consultations/review-miscellaneous-rates-and-charges.

As per item a) above, Nordicity prepared a data collection template that was issued to LDCs in the first week of June 2016 and LDCs were requested to submit their response by June 30, 2016. Based on the data submitted by LDCs, Nordicity presented analysis at the 2nd PAWG meeting on July 27, 2016.

At the 2nd PAWG meeting, a round table discussion was also held to discuss the key issues identified in the 1st PAWG meeting and additional detailed issues submitted by Rogers. These items are summarized in Appendix A. Based on the detailed discussion of the issues, the PAWG members agreed that Nordicity would issue an additional data request template in order to allow further and more detailed analysis of the issues raised.

Accordingly, a second data request was issued to LDCs on September 13, 2016, and LDCs submitted their responses by September 30, 2016.

At the 3rd PAWG meeting on November 24, 2016, Nordicity presented detailed analysis based on the additional data received from LDCs. At that meeting, participants mainly focused on the critical issues associated with the following four key areas of the rate calculation:

- Embedded cost
- Maintenance cost
- Direct costs
- Average number of attachers

With respect to the above items, various issues were raised and discussed at length among the participants. For each issue, the participants stated their positions and their lines of reasoning, which were included in the summary attached to the 3rd PAWG minutes of meeting.

At the 4th PAWG meeting, the participants presented their positions on the key issues based on the final analysis of issues presented by OEB staff as well as Nordicity. Based on the discussion, OEB staff and Nordicity prepared a description of key issues critical to pole attachment rate calculation that required final input from the PAWG members. The issues were grouped in the following three categories:

- Cost allocation methodology
- Costing inputs
- Rate calculation methodology

As a follow up to the 4th PAWG meeting, OEB staff issued a questionnaire to PAWG members on February 16, 2017 in order to obtain their final comments on each identified issue. The members were requested to submit a single response for their respective groups: “carrier”, “LDC”, and “rate payers” in the specified format (1000 characters) by March 3, 2017. The three responses received are available at OEB website[7].

[7] see https://www.oeb.ca/industry/policy-initiatives-and-consultations/review-miscellaneous-rates-and-charges

1.4 Understanding the Current Standard Pole Attachment Rate of $22.35 per Pole Attacher

As stated above, in its March 7, 2005 OEB Decision and Order (RP-2003-0249) (2005 OEB Decision), the OEB established a province-wide rate of $22.35 per pole per year. This decision concluded a proceeding triggered by an application of the Canadian Cable Television Association "CCTA" to the OEB.

Historically, CCTA members had rented space on utilities' poles at negotiated rates under a private contract. That contract expired in 1996. After the expiry of the contract, the two parties - CCTA and the Electricity Distribution Association (EDA) - failed to renew or reach further agreement with respect to the pole attachment rates. In this regard, the OEB noted:

"*In the past, the CCTA members have rented space on the utilities' poles under private contract. That contract came to an end in 1996. Since then, the parties have been unable to reach further agreement with respect to rates".*[8]

In early 1997 the CCTA first applied to the Canadian Radio-television and Telecommunications Commission (CRTC) for access by cable companies to the poles of the Ontario electricity distributors[9]. After a lengthy proceeding, the CRTC in its September 28th, 1999 Decision ("*Telecom Decision CRTC 99-13*") determined an annual pole charge of $15.89, as detailed in Table 3 below.

However, in response to an appeal by the Ontario Municipal Electric Association (MEA), the Federal Court of Appeal in 2001 held that the CRTC did not have statutory authority under the *Telecommunications Act* to regulate access by cable operators and telecommunications carriers to power poles[10]. In 2003, the Supreme Court of Canada upheld the decision of the Federal Court of Appeals. As a result, on December 16, 2003 the CCTA filed an application with the Board to set the pole attachment rate.

In its 2005 application, the CCTA proposed a rate of $15.65 per pole per year. This proposed rate was based on a common cost allocation rate of 15.5% - as determined by the CRTC - compared to 21.9%, as later determined by the OEB. The "common cost" refers to costs associated with the pole space that is not used by attachers (whether power, or telecom) for their attachments but required to meet the requirements of public safety standards and by-laws.

As shown in Figure 6 below, the examples of such space include "buried space" and "clearance space". Both buried and clearance space constitute almost two-third of the pole height. Accordingly, the majority of pole costs are attributable to the common space. This raises the issue of how to allocate the common cost among different types of attachers, such as power and telecom service providers. As discussed later in the report, different methodologies can be applied to allocate the common costs, with proportionate use and equal sharing constituting the principal methodologies considered by economists in the literature, and applied by regulatory authorities.

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[8] March 7, OEB 2005 Order (p.1).

[9] The CRTC established the rate of $15.89 per year per attachment (CRTC 99-13).

[10] Barrie Public Utilities v. Canadian Cable Television Association (2001) 4 F.C. 237.

As shown in Table 3 below, the allocation rate of 15.5% (CRTC) is based on proportionate use, and 21.9% (OEB) is based on an equal sharing methodology.

Table 3: Common Cost Allocation - 2005 OEB (Equal Sharing) vs. 1999 CRTC (Proportionate Use)

Pole Specs	2005 OEB (Equal Sharing)				1999 CRTC (Proportional)			
	Joint Pole Length (ft.)	Attachers	Length Per Attacher (ft.)	Explanation	Joint Pole Length (ft.)	Attachers	Length Per Attacher (ft.)	Explanation
A Power space	11.50 ÷	1.00		A	11.50 ÷	1.00		A
B Communication space	2.00 ÷	**2.50**	= 0.80	B	2.00 ÷	**2.00**	= 1.00	B
C Separation space	3.25 ÷	2.50	= 1.30	C	3.25 ÷	2.00	= 1.60	C
D Usable Space	**16.75**	**3.50**	**2.10**	= A + B + C	**16.75**		**2.60**	= A + B + C
E Clearance	17.25			E	17.25			E
F Buried	6.00			F	6.00			F
G Common Space	**23.25**	3.50	**6.64**	= D + E + F	**23.25**			= D + E + F
H Total Pole Length	**40.00**		**8.74**	= D + G	**40.00**		**2.60**	= D + G
I Allocation Rate			**21.9%**	= 8.74 ÷ 40.0			**15.50%**	= 2.60 ÷ 16.75
J Common Cost	**$93.31**		**$ 20.43**	= $93.21 x 21.9%	**$78.21**		**$ 12.12**	= $78.21 x 15.5%
K Direct Cost			**$ 1.92**				**$ 3.77**	
L Total Rate			**$ 22.35**	= J + K			**$ 15.89**	= J + K

As shown in Table 3 above, the main differences between OEB and CRTC allocation rates were due to:

a) the methodology –the CRTC used "proportional use" and OEB used "equal sharing approaches to allocate common space; and

b) the average number of attachers assumed for the communication space – (OEB: 2.5 attachers, and CRTC: 2 attachers)

The third difference was in the common cost base as detailed in Table 4, below:

Table 4: Direct and Indirect (Common) Cost Base - 2005 OEB vs. 1999 CRTC

Cost Components per Pole			2005 OEB (EB-2003-0249)	1999 CRTC (CRTC-99-13)
Direct Cost	Administration Cost	A	$ 0.69	$ 0.62
	Loss in Productivity	B	$ 1.23	$ 3.15
	Total Direct Cost	C = A+B	**$ 1.92**	
Indirect Cost	Net Embedded Cost per pole	D	**$ 478.00**	**$ 478.00**
	Capital Carrying Cost Rate %	E	11.42%	8.50%
	Depreciation Expense	F	$ 31.11	$ 31.11
	Pole Maintenance Expense	G	$ 7.61	$ 6.47
	Capital Carrying Cost	H = D x E	$ 54.59	$ 40.63
	Utility Tax Cost	I	-	-
	Loss in Productivity	J	incl. above	incl. above
	Total Indirect Cost	K=F+...+J	**$ 93.31**	**$ 78.21**

In the 2005 OEB proceedings, both parties- CCTA and EDA - submitted evidence in support of their respective positions on the cost allocation methodology:

- CCTA – based on testimony by Dr. Donald Ford advocated for "proportional use", and
- Electricity Distribution Association (EDA) – based on testimony by Dr. Bridger Mitchell, advocated for "equal sharing".

It is worth noting that in the 2005 proceeding, the OEB focused on the following key issues:

1. Is it necessary that the OEB set access charges?
2. Which parties should have access?
3. What is the appropriate methodology?
4. How many attachers should be assumed in calculating the rate?
5. Should there be a province-wide rate?
6. What costs should be used in calculating the rate?
7. Should new licence conditions impact existing contracts?

With respect to the above questions, the OEB concluded as follows[11]:

1. The OEB should set a specific (single) access charge[12]
2. The OEB determined that a single province-wide rate is in the public interest. The OEB also noted that a province-wide rate has the advantage that it is simple to administer. The OEB further noted that calculating different costs for ninety utilities would be a challenge for all concerned. However, the OEB stated that ***any LDC that believes that the province-wide rate is not appropriate could bring an application to have the rates modified based on its own costing.***
3. "Equal sharing" should be the preferred methodology to allocate common costs.
4. 2.5 attachers was assumed to be reasonable, instead of the 2 attachers assumed in the CRTC 1999 decision.[13]
5. While the OEB recognized local costs vary, there were advantages to having a province-wide rate.
6. The rate should to a maximum extent possible, be based upon representative costs. The OEB accepted the costs as detailed in Table 5 below.

[11] Question 7: "Should new licence conditions impact existing contracts?", was not addressed in the OEB's determination.
[12] The OEB did not accept the submission of EDA et al to set a range of rate instead of a specific rate. The OEB determined that there was no rationale for a range of rates in the given circumstances.
[13] "The OEB considers 2.5 attachers to be reasonable. Things have changed since the days of the CRTC decision. If anything, there will be more than 2.5 attachers in the future" (OEB 2005, p. 7).

Table 5: 2005 OEB Decision and Order – Cost Breakdown

	Price Component - Per Pole	$	Explanation
	DIRECT COST		
A	Administration Costs	$ 0.69	CRTC estimate 1999 $0.62, plus inflation
B	Loss in Productivity	$ 1.23	MEA estimate 1991 - $3.08, plus inflation, and divided between 2.5 pole attachers
C	Total Direct Costs	**$ 1.92**	A + B
	INDIRECT COST		
D	Net Embedded Cost per pole	**$ 478.00**	Milton Hydro 1995 = $478
E	Depreciation Expense	$ 31.11	Milton Hydro 1995 = $31.11
F	Pole Maintenance Expense	$ 7.61	Milton Hydro 1995 = $6.47, plus inflation
G	Capital Carrying Cost	$ 54.59	Pre-tax weighted average cost of capital 11.42% applied to net embedded cost per pole (D)
H	Total Indirect Costs per Pole	**$ 93.31**	E + F + G
I	Allocation Factor	21.9%	Allocation based on 2.5 attachers
J	Indirect Cost Allocated	$ 20.43	H x I
K	Annual Pole Rental Charge	**$ 22.35**	C + J
Note: Reproduced Appendix 2 (page 13) of OEB 2005 Decision and Order (RP-2003-0249), dated March 7, 2005.			

Subsequent to the 2005 OEB Decision, the OEB recently approved the following three LDC-specific pole attachment rates:

- Toronto Hydro (EB-2014-0116): $42 per pole per year, effective May 1, 2015[14]
- Hydro Ottawa (EB-2015-0004): $53 per pole per year, effective January 1, 2016
- Hydro One (EB-2015-0141): $ 41.28 per pole per year, effective January 1, 2015

Compared to the 2005 OEB Decision, the main differences in the calculations of the rate in the recent three applications stated above, were as follows:

- Inclusion of specific costs submitted by the LDC, instead of representative costs accepted in the 2005 OEB Decision
- Inclusion of a utility-specific actual average number of attachers instead of 2.5 attachers assumed in the 2005 OEB Decision

[14] $42 per pole per year for Toronto Hydro was determined based on a settlement process.

1.5 Decisions in other Canadian jurisdictions

Since the Federal Court of Appeal held in 2001 that the CRTC did not have statutory authority to regulate access by cable operators and telecommunication carriers to power poles, there have been relatively few rate decisions by provincial energy regulators in the last two decades. The pole attachment rate decisions in different Canadian jurisdictions varied with respect to the following factors:

1) Estimates of different cost items, associated with the poles, used to determine annual cost per pole – such as capital cost, annual maintenance cost, and annual capital carrying cost. The differences in costs are attributable to factors such as LDCs' specific cost structure, geography and weather conditions, and applicable public safety standards, regulations and by laws in each jurisdiction;
2) Type of poles used in the rate calculation, such as joint-use poles only or the total number of poles, including power only poles;
3) Methodology to allocate common costs[15] between the two types of attachers – such as equal sharing[16] versus proportionate use;[17]
4) Number of average attachers (presumption average versus actual average) used in the rate calculation; and,
5) Costing approach such as historical cost of the LDC itself or historical cost of another utility assumed to fairly represent the cost of LDCs in the province ("representative cost")

For the cost estimates for items included in 1) above, the same cost categories were used to determine the annual common cost of the pole, which include (a) annual depreciation, (b) capital carrying cost, (c) maintenance cost. However, the dollar value of the cost estimates typically varies across different jurisdictions for common reasons such as:

- Difference in embedded (historical) cost per pole due to the relative age-mix and installation cost of poles in each jurisdiction;
- Difference in annual depreciation rate due to different average useful life assumed in the rate calculation; and,
- Difference in capital carrying cost due to different cost of capital rates (weighted average cost of capital) applicable to a specific utility or a province.

[15] Common costs typically include annual depreciation, maintenance and capital carrying costs.
[16] The common costs are equally divided among the attachers.
[17] The common costs are divided according to the ratio of space occupied by an attacher to the total usable space of the pole. That is clearance and buried space are not considered as usable space so not included in the allocation ratio.

In terms of the above five factors, Table 6 below provides a comparative summary of pole attachment rate decisions by different Canadian energy boards and the CRTC [18]:

Table 6: Summary of Decisions in Canadian Jurisdictions

Year	Canadian Jurisdiction	Annual Common Cost	Annual Rate	Pole Population	Costing Approach	Allocation Methodology	Rate Methodology	
							Communication Space Attachers	#
1999	CRTC - Power Utility Poles (CRTC 99-13)	$78.21	$15.89	Joint Use	Historical *(representative)*	Proportional	Presumptive Attachers	2.00
2000	AEUB - Alberta Energy and Utilities Board (2000-86)	$51.00	$18.36	Joint Use	Historical cost	Equal Sharing (1) (implied)	Presumptive Attachers	2.00
2002	NSURB - Nova Scotia Utility and Review Board (2002)	$75.11	$14.15	Joint Use	Historical *(representative)*	Proportional	Presumptive Attachers	2.00
2005	OEB (RP-2003-0249)	$93.31	$22.35	Joint Use	Historical *(representative)*	Equal Sharing	Presumptive Attachers	2.50
2006	New Brunswick (2006)	n.a.	$18.00	*Interim order based on decisions in other jurisdictions*				n.a.
2010	CRTC – Telephone Poles Ontario and Quebec (CRTC 2010-900) - Bell Canada and Aliant	$62.78	$12.48	Joint Use	Historical	Proportional	Actual Attachers	1.70
2015	New Brunswick Energy and Utilities (matter # 272) - NB Power	$79.91	$20.77	Total	Historical	Proportional	Actual Attachers	1.40
2015	OEB (EB-2015-0004) Hydro Ottawa	$169.69	$53.00	Total	Historical	Equal Sharing	Actual Attachers	1.74
2015	OEB (EB-2015-0141) – Hydro One	$108.71	$41.28	Total	Historical	Equal Sharing	Actual Attachers	1.30
2016	OEB (EB-2014-0116) Toronto Hydro	$144.53	$42.00	Total	*Not available (agreed upon in a settlement agreement)*			1.61
2016	CRTC 2016-228 - TELUS	$62.26	$19.33	Joint Use	Historical	Proportional	Actual Attachers	1.32

(1): Alberta Energy and Utilities OEB accepted TransAlta's cost sharing methodology, based on "a simplified hypothetical system where each utility constructs its own system without regard for existing facilities. Each utility's share of the combined cost of the three systems was applied to TransAlta's embedded pole cost to arrive at a preliminary share by utility" (EUB 2008-86, Section 3.1, p. 17).

[18] The decisions listed in the Table 6 are only for reference purpose only.

There are certain specific cost factors associated with pole infrastructure that can cause significant differences in annual cost per pole across different jurisdictions - for example, inclusion of extraordinary vegetation and storm recovery cost in the rate calculation. The New Brunswick Energy and Utilities Board in its 2016 Decision (matter # 272- NB Power), for example, allowed for inclusion of planned and storm-related vegetation expenditures and storm-related repair expenses in the annual maintenance cost. Inclusion of other associated costs such as the cost of neutrals can also cause significant differences in the embedded cost per pole. To the best of Nordicity's knowledge, such costs have not been included in the decision cited in Table 6 above. In the case of the New Brunswick Energy and Utilities Board's (matter # 272) NB Power proceeding, this issue was raised and the NBEUB ruled as follows:

"The Board ruled on June 23 that it would not consider, in the absence of a cost analysis, the issue of whether secondary and neutral costs should be included in the cost allocation methodology. Accordingly, this matter proceeded without reference to the pre-filed evidence on this issue. The Board indicated that NB Power may bring this issue forward in future rate applications. The remaining costs presented by NB Power below are based on its revised evidence." (matter no. 272, November 16, 2015, para 9, p. 2)

Table 7 below illustrates the cost differences contained in four regulatory board decisions cited in Table 6 above.

Table 7: Pole Cost Comparison of Selected Poles Attachment Rate Decisions in Canadian Jurisdictions

Cost Components per Pole			2005 OEB (EB-2003-0249)	2005 OEB (Hydro Ottawa EB-2015-0004)	2016 NBEUB (matter 272)	1999 CRTC (CRTC-99-13)
Direct Cost	Administration Cost	A	$ 0.69	$ 2.28	$ 0.62	$ 0.62
	Loss in Productivity	B	$ 1.23	$ 1.96	incl. below	$ 3.15
	Total Direct Cost	C = A+B	**$ 1.92**	**$ 4.23**	**$ 0.62**	**$ 3.77**
Indirect Cost	Net Embedded Cost per pole	D	$ 478.00	$ 1,479.02	$ 346.68	$ 478.00
	Capital Carrying Cost Rate %	E	11.42%	8.04%	5.13%	8.50%
	Depreciation Expense	F	$ 31.11	$ 38.89	$ 19.34	$ 31.11
	Pole Maintenance Expense	G	$ 7.61	$ 11.89	$ 30.93	$ 6.47
	Capital Carrying Cost	H = D x E	$ 54.59	$ 118.91	$ 17.78	$ 40.63
	Utility Tax Cost	I	-	-	$ 6.43	-
	Loss in Productivity	J	incl. above	incl. above	$ 5.43	incl. above
	Total Indirect Cost	K=F+...+J	**$ 93.31**	**$ 169.69**	**$ 79.91**	**$ 78.21**

2 Key Objectives

2.1 Why a policy framework is required

Wireline poles are an essential part of both electrical distribution and telecommunications networks.

With the rapid uptake of bandwidth by subscribers necessary to support a myriad of everyday applications and increasing competition in the telecom sector, there has been an increasing need for third-party attachments to wireline poles. Municipal governments have always promoted the sharing of pole infrastructure for efficiency and aesthetic considerations. Given that the predominant location of poles is on public land, municipal intervention has been able to significantly increase the sharing of poles - owned by both power and communication operators - and correspondingly, reduce wasteful duplication in overall pole infrastructure.

For example, the OEB in its 2005 order noted:

"*Duplication of poles is neither viable nor in the public interest*" (p. 3).

Earlier, in its 99-13 decision, the CRTC made a similar observation in the following words:

"By allowing access to existing supporting structures irrespective of the type of utility owning or controlling such a structure, the adverse environmental, economic and aesthetic impacts associated with unnecessary duplication of aerial supporting structures is avoided." (para. 124)

In this context, it is important to ensure the rates charged to third party users of the wireline poles are "***just and reasonable*"** based on the following principles:

(a) communication attachers have access to the utility poles, and

(b) utilities are able to recover the cost of their poles, based on just and reasonable rates.

In its seminal 2014 decision, the Public Utilities Commission of Ohio (Case No. 13-579-AU-ORD) defined the just and reasonable principle as follows:

"A rate is just and reasonable if it assures a utility the recovery of not less than the additional costs of providing pole attachments, nor more than an amount determined by multiplying the percentage of the total usable space, or the percentage of the total duct or conduit capacity, which is occupied by the pole attachment by the sum of the operating expenses and actual capital costs of the public utility attributable to the entire pole, duct, conduit, or right-of-way."

Therefore, an effective policy framework is required to ensure pole attachment rates that are just and reasonable are developed and maintained moving forward.

To achieve this overarching objective, in Nordicity's view the issues to be addressed within a policy framework include:

a) Development of an appropriate costing methodology;

b) Determination of a representative pole specifications: type, dimensions, spacing, useful life and so forth;

c) Determination of a cost-sharing and allocation methodology;

d) Identification of cost elements (e.g. vegetation management costs) for inclusion in the rate;

e) Determination of the basis to calculate the rate per attacher, e.g. determining the number of attachments per pole;

f) Determination of the relevant pole population to be used as the basis for rate calculations: e.g. total pole population or only those poles with third party attachments;

g) Treatment of revenue generated through third party pole attachment rates, make-ready cost charges[19] etc.;

h) Treatment of potential revenue, if any, received by a third party (host) attacher by allowing another third party attacher to "overlash"[20] on the its attachment on the utility pole;

i) Application of economic principles of efficiency, fairness and reasonableness to all items listed above; and

j) Rate of return rate determination: e.g., based on cost recovery of poles infrastructure cost or on utility specific capital structure and financial risk.

2.2 2005 OEB Order Analysis

James Bonbright, an economist recognized for developing practical solutions to utility problems, recommended certain key attributes of a sound rate structure for a utility, which can be summarized into the following key six criteria[21] :

1) The rate should be simple and feasible to implement;
2) The rate has public acceptability and is free from controversies as to proper interpretation;
3) **The rate should be effective in yielding total revenue requirement under the fair-return standard;**
4) **The rate should provide revenue stability from year to year, with minimum unexpected changes;**
5) The rate should be based on fair allocation of total cost among different customers; and
6) The rate should avoid undue discrimination and promote efficiency in use of services

[19] Make-ready charges represent the onetime charges an attacher is to pay to an LDC in order to prepare the pole for a requested attachment in full conformance with the applicable safety code, engineering standards and by-laws. For example, the age of the pole and condition of the pole is assessed to determine with if the pole can support the additional attachments being requested.

[20] "Overlashing" refers to the process of physically attaching additional cables to the cables that are already attached to a utility pole. For example, an existing attacher A (called as host attacher) allows to attach cable of another attacher B.

[21] Bonbright, James C, "Principles of Public Utility Rates", Columbia University Press, New York NY, 1961, p.21.

Nordicity examined the 2005 OEB Decision, in terms of the criteria as set out above, by Bonbright by answering the following question:

Does this OEB approach ensure rate stability and effectively yield revenue requirement under the fair return standard?

The direct cost as shown in Table 7 above, is directly attributable (causal) to the attacher. The indirect cost, which constitutes 91% of the total annual cost, since it is not directly attributable, needs to be allocated to the attachers using a specific allocation methodology. The indirect cost is associated with the common pole space (buried and clearance), which accounts for over two-third of the total pole height. For this reason, the methodology used to estimate indirect cost and subsequently to allocate to the attachers, can have a major impact on the pole attachment rate. For this reason, Nordicity analysed the annual indirect cost.

As shown in Table 7 above, the annual indirect cost of $93.31 per pole used in the 2005 OEB Rate Order, is based on the following cost inputs:

(A) Net Embedded Cost[22]: **$478.00**

(B) Depreciation Expense: **$31.11**

(C) Maintenance Expense: **$7.61**

(D) Pre-tax cost of capital: **11.42%**

(E) Capital Carrying Cost[23]: **$54.59** [= 11.42% (A) x $478.00 (D)]

<u>Based on the above cost items, the indirect cost per pole determined in the 2005 OEB Decision was the sum of (B), (C) and (E) for a total of $93.31 (= $31.11 + $7.61 + $54.59).</u>

Notwithstanding the cost inputs used in the OEB rate calculation, it is important to examine the OEB Rate Order in terms of the criteria set out by Bonbright, in the following question:

> *Does the OEB approach ensure rate stability and effectively yields the revenue requirement under the 'fair return' standard?*

As an illustration, using the approach from the 2005 OEB Rate Order, annual indirect costs are calculated from year-to-year over the 25-year life assumed in the Decision. That is, based on a 25-year useful life of a pole, and annual (straight line) depreciation of $31.11 shown above, the total average embedded cost

[22] Net Embedded Cost = Total (gross) embedded cost minus accumulated depreciation. ***Embedded cost*** is referred to as the <u>total installed cost averaged over the pole population</u>, and ***net embedded cost*** is referred to as the <u>undepreciated value</u> of those poles averaged over the pole population. (*for example, see New Brunswick Power evidence NBP1.03 submitted on November 21, 2014 to New Brunswick Energy and Utility OEB for matter no. 272).*

[23] Capital Carrying Cost = $478.00 (Net Embedded Cost) x Pre-tax weighted average cost of capital 11.42%.

per pole is calculated to be **$777.75** (= $ 31.11 x 25 years)[24].

The OEB applied the "**half-year rule**" to account for depreciation expense and the capital carrying cost in the initial and last year of the asset's useful life[25]. For example, for a 25-year useful life, the depreciation expense in year 1 is one-half (50%) of the annual depreciation expense, and as a result, the remaining one-half of the depreciation will be recorded in the 26th calendar year. Using the 2005 OEB Rate Order capital carrying cost of 11.42% per annum, and annual maintenance cost of $7.61, the year-to-year total average annual costs per pole - calculated for years 1-25, are provided in Table 8 below.

Table 8: Year-over-year Total Annual Indirect Cost Per Pole (based on 2005 OEB Rate Order)

Year (N)	Embedded	Depreciation	Accumulated Depreciation	Net Embedded	Carrying Cost	Maintenance	Total Annual Cost
	A	B	C = C (Previous Year) + B	D = A – C	E = D x 11.42%	F	G = B + E + F
0	$ 777.75	-	-	$ 777.75	-	-	-
1	$ 777.75	**$ 19.76**	$ 19.76	$ 757.99	**$ 43.28**	**$ 7.61**	**$ 70.65**
2	$ 777.75	**$ 31.11**	$ 50.87	$ 726.88	**$ 83.01**	**$ 7.61**	**$ 121.73**
3	$ 777.75	**$ 31.11**	$ 81.98	$ 695.77	**$ 79.46**	**$ 7.61**	**$ 118.18**
4	$ 777.75	**$ 31.11**	$ 113.09	$ 664.66	**$ 75.90**	**$ 7.61**	**$ 114.62**
5	$ 777.75	**$ 31.11**	$ 144.20	$ 633.55	**$ 72.35**	**$ 7.61**	**$ 111.07**
6	$ 777.75	**$ 31.11**	$ 175.31	$ 602.44	**$ 68.80**	**$ 7.61**	**$ 107.52**
7	$ 777.75	**$ 31.11**	$ 206.42	$ 571.33	**$ 65.25**	**$ 7.61**	**$ 103.97**
8	$ 777.75	**$ 31.11**	$ 237.53	$ 540.22	**$ 61.69**	**$ 7.61**	**$ 100.41**
9	$ 777.75	**$ 31.11**	$ 268.64	$ 509.11	**$ 58.14**	**$ 7.61**	**$ 96.86**
10	$ 777.75	**$ 31.11**	$ 299.75	**$ 478.00**	**$ 54.59**	**$ 7.61**	**$ 93.31**
11	$ 777.75	**$ 31.11**	$ 330.86	$ 446.89	**$ 51.03**	**$ 7.61**	**$ 89.75**
12	$ 777.75	**$ 31.11**	$ 361.97	$ 415.78	**$ 47.48**	**$ 7.61**	**$ 86.20**
13	$ 777.75	**$ 31.11**	$ 393.08	$ 384.67	**$ 43.93**	**$ 7.61**	**$ 82.65**
14	$ 777.75	**$ 31.11**	$ 424.19	$ 353.56	**$ 40.38**	**$ 7.61**	**$ 79.10**
15	$ 777.75	**$ 31.11**	$ 455.30	$ 322.45	**$ 36.82**	**$ 7.61**	**$ 75.54**
16	$ 777.75	**$ 31.11**	$ 486.41	$ 291.34	**$ 33.27**	**$ 7.61**	**$ 71.99**
17	$ 777.75	**$ 31.11**	$ 517.52	$ 260.23	**$ 29.72**	**$ 7.61**	**$ 68.44**
18	$ 777.75	**$ 31.11**	$ 548.63	$ 229.12	**$ 26.17**	**$ 7.61**	**$ 64.89**
19	$ 777.75	**$ 31.11**	$ 579.74	$ 198.01	**$ 22.61**	**$ 7.61**	**$ 61.33**
20	$ 777.75	**$ 31.11**	$ 610.85	$ 166.90	**$ 19.06**	**$ 7.61**	**$ 57.78**
21	$ 777.75	**$ 31.11**	$ 641.96	$ 135.79	**$ 15.51**	**$ 7.61**	**$ 54.23**
22	$ 777.75	**$ 31.11**	$ 673.07	$ 104.68	**$ 11.95**	**$ 7.61**	**$ 50.67**
23	$ 777.75	**$ 31.11**	$ 704.18	$ 73.57	**$ 8.40**	**$ 7.61**	**$ 47.12**
24	$ 777.75	**$ 31.11**	$ 735.29	$ 42.46	**$ 4.85**	**$ 7.61**	**$ 43.57**
25	$ 777.75	**$ 31.11**	$ 766.40	**$ 11.35**	**$ 1.30**	**$ 7.61**	**$ 40.02**
26	$ 777.75	**$ 11.35**	$ 777.75	-	-	**$ 7.61**	**$ 18.96**
Total		**$ 777.75**			**$ 1,054.95**	**$ 197.86**	**$ 2,030.56**

[24] To arrive at the net embedded cost of $478.00 in Year 10, as determined in 2005 OEB Order, the depreciation in Year 1 was estimated to be $19.76 - balancing amount added to half-year rule amount ($31.11 ÷ 2) applied in the first year.

[25] The "half-year rule" is used to represent that since not all assets in the common pool, such as poles are commissioned on day 1 (January 1) of their initial year of service. Similarly, not all assets are decommissioned in the last year of their useful life. Half-year rule represents the overall average of asset's service in the first and last year of their useful life.

It is worth noting that $93.31 annual indirect cost per pole in year 10 generates the same value as that was determined in the 2005 OEB Decision (see Table 5 above). This confirms that the indirect cost base used in OEB's current rate methodology is accurately simulated in Table 8 over the useful life assumed in the OEB 2005 Decision[26]. Figure 2 below shows the annual cost per pole for all 1-25 years.

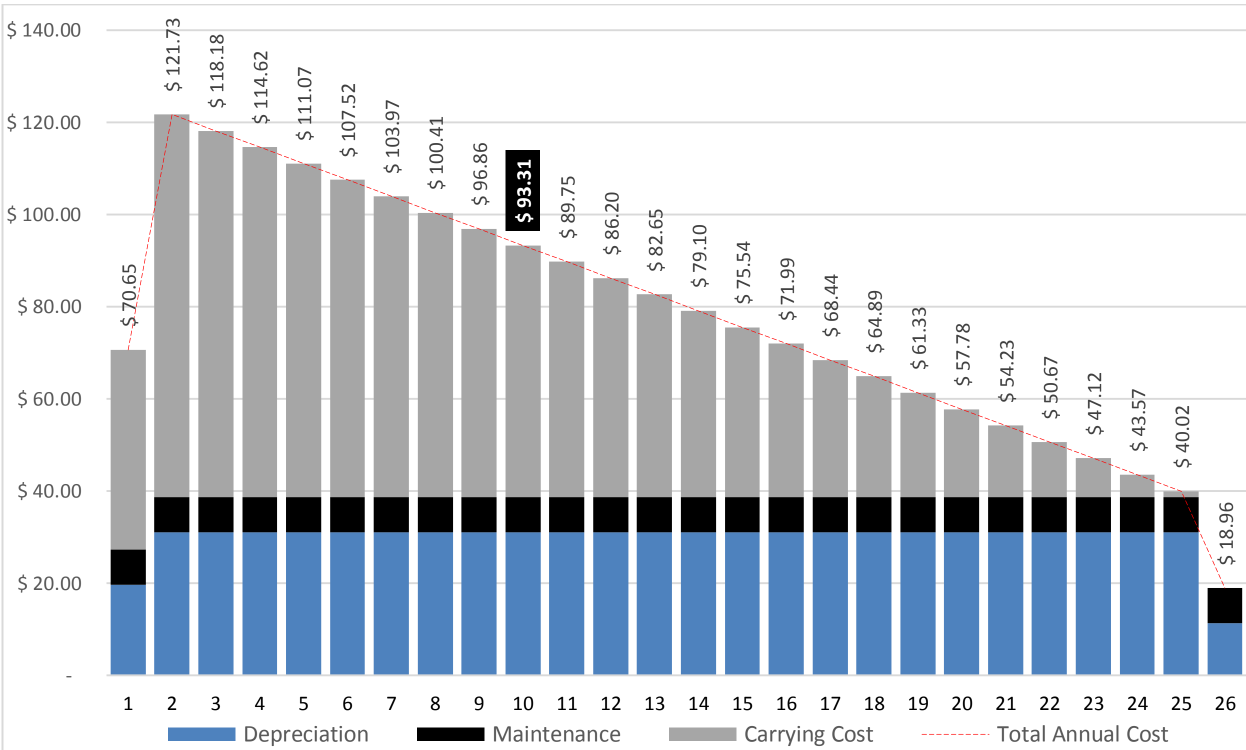


Figure 2: Annual indirect cost per pole ***(over 25-year useful life based on 2005 OEB Rate Order Formula)***

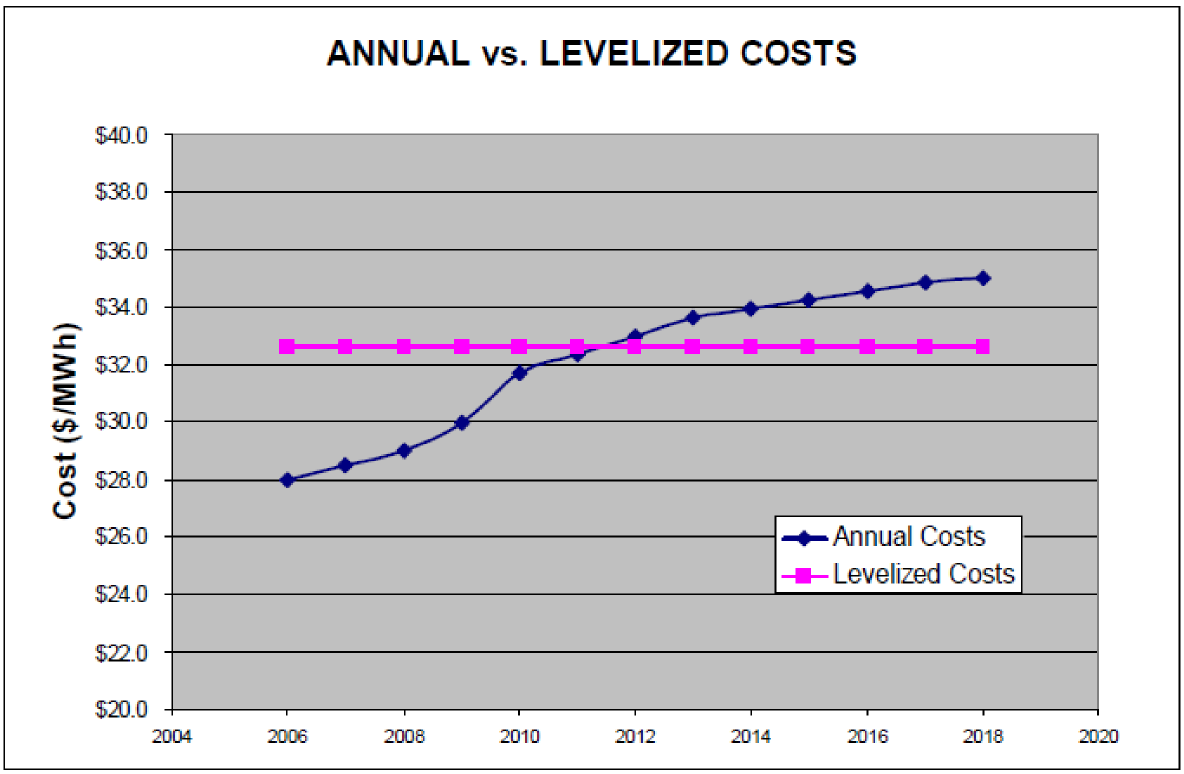
It is evident from Figure 2 above, that the annual indirect cost per pole correspondingly decreases from year- to-year as net embedded cost progressively reduces in succeeding years. Furthermore, significant fluctuation in the annual cost can occur as result of major pole replacement programs undertaken by LDCs in certain years. This fluctuation could be avoided if the age of individual poles were uniformly distributed – that is, if replacement occurred at a consistent rate each year-over-year throughout the economic life of the pole asset. However, this would be difficult for LDCs to realize in practical terms given their operational uncertainties.

[26] The 2005 OEB Decision used $31.11 as annual depreciation. This number was based on Milton Hydro's cost inputs cited in CRTC99-13 Decision. Milton Hydro based their calculations on pole's useful lie of 25 years..

In this context, a "levelized cost-based" rate could provide a practical alternative solution to validate the current methodology and avoid the problems described above by providing a single rate from year to year[27]. "Levelised cost" is a widely used concept in the electricity literature, which is entirely based on discounted cash flows concept and is calibrated as the minimum average price that a firm should receive to justify investment in a production facility[28]:

"Levelized costs [rate] are uniform annual costs that determine the estimated annual revenue required to recover all costs over the life of the project"[29].

In other words, a levelized cost is the constant annual cost that is equivalent on a present value basis to the actual annual costs, which are themselves variable, as illustrated in Figure 3 below[30]:



Source: Energy Commission

Figure 3: Variable Annual Cost Vs. Levelised (Annualized) Cost

[27] For example, California Energy Commission (CEC) uses levelized rate approach since several years ago.
[28] Reichelstein, S. and Rohlfing-Bastian, A. "Levelized Product Cost: Concept and Decision Relevance", The Accounting Review, American Accounting Association, Vol. 90 (40), 2015.
[29] Bemis, Gerald R, and DeAngelis, Michael, "*Levelized cost of Electricity Generation Technologies*", Contemporary Policy Issues, July 1990 (8,3).
[30] California Energy Commission (CEC) draft staff report (June 2007, CEC-200-2007-011-SD), p. 4.

As shown in Figure 3 above, the levelized cost approach, by providing costs that are consistent across all years, could ensure rate stability and an effective yield to recover the initial cost of the pole on a just and reasonable basis.

For example, in terms of the above rate calculation the capital cost of the pole must be fully recovered through depreciation expense ($31.11), and capital carrying cost (calculated at 11.42% of respective year embedded cost), included in the rate base i.e. annual indirect cost per pole. That is, the present value of depreciation expense and capital carrying cost must equal to $777.75, embedded (initial) capital cost per pole.

As shown in Table 9 below at 11.42% cost of capital, the present value of depreciation is $244.66 and carrying cost is $466.30 resulting in a total cost of $710.96, which is less than $777.75 embedded (initial) cost i.e. by only $66.79. This slight difference may be attributed to the application of the half-year depreciation rule and straight-line amortization of embedded (initial) cost of the pole over its assumed 25-year useful life.

In summary, Nordicity has identified the following potential issues with the current OEB rate structure:

- It results in significant variation in rate from year to year, as shown in Table 8 above. That is, it results in very high rate in the initial years of poles useful life (e.g. annual indirect cost of $113.9 in Year 1, and $121.7 in Year 2) and an extremely low rate in the last years of poles' useful life (e.g. annual indirect cost of only $43.6 in Year 24, and $50.1 in Year 25). However, this issue could be addressed by ensuring an optimum average age of pole infrastructure is maintained through replacement of poles at a consistent year over year rate.[31]
- Application of the half-year depreciation rule in Year 1, and straight-line depreciation causes a slight understatement of revenue requirement on present value basis. However, this issue has negligible impact on the resulting pole attachment rate.

[31] Extraordinary, non-recurring expenditures such as disaster recovery due to major storms are difficult to forecast. Inclusion of any such cost in the regular rate only causes uncertainty. The recovery of such extraordinary expenditures may be made through ad hoc rate increases for a defined period of time, to be based on actual expenditure evidence submitted by the LDCs.

Table 9: 2005 OEB Model Present Value Analysis – Recovery of Initial Capital Cost

Year (N)	Embedded	Depreciation	Accumulated Depreciation	Net Embedded	Carrying Cost	Maintenance	Total Annual Cost	Investment Repayment	Present Value Factor	Present Value Factor
	A	B	C = C (Previous Year) + B	D = A - C	E = D x 11.42%	F	G = B + E + F	H = B + E	I = 1/(1+11.42%)^N	J = H x G
0	$ 777.75	-	-	$ 777.75	-	-	-		1.0000	-
1	$ 777.75	$ 19.76	$ 19.76	$ 757.99	$ 43.28	$ 7.61	$ 70.65	$ 63.04	0.8975	$ 56.58
2	$ 777.75	$ 31.11	$ 50.87	$ 726.88	$ 83.01	$ 7.61	$ 121.73	$ 114.12	0.8055	$ 91.93
3	$ 777.75	$ 31.11	$ 81.98	$ 695.77	$ 79.46	$ 7.61	$ 118.18	$ 110.57	0.7230	$ 79.93
4	$ 777.75	$ 31.11	$ 113.09	$ 664.66	$ 75.90	$ 7.61	$ 114.62	$ 107.01	0.6489	$ 69.44
5	$ 777.75	$ 31.11	$ 144.20	$ 633.55	$ 72.35	$ 7.61	$ 111.07	$ 103.46	0.5824	$ 60.25
6	$ 777.75	$ 31.11	$ 175.31	$ 602.44	$ 68.80	$ 7.61	$ 107.52	$ 99.91	0.5227	$ 52.22
7	$ 777.75	$ 31.11	$ 206.42	$ 571.33	$ 65.25	$ 7.61	$ 103.97	$ 96.36	0.4691	$ 45.20
8	$ 777.75	$ 31.11	$ 237.53	$ 540.22	$ 61.69	$ 7.61	$ 100.41	$ 92.80	0.4210	$ 39.07
9	$ 777.75	$ 31.11	$ 268.64	$ 509.11	$ 58.14	$ 7.61	$ 96.86	$ 89.25	0.3779	$ 33.72
10	$ 777.75	$ 31.11	$ 299.75	$ 478.00	$ 54.59	$ 7.61	$ 93.31	$ 85.70	0.3391	$ 29.06
11	$ 777.75	$ 31.11	$ 330.86	$ 446.89	$ 51.03	$ 7.61	$ 89.75	$ 82.14	0.3044	$ 25.00
12	$ 777.75	$ 31.11	$ 361.97	$ 415.78	$ 47.48	$ 7.61	$ 86.20	$ 78.59	0.2732	$ 21.47
13	$ 777.75	$ 31.11	$ 393.08	$ 384.67	$ 43.93	$ 7.61	$ 82.65	$ 75.04	0.2452	$ 18.40
14	$ 777.75	$ 31.11	$ 424.19	$ 353.56	$ 40.38	$ 7.61	$ 79.10	$ 71.49	0.2200	$ 15.73
15	$ 777.75	$ 31.11	$ 455.30	$ 322.45	$ 36.82	$ 7.61	$ 75.54	$ 67.93	0.1975	$ 13.42
16	$ 777.75	$ 31.11	$ 486.41	$ 291.34	$ 33.27	$ 7.61	$ 71.99	$ 64.38	0.1773	$ 11.41
17	$ 777.75	$ 31.11	$ 517.52	$ 260.23	$ 29.72	$ 7.61	$ 68.44	$ 60.83	0.1591	$ 9.68
18	$ 777.75	$ 31.11	$ 548.63	$ 229.12	$ 26.17	$ 7.61	$ 64.89	$ 57.28	0.1428	$ 8.18
19	$ 777.75	$ 31.11	$ 579.74	$ 198.01	$ 22.61	$ 7.61	$ 61.33	$ 53.72	0.1281	$ 6.88
20	$ 777.75	$ 31.11	$ 610.85	$ 166.90	$ 19.06	$ 7.61	$ 57.78	$ 50.17	0.1150	$ 5.77
21	$ 777.75	$ 31.11	$ 641.96	$ 135.79	$ 15.51	$ 7.61	$ 54.23	$ 46.62	0.1032	$ 4.81
22	$ 777.75	$ 31.11	$ 673.07	$ 104.68	$ 11.95	$ 7.61	$ 50.67	$ 43.06	0.0926	$ 3.99
23	$ 777.75	$ 31.11	$ 704.18	$ 73.57	$ 8.40	$ 7.61	$ 47.12	$ 39.51	0.0831	$ 3.29
24	$ 777.75	$ 31.11	$ 735.29	$ 42.46	$ 4.85	$ 7.61	$ 43.57	$ 35.96	0.0746	$ 2.68
25	$ 777.75	$ 31.11	$ 766.40	$ 11.35	$ 1.30	$ 7.61	$ 40.02	$ 32.41	0.0670	$ 2.17
26	$ 777.75	$ 11.35	$ 777.75	-	-	$ 7.61	$ 18.96	$ 11.35	0.0601	$ 0.68
Total		$ 777.75			$ 1,054.95	$ 197.86	$ 2,030.56	$ 1,832.70		$ 710.96

Theoretically, since both approaches use historical (actual - embedded) costs and the same economic parameters (carrying cost or cost of capital), they should produce the same outcome - full recovery of actual cost on a fair return standard. However, this only occurs if all factors are incorporated adequately. As illustrated in Table 10 below, the levelized cost approach provides a constant rate and certainty from year to year, and full cost recovery over 25 years (i.e. the present value of $777.75 exactly equates to the initial capital cost of the pole).

Table 10: Levelized Cost Base (Annual Indirect Cost per Pole)

Year (N)	Principal	Amortization	Accumulated Amortization	Principal Outstanding	Carrying Cost	Maintenance	Total Annual Cost	Investment Repayment	Present Value Factor	Present Value Factor
	A	B	C = C (Previous Year) + B	D = A - C	E = D x 11.42%	F	G = B + E + F	H = A ÷ sum(I)	I = 1/(1+11.42%)^N	J = H x G
0	$ 777.75	-	-	$ 777.75		-	-			
1	$ 777.75	**$ 6.38**	$ 6.38	$ 771.37	**$ 88.82**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.8975	$ 85.44
2	$ 777.75	**$ 7.10**	$ 13.48	$ 764.27	**$ 88.09**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.8055	$ 76.68
3	$ 777.75	**$ 7.92**	$ 21.39	$ 756.36	**$ 87.28**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.7230	$ 68.82
4	$ 777.75	**$ 8.82**	$ 30.21	$ 747.54	**$ 86.38**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.6489	$ 61.77
5	$ 777.75	**$ 9.83**	$ 40.04	$ 737.71	**$ 85.37**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.5824	$ 55.44
6	$ 777.75	**$ 10.95**	$ 50.99	$ 726.76	**$ 84.25**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.5227	$ 49.75
7	$ 777.75	**$ 12.20**	$ 63.19	$ 714.56	**$ 83.00**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.4691	$ 44.66
8	$ 777.75	**$ 13.59**	$ 76.78	$ 700.97	**$ 81.60**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.4210	$ 40.08
9	$ 777.75	**$ 15.14**	$ 91.92	$ 685.83	**$ 80.05**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.3779	$ 35.97
10	$ 777.75	**$ 16.87**	$ 108.80	$ 668.95	**$ 78.32**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.3391	$ 32.28
11	$ 777.75	**$ 18.80**	$ 127.60	$ 650.15	**$ 76.39**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.3044	$ 28.97
12	$ 777.75	**$ 20.95**	$ 148.54	$ 629.21	**$ 74.25**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.2732	$ 26.00
13	$ 777.75	**$ 23.34**	$ 171.88	$ 605.87	**$ 71.86**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.2452	$ 23.34
14	$ 777.75	**$ 26.00**	$ 197.89	$ 579.86	**$ 69.19**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.2200	$ 20.95
15	$ 777.75	**$ 28.97**	$ 226.86	$ 550.89	**$ 66.22**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.1975	$ 18.80
16	$ 777.75	**$ 32.28**	$ 259.15	$ 518.60	**$ 62.91**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.1773	$ 16.87
17	$ 777.75	**$ 35.97**	$ 295.12	$ 482.63	**$ 59.22**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.1591	$ 15.14
18	$ 777.75	**$ 40.08**	$ 335.20	$ 442.55	**$ 55.12**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.1428	$ 13.59
19	$ 777.75	**$ 44.66**	$ 379.85	$ 397.90	**$ 50.54**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.1281	$ 12.20
20	$ 777.75	**$ 49.75**	$ 429.61	$ 348.14	**$ 45.44**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.1150	$ 10.95
21	$ 777.75	**$ 55.44**	$ 485.04	$ 292.71	**$ 39.76**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.1032	$ 9.83
22	$ 777.75	**$ 61.77**	$ 546.81	$ 230.94	**$ 33.43**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.0926	$ 8.82
23	$ 777.75	**$ 68.82**	$ 615.63	$ 162.12	**$ 26.37**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.0831	$ 7.92
24	$ 777.75	**$ 76.68**	$ 692.31	$ 85.44	**$ 18.51**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.0746	$ 7.10
25	$ 777.75	**$ 85.44**	$ 777.75	($ 0.00)	**$ 9.76**	**$ 7.61**	**$ 102.80**	**$ 95.19**	0.0670	$ 6.38
Total		**$ 777.75**			**$ 1,602.12**	**$ 190.25**	**$ 2,570.12**	**$ 2,379.87**	8.1701	**$ 777.75**

In summary, a levelized approach would provide a practical solution for the OEB and other energy utility regulators to meet the criteria of fair return and revenue stability set out by Bonbright. Adoption of the levelized approach may not be consistent with the rate design methodology followed the OEB for other services. In this context, implementation of the levelized approach for pole attachment rate calculation would be a significant step and may increase the complexity of the overall rate design process within the OEB. However, the levelized approach would provide a practical solution for the OEB and other energy utility regulators to further validate their current methodology. This would ensure the rate outcome of the current process meets the principles of fair return and revenue stability as set out by Bonbright. That is, the levelized approach may be used as an additional step in the pole attachment rate determination process in order to ensure long term stability in rates. For example, if the levelized cost base, was used in the 2005 attachment rate would have been $24.43, instead of $22.35, shown below:

	Item	Amount	Reference
A	Levelized Annual Indirect (Common) cost per pole	$102.80	Table 10, Column "G"
B	Common Cost Allocation Ratio	21.9%	Table 5, Row "I"
C	**Indirect cost per telecom attacher**	**$22.51**	= B x C
D	Direct cost per attacher	1.92	Table 5, Row "C"
E	**2005 Rate (based on levelized cost)**	**$24.43**	= B x C

That is, a constant rate $24.43 could have been applied for all years over the useful life of poles. In contrast, using current (net embedded) cost approach the rate varies from year to year as shown Table 11 below:

Table 11: Year to Year Pole Attachment Rate (Based on 2005 OEB Rate Model)

Year (N)	Common Cost per Pole (see Table 9 Column F)	Allocation Rate (Table 5, Row "I" above)	Indirect Cost Per Attacher	Direct Cost Per Attacher (Table 5, Row "I" above)	Rate Per Attacher
	A	B	D = A x B	E	F = D + E
1	$ 70.65	21.9%	$ 15.47	$ 1.92	$ 17.39
2	$ 121.73	21.9%	$ 26.66	$ 1.92	$ 28.58
3	$ 118.18	21.9%	$ 25.88	$ 1.92	$ 27.80
4	$ 114.62	21.9%	$ 25.10	$ 1.92	$ 27.02
5	$ 111.07	21.9%	$ 24.32	$ 1.92	$ 26.24
6	$ 107.52	21.9%	$ 23.55	$ 1.92	$ 25.47
7	$ 103.97	21.9%	$ 22.77	$ 1.92	$ 24.69
8	$ 100.41	21.9%	$ 21.99	$ 1.92	$ 23.91
9	$ 96.86	21.9%	$ 21.21	$ 1.92	$ 23.13
10	$ 93.31	21.9%	$ 20.43	$ 1.92	$ 22.35
11	$ 89.75	21.9%	$ 19.66	$ 1.92	$ 21.58
12	$ 86.20	21.9%	$ 18.88	$ 1.92	$ 20.80
13	$ 82.65	21.9%	$ 18.10	$ 1.92	$ 20.02
14	$ 79.10	21.9%	$ 17.32	$ 1.92	$ 19.24
15	$ 75.54	21.9%	$ 16.54	$ 1.92	$ 18.46
16	$ 71.99	21.9%	$ 15.77	$ 1.92	$ 17.69
17	$ 68.44	21.9%	$ 14.99	$ 1.92	$ 16.91
18	$ 64.89	21.9%	$ 14.21	$ 1.92	$ 16.13
19	$ 61.33	21.9%	$ 13.43	$ 1.92	$ 15.35
20	$ 57.78	21.9%	$ 12.65	$ 1.92	$ 14.57
21	$ 54.23	21.9%	$ 11.88	$ 1.92	$ 13.80
22	$ 50.67	21.9%	$ 11.10	$ 1.92	$ 13.02
23	$ 47.12	21.9%	$ 10.32	$ 1.92	$ 12.24
24	$ 43.57	21.9%	$ 9.54	$ 1.92	$ 11.46
25	$ 40.02	21.9%	$ 8.76	$ 1.92	$ 10.68
26	$ 18.96	21.9%	$ 4.15	$ 1.92	$ 6.07

The resulting year-to-year pole attachment rates based on the 2005 OEB Rate Model are depicted in Figure 4, below.

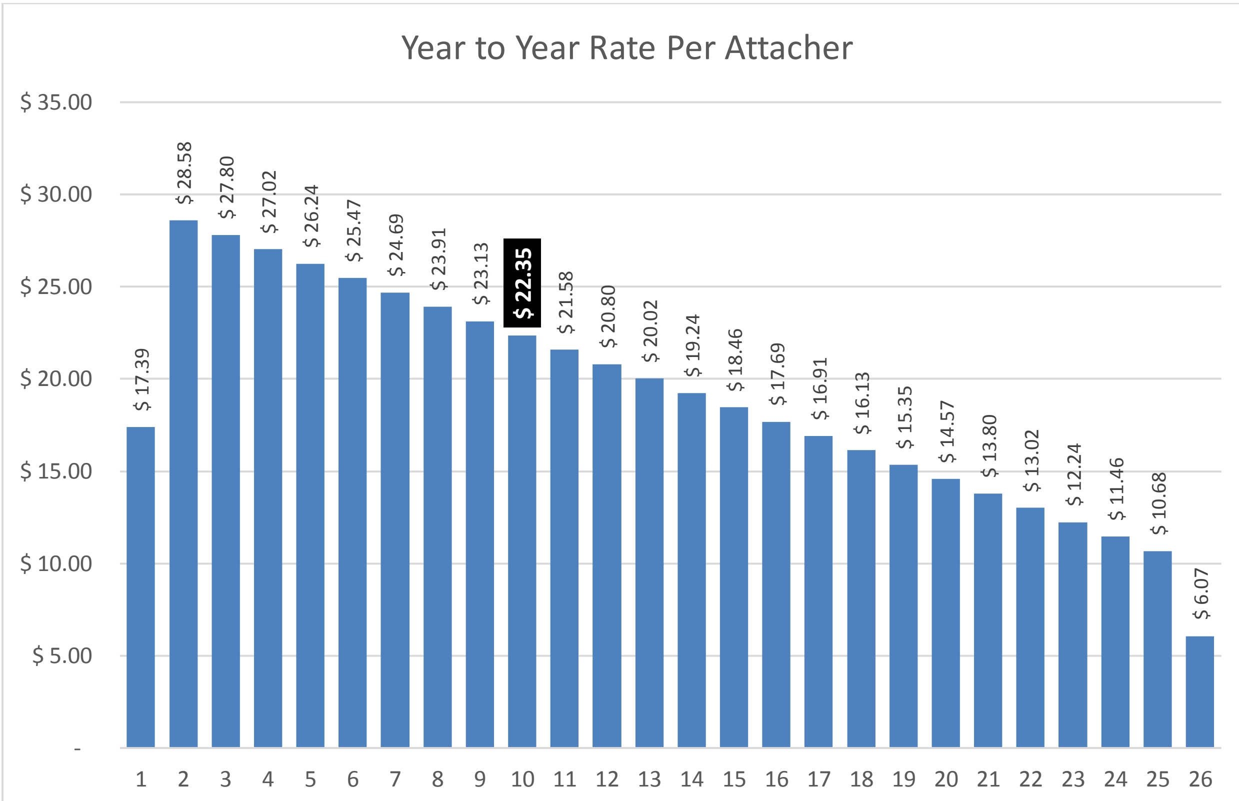


Figure 4: Year to Year Pole Attachment Rate (Based on 2005 OEB Rate Model)

The levelized cost approach may be used as a reference to avoid the possible rate variation - as shown in Table 11 and Figure 4 above. For example, based on levelized cost a constant (stable) rate of $24.43 could be maintained over the useful life of the pole. Using this rate as benchmark, the current OEB rate model could be modified to produce this rate. For instance, instead of using net embedded cost (gross book value less accumulated depreciation) for each year, net embedded cost may be estimated assuming on average the age of pole population is 75% of the total useful life[32] – some poles are newly installed, some are 10 years old, some have ended their useful life, and so forth. Accordingly, a constant rate using the current OEB Rate model may be developed. For example, Table 5 above may be revised as below:

[32] The 75% ratio may change depending on the applicable capital carrying cost rate.

Table 12: REVISED 2005 OEB Decision and Order – Cost Breakdown

	Price Component - Per Pole	$	Explanation
	DIRECT COST		
A	Administration Costs	$ 0.69	CRTC estimate 1999 $0.62, plus inflation
B	Loss in Productivity	$ 1.23	MEA estimate 1991 - $3.08, plus inflation, and divided between 2.5 pole attachers
C	Total Direct Costs	**$ 1.92**	A + B
	INDIRECT COST		
D	Net Embedded Cost per pole	**$583.31**	**= 75% x Embedded Cost $ 777.75 (Table 9, Column "A" above)**
E	Depreciation Expense	$ 31.11	Milton Hydro 1995 = $31.11
F	Pole Maintenance Expense	$ 7.61	Milton Hydro 1995 = $6.47, plus inflation
G	Capital Carrying Cost	$ 66.61	Pre-tax weighted average cost of capital 11.42% applied to net embedded cost per pole (D)
H	Total Indirect Costs per Pole	**$ 105.33**	E + F + G
I	Allocation Factor	21.9%	Allocation based on 2.5 attachers
J	Indirect Cost Allocated	$ 23.07	H x I
K	Annual Pole Rental Charge	**$ 24.99**	C + J

3 Wireline Pole Infrastructure in Ontario

In this section, key trends in pole infrastructure in the province over the last 10 years and the standard specifications for attachment rate-making are discussed.

3.1 Pole Population and Key Trends

The average age of poles and the number of new poles versus replacements are key parameters in determining the capital cost base of a pole. Some stakeholders have questioned the appropriate methodology for calculating the average age of poles and whether the number of pole replacements has in fact, increased in response to intensified third party use of poles. Analysis of historical trends provides a framework to examine these issues.

In response to Nordicity's data request, five LDCs (Toronto Hydro, Hydro One, Horizon, London Hydro, and Hydro Ottawa) provided their installed poles data from 2005 to 2015[33], which is summarized in Table 13 below.

[33] CHEC did not respond to Nordicity's data request for pole population. Toronto Hydro only provided pole population data, excluding attachments data as requested.

Table 13: LDCs' Total Installed Poles in Ontario

Year	Toronto Hydro	London Hydro	Ottawa Hydro	Hydro One	Horizon	Total (2)
2005	159,000	27,700	44,600	1,451,344	n/a	1,682,644
2006	190,816	27,860	46,761	1,463,344	n/a	1,728,781
2007	181,397	28,000	51,582	1,475,344	n/a	1,736,323
2008	142,300	28,000	49,201	1,487,344	52,332	1,759,177
2009	140,771	28,698	48,699	1,499,344	52,146	1,769,658
2010	139,842	29,424	48,574	1,511,344	52,146	1,781,330
2011	140,641	29,384	48,377	1,523,344	52,163	1,793,909
2012	135,986	28,345	48,298	1,535,344	52,031	1,800,004
2013	135,986	27,980	47,978	1,547,344	51,615	1,810,903
2014	135,986	27,680	47,825	1,559,522	51,418	1,822,431
2015	137,172	27,184	48,384	1,571,384	51,390	1,835,514
Average	149,082	28,205	48,207	1,511,364	51,905	1,774,607
CAGR(1)	**-1.47%**	**-0.19%**	**0.82%**	**0.80%**	**-0.26%**	**0.87%**

(1). CAGR: Compound Annual Growth Rate
(2). The "Total" represents the total of pole data submitted by LDCs as above, which approximately represent 97% of the installed LDC poles in the province of Ontario

Overall, total poles increased from 1,682,644 in 2005 to 1,835,514 in 2015, an increase of only 152,870 poles over 10 years, which is less than one percent (0.87%) from year to year. In two cases, the population decreased – Hydro One (-1.47%), and London Hydro (-0.19%). These trends imply that since the 2005 Decision, there has been no significant growth in the pole population which would have caused significant variation in the capital cost base of the poles. **Nordicity believes any material variation in the average installed cost per pole is mainly due to replacements rather than net growth in the poles infrastructure in the province**.

It is worth noting that advancements in technology, such as horizontal direction drilling (HDD), in the past 10 years have enabled more efficient and cost effective deployment of buried/conduit cable. For example, carriers are increasingly relying on HDD techniques in their new fibre-to-the-home (FTTH) projects.

Based on the 10-year (2005-2015) simple average pole population, 92.8% of the total LDC pole population is owned by just two LDCs: Hydro One (84.5%) and Toronto Hydro (8.3%), as shown in Figure 5 below[34]. It is worth noting that with the addition of the next three LDCs: Hydro Ottawa, Horizon and London Hydro, these five LDCs represent over 95% of the total pole population in the province.

[34] CHEC did not respond to the data request, therefore not included in the pole population distribution shown in Figure 5

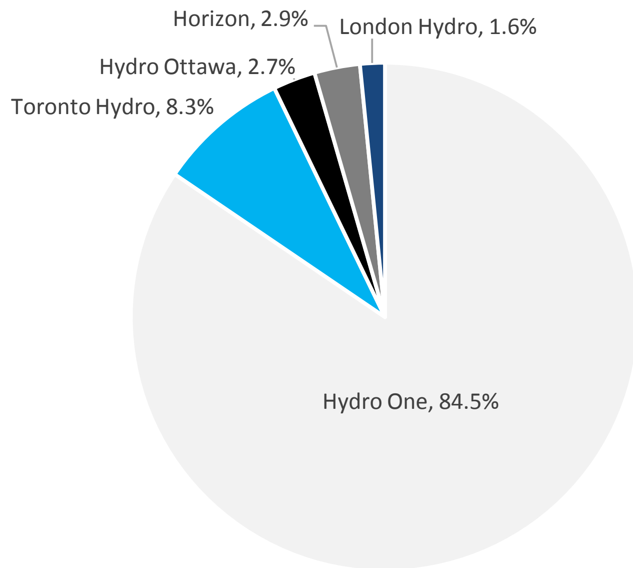
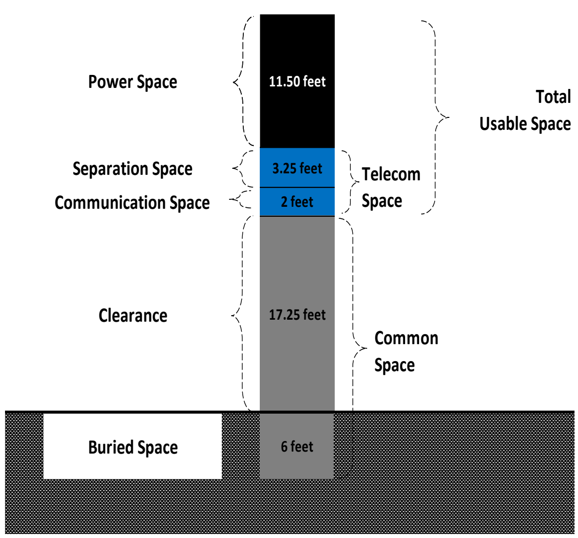


Figure 5: Average Pole Population by LDCs

3.2 Standard Pole Specification

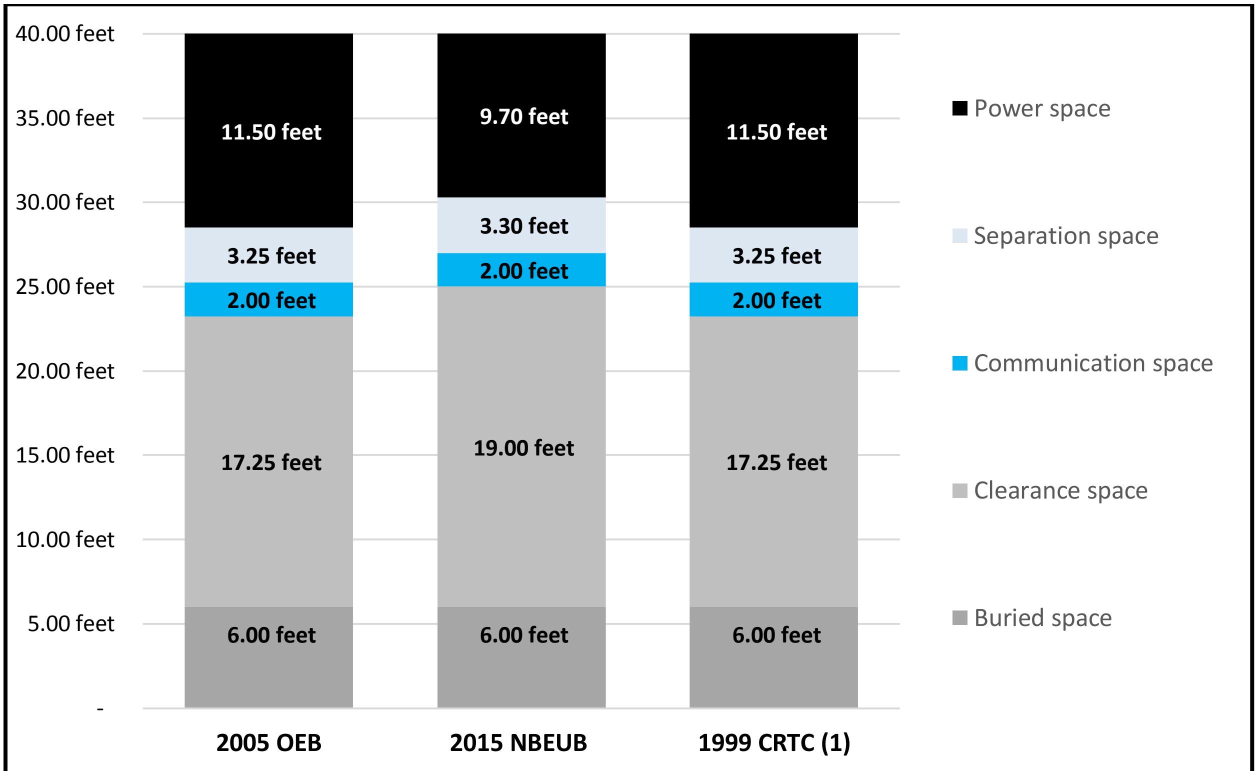
The 2005 OEB Decision was based on pole specifications, proposed by the Canadian Cable Television Association (CCTA), as shown in Figure 6 below:



	Feet
Power Space	**11.50**
Separation Space	3.25
Communication Space	2.00
Telecom Space	**5.25**
Total Usable Space	**16.75**
Clearance Space	17.25
Buried Space	6.00
Total Common Space	**23.25**
Total	**40.00**

Figure 6: Pole Specification used in 2005 OEB Rate Order

Other Canadian jurisdictions in their determinations also used an overall 40-foot pole height, with some minor variations in the different space areas, as shown in Figure 7 below:



(1) Most of the energy boards in other Canadian jurisdictions used CRTC pole specifications such as: BCUC (2009) BC; ANSUARB (2000) AB; and; AEUB (2000) NS.

Figure 7: Pole Specifications Used in Different Canadian Jurisdiction

During the consultation process, participating LDCs were requested to provide pole related data as a follow up to the 1st PAWG meeting. The purpose of this data request was to confirm whether the 40 feet pole size as shown in Figure 6 above fairly represents a standard pole in Ontario for rate making.

Table 14: Average Pole Specifications based on LDCs' Actual Data[35]

Pole Size (Feet)	Based on all Pole Classes						Joint Use Poles	
	Power Space (Feet)	Separation Space (Feet)	Communication Space (Feet)	Clearance Space (Feet)	Buried Space (Feet)	Total (Feet)	Total (Number)	%
30	3.86	2.87	1.90	14.91	4.95	28.50	61,047	8.8%
35	7.83	3.02	2.00	15.18	6.30	34.33	185,504	26.7%
40	11.77	3.22	2.00	14.56	7.17	38.73	192,239	27.7%
45	15.44	3.17	2.54	14.05	9.59	44.79	144,984	20.9%
50	20.96	3.33	2.00	13.99	8.77	49.06	46,437	6.7%
55	26.45	3.05	2.00	16.00	7.50	55.00	31,490	4.5%
60	30.64	3.08	2.00	16.28	8.00	60.00	18,725	2.7%
65	34.26	3.06	2.00	16.13	8.59	64.04	8,695	1.3%
70	38.79	3.08	2.00	17.13	9.00	70.00	3,086	0.4%
75	43.58	3.16	2.00	16.75	9.50	74.99	1,608	0.2%
80	47.50	3.23	2.00	17.25	10.00	79.98	451	0.1%
Other	n/a	n/a	n/a	n/a	n/a	n/a	3,089	0.4%
Total	13.08	3.12	2.10	14.76	7.42	40.49	693,815	100%
Sample (1)	11.39	3.14	2.15	14.64	7.53	38.85	522,727	75%
2005 OEB	11.50	3.25	2.00	17.25	6.00	40.00		

(1) Sample includes pole sizes of 35, 40, and 45 feet, which represent 75% of the total joint use poles shown above

According to Table 14 above, the average height of joint use poles is 40.49 feet, which is consistent with the 2005 OEB Decision. However, there are some differences in the space segments as noted below:

- Differences in separation space (3.25 vs. 3.12 feet), and communication space (2.00 vs. 2.1 feet) are minor;
- In case of power space, and buried space, actual averages are higher respectively by 1.6 feet (power space 11.5 vs. 113.08 feet), and 1.4 feet (buried space 6.00 vs. 7.42 feet); and,
- In the case of clearance space, there is a difference of 2.5 feet between the 2005 Order (17.25 feet) as compared to actual average (14.76 feet).

However, these differences are minimized if the calculation of the average is based on a 35, 40, and 45 feet (normal) size sample, which represents 75% of the above total pole population.

This analysis was presented to PAWG members in the second PAWG meeting on July 27, 2016. The participants agreed to maintain the pole specifications used in 2005 OEB Decision for the pole attachment rate calculation framework, as discussed in the next section.

[35] Includes pole data submitted by Hydro One, Hydro Ottawa, London Hydro, and Horizon. CHEC and Toronto Hydro did not respond to this data request.

4 Policy Attachment Rate Policy Framework

In the first PAWG meeting on May 20, 2016 Nordicity presented an overarching framework for the development of a pole attachment rate. The proposed framework is comprised of three key elements, as shown in Figure 8 below.

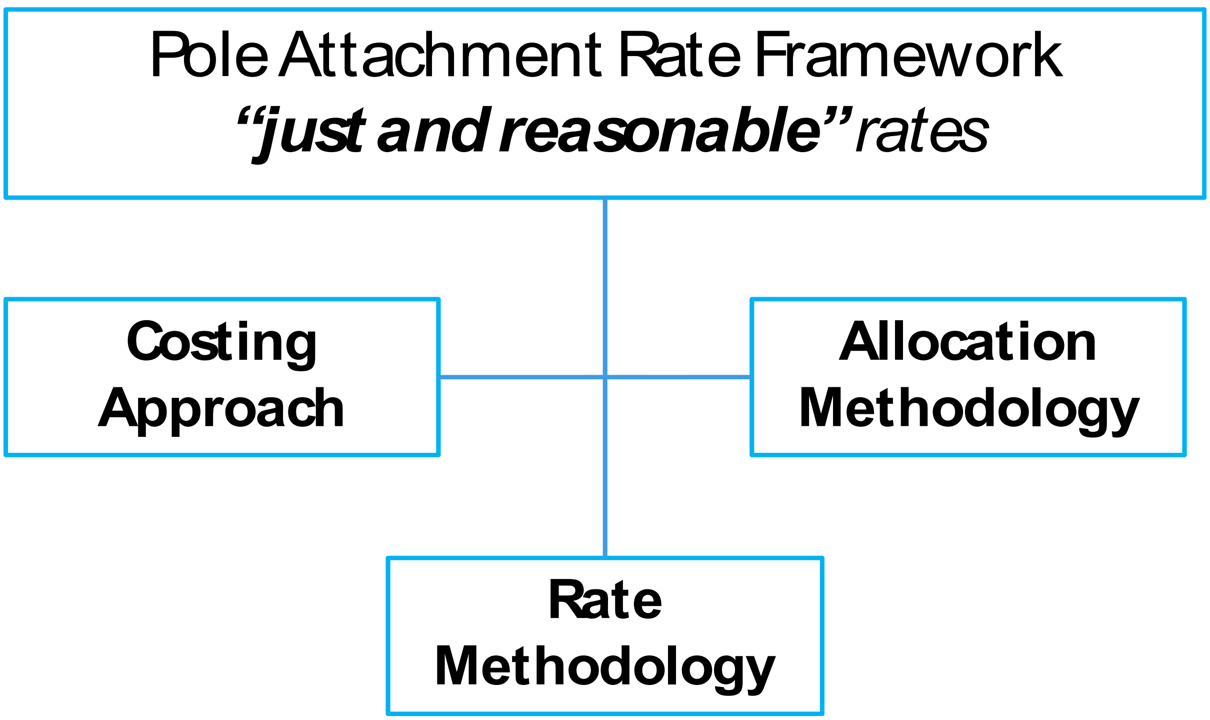


Figure 8: Key elements of pole attachment rate framework

It is worth noting that the above framework was used as a reference point for discussion in all the three subsequent three PAWG meetings. The three key elements of the rate framework are discussed in the following sections.

4.1 Costing Approach

The following three costing approaches may be considered for determining the common cost base for a pole attachment rate calculation:

- **Historical Cost**: Refers to the original or actual (book value) of the costs of poles operated by the LDC. Since the rate is determined for future years, this cost base may include budgeted estimates for the next two to three years. The budget estimates are normally based on historical cost trends and represent planned replacements of poles, as well as maintenance and repair expenditures.

- **Forward-looking/replacement cost:** Refers to the replacement cost of poles to service current and/or future volumes. The cost estimates may be based on a five to seven year forecast. This approach is useful if significant changes in cost structure and/or demand are anticipated in future.
- **Standard Cost (Benchmarking):** Refers to the cost of poles based on the industry's normal cost structure in comparable jurisdictions - excluding extraordinary costs such as disaster-recovery costs. This approach may be useful to determine a province-wide rate, assuming no major differences in the cost structure of poles operated by individual LDCs. This approach may also be useful in the following situations:

  (a) if reasonable cost estimates are not available for the LDCs operating in the province; and/or

  (b) actual costs across LDCs vary significantly due to differences in their respective accounting practice.

Table 6, above, indicates the costing approach used in different decisions in Canadian jurisdictions, which is primarily historical. It is pertinent to note that the trends in cost structure may lead different pole user groups to argue for a different costing approach. This issue has been noted by Tardiff in his paper *"Prices based on current or historical cost: How different are they?"* in the following word:[36]

> *"Parties advocating low rates favored replacement cost when equipment costs were expected to decrease, but original costs when such asset prices would be expected to increase"*

Tardiff further noted:

> *"……because the costs of acquiring, placing, and maintaining utility poles and conduit tend to increase over time because of their relatively low technology-intensity and relatively high labor-intensity, the use of historical cost pricing was widely believed to produce lower rates than would the use of current cost-based pricing"*[37]

In this context, it is important to note that historical cost would result in a significant understatement of rate in a scenario where:

i) The pole costs are significantly increasing due to inflationary factors such as increasing costs of material and labour, or new public safety and environment standards, regulations and by-laws; and,

ii) Major pole replacements are expected in the near future (next three to five years) due to aging of the pole infrastructure.

[36] Tardiff, J. T., "*Prices based on current or historical cost: How different are they?*", Journal of Regulatory Economics, Issue 47, 2015, p. 201

[37] Tardiff, J. T., "*Prices based on current or historical cost: How different are they?*", Journal of Regulatory Economics, Issue 47, 2015, p. 203

4.2 Allocation Methodology

After the cost base is ascertained, the next step in rate-making is to determine the appropriate approach to allocate costs associated with the common space of the pole (such as buried space and common space) between the two groups of attachers: telecom and power[38]. The following three approaches have been identified in the literature to allocate common costs of the pole:

1) **Proportionate**: This approach is based on the ratio of usable space (i.e. power space and communication space) used by the respective attacher groups. For illustration purposes, let's assume a total usable space of 10 feet which is comprised of 7 feet for power attachers and 3 feet for telecom attachers, and 30 feet of common space. Based on a proportionate allocation, then 9 feet [= (3÷10) x 30], or 30% of common cost is allocated to the telecom users. If there are two telecom attachers then 4.5 feet = 9 feet ÷ 2, or 15% is the ratio that will be used to allocated common cost to the individual telecom attacher. The NBEUB 2015 decision is a recent example of proportionate methodology, as shown in Table 15, below.

Table 15: Illustration of Proportionate Use Methodology (2015 NBEUB Decision - NB Power)

		Joint Pole Length (feet)		Attachers		Length Per Attacher (ft.)	Explanation
A	Power space	9.70	÷	1.00			A
B	Communication space	2.00	÷	1.40	=	1.43	B
C	Separation space	3.30	÷	1.40	=	2.30	D
D	**Total Usable Space**	15.00		2.40		**3.73**	**= A + B + C**
E	Clearance	19.00					E
F	Buried	6.00					F
G	**Total Common Space**	**25.00**					**= D + E + F**
H	**Total Pole Length**	**40.00**				**3.73**	**= D + G**
I	Allocation Rate					25.2%	= [(2+3.3) ÷ 15.0] ÷ 1.4
J	**Common Cost**	$ 79.91				**$ 20.15**	= $79.91 X 25.2%
K	**Direct Cost (Admin)**					**$ 0.62**	
L	**Total Rate**					$ 20.77	= J + K

In this regard, the NBEUB Decision noted:

"The proportionate sharing model, proposed by Rogers, recognizes the practical and economic

[38] Separation space is generally considered as part of communication space since it is required (causal) to provide for communication space in conformance with the safety standards of the province. However, Rogers (a carrier) in the PAWG third meeting (November 24, 2016) raised the issue that the separation space should be equally divided if an equal sharing approach is used to allocate common cost.

disparities between NB Power, as pole owner, and third party attachers. Third party communications attachers do not have the rights of ownership of the pole. They are required to apply through an intermediary to gain attachment access. The evidence indicates that they are generally allocated the less desirable field side of the pole. Economic efficiency dictates that paying a reasonable rate on another party's joint-use pole network is preferred over building a stand-alone system. Further, the Board is not convinced, as Dr. Mitchell suggested, that all users or potential users of joint-use poles are established utilities with substantial revenues." Para [93]

The NBEUB in para [94] of its Decision made the following determination:

"The Board recognizes that all of the cost allocation methodologies reviewed above can be viewed as yielding fair rates. For the reasons outlined above, the Board prefers the proportionate sharing of common costs as the most appropriate methodology for the allocation of common costs between NB Power and third party attachers."

2) **Equal Sharing:** This approach allocates common costs of the pole equally between the two attacher groups (power and telecom). To illustrate this approach, the same example as above is used assuming a total usable space of 10 feet, which is comprised of 7 feet for power attachers and 3 feet for the telecom attachers, as well as 30 feet of common space. Using this example, the equal sharing approach may be applied in two ways, as follows:

i) The first approach allocates the common space equally among all the combined number of attachers including power and telecom. That is, based on the example in 1) above, if there are three attachers (1 power + 2 telecom), each of the three attachers is allocated 10 feet (=30 feet ÷ 3), or 33% of the common space. The 2005 OEB Decision is based on this approach as illustrated in Table 16 below.

Table 16: Illustration of Equal Sharing Allocation Methodology (2005 OEB Order)

		Joint Pole Length (ft.)		Attachers		Length Per Attacher (ft.)	Explanation
A	Power space	11.50	÷	1.00			A
B	Communication space	2.00	÷	2.50	=	0.80	B
C	Separation space	3.25	÷	2.50	=	1.30	C
D	Total Usable Space	16.75		3.50		2.10	= A + B + C
E	Clearance	17.25					E
F	Buried	6.00					F
G	Total Common Space	23.25		3.50		6.64	= D + E + F
H	Total Pole Length	40.00				8.74	= D + G
I	Allocation Rate					21.9%	= 8.74 ÷ 40.0
J	Common Cost	$ 93.31				$ 20.43	= $93.21 X 21.9%
K	Direct Cost (Admin & LOP)					$ 1.92	
L	Total Rate					$ 22.35	= J + K

ii) The second approach is a hybrid between "Equal Sharing" and "Proportionate Use" approaches, with 50% or 15 feet (= 30 ÷ 2) of the common space allocated equally to each of the two user groups (power and telecom). If there are two telecom attachers then 7.5 feet (= 15 feet ÷ 2), or 25% of the total common space is allocated to the individual telecom attacher. This application of hybrid equal sharing is a novel approach proposed by Nordicity and has not been applied by any Canadian jurisdiction to the best of Nordicity's knowledge.

iii) Another variation of equal sharing methodology is the approach submitted by TransAlta in the 2000 Alberta Energy and Utilities decision (EUB Decision 2000-86 dated December 27, 2000). In this case, TransAlta submitted that the allocation methodology be based on a simplified hypothetical system where each utility constructs its own system without regard for existing facilities. TransAlta submitted that based on this approach each of the telephone and cable utilities accounted for 36% of the $51 total embedded cost per pole. The calculation of the 36% ratio was based on TransAlta's consideration of the following factors:

- TransAlta required longer poles than telephone or cable companies;
- TransAlta was prepared to bear a higher than average share of the costs;
- In areas where only TransAlta and one other party were present (telephone or cable), TransAlta accounted for 54% of the total cost and the other party accounted for 46% of the total cost; and
- In an area where TransAlta and two other parties were present (telephone and cable), TransAlta accounted for 38% of the cost while telephone and cable each accounted for 31% of the total cost.

The Alberta Energy and Utilities Board determined that shared-use poles are of a greater height and strength than single-use poles, and TransAlta's allocation of 36% of the $51 embedded cost per pole per year was reasonable. Since this allocation is based on a hypothetical scenario of three pole infrastructure systems (power, telephone, and cable), it lacks practicability and objectivity, particularly in jurisdictions such as Ontario where there are multiple electricity distribution utilities.

3) **Incremental:** This approach is based on the principle that the cost attributable to telecom attachers is the incremental annual cost per pole that is associated with the provision of additional space for telecom attachers on an LDC pole. For example, if a typical power-only (single attacher) pole height is 36 feet, and the LDC installs a 40-foot pole (instead of 36 feet) to accommodate telecom attachers, then under the incremental costing approach, the annual costs causal to the provision of the additional 4 feet is attributable to the telecom attachers. Although this approach has been discussed in different proceedings, it has not been implemented to date for pole attachment rates to the best of Nordicity's knowledge.

   The major limitation associated with this approach is that the proponents (third party attachers) of this methodology overlook the issue of cross-subsidization. To illustrate the cross-subsidization issue Nordicity assumes the following hypothetical example:

   - $80 is the cost of a dedicated pole of a telecom attacher
   - $100 is the cost of dedicated pole of a power attacher (power poles require additional strength)
   - $120 is the cost of a joint-use pole (power and telecom attachers) owned by an electric utility.

The proponents of the incremental costing approach would argue that telecom attacher should pay for the incremental cost of $20, which represents the cost of additional space to accommodate telecom attachers on an electric utility pole. However, the implication is that a telecom attacher using a joint-use pole avoids incurring a cost of $80, which only benefits their customers at the expense of electric utility customers. That is, it results in cross-subsidization of pole costs by electric utility customers.

In the 2000 Alberta Energy and Utilities Board decision (EUB Decision 2000-86 dated December 27, 2000), TELUS (telecom attacher) argued for incremental costing, which was opposed by TransAlta on the grounds that it can result in cross-subsidization. The Alberta Energy and Utility Board determined it reasonable that those customers (i.e. the telecommunications carriers and cable operators) that benefit from the use of TransAlta's distribution poles should pay an appropriate rate so that TransAlta's other customers do not incur or cross-subsidize this additional cost[39].

4.3 Rate Methodology

It is apparent from the preceding section (also see tables 15 and 16) that the number of attachers (also referred to as "users") is critical in the final rate outcome. The first issue in this regard is to determine whether a rate should be based on:

4) The number of attachers (users), or

5) The number of attachments

An attacher is referred to as an entity (firm) that is attached to an LDC pole. It is worth noting that the attachers can have more than one attachment. In addition, an attacher may also be hosting attachments of other entities, referred to as "overlashing. Overlashing, in certain cases is an effective way of efficiently accommodating additional attachments, particularly where space is limited.

In the second data request issued in June 2016, as part of the PAWG consultation process, LDCs (*Hydro One*, *Hydro Ottawa*, *Toronto Hydro*, *London Hydro*, *Horizon*, and *CHEC members*) were requested to provide data on the number of attachments. No response was received from the LDCs. According to Hydro One's response "*Hydro One will not be able to complete this tab* [attachment data request] *as Hydro One tracks permitted attachments on Hydro One owned poles using a data base that is not GIS related."*

Based on the responses received and feedback provided by LDCs during the second PAWG meeting on July 27th, 2016, it would appear at least for certain LDCs that current information systems do not have the capability to track and provide the number of attachments on an LDCs' poles. The magnitude of investment required to implement systems and processes to enable the tracking/counting of the number of attachments on their poles is yet to be determined.

[39] AEUB Decision 2000-86 (December 27, 2000), p. 20

Absent a count of the number of attachments, the alternative methodology is to continue with the status quo of using the number of attachers, which has been commonly used in pole attachment rate determinations. With the number of attachers, there are two approaches that can be used in the application of this methodology:

a) Presumptive Number of Attachers

This refers to the number of attachers assumed in the rate calculation in the absence of information required to determine the actual number of attachers for a certain service area. For example, US Federal Communications Commission (FCC) established rebuttable presumptive average numbers of attaching entities (attachers) for two categories, as below[40]:

- 3 attaching entities (attachers) for non-urbanized areas (less 50,000 population), representing *electric*, *telephone*, and *cable* attachers
- 5 attaching entities (attachers) for urbanized areas, representing *electric*, *telephone*, *cable*, *competitive telecommunications service providers,* and *governmental agencies*[41]*.*

Taking a similar approach, the OEB in its 2005 Order determined the average number of telecom attachers to be 2.5, (instead of 2 which had been assumed in previous CRTC decisions): "*The OEB considers 2.5 attachers to be reasonable. Things have changed since the days of the CRTC decision. If anything, there will be more than 2.5 attachers in the future"* (OEB 2005 Order, p. 7).

b) Actual Number of Attachers.

An alternative approach is to determine the actual number of attachers. However, this depends on the availability of consistent, reliable and verifiable actual data across all LDCs in the province. It is worth noting the FCC's explanation regarding its rebuttable presumptive average number of attachers approach. The FCC explained that: "*As with all our presumptions, either party may rebut this presumption with a statistically valid survey or actual data*" (FCC 01-170, 2001, paragraph 70, p. 39).

Subsequently, after considering rebuttals the FCC acknowledged that a gap existed between its presumptive average 5 (urbanized) and 3 (non-urbanized) attachers and the average based on an actual count of attachers. Accordingly, the FCC in its November 24, 2015 Order (FCC 15-151) expanded its presumptive average attachers definition according to service area categories, instead of urbanized and non-urbanized[42]. The FCC's expanded presumptive attachers' averages by service areas currently include 5, 4, 3, and 2 attaching entities.

[40] See "CONSOLIDATED PARTIAL ORDER ON RECONSIDERATION" FCC 01-170, May 25 2001, paragraphs 69-72, p.39-40
[41] "The record supports a presumptive average number of five attachers in urbanized areas" (FCC 01-170, 2001, para 72, p.40)
[42] "Specifically, we add cost allocators for poles with 2 and 4 attaching entities to augment the current cost allocators that target poles with 3 and 5 attaching entities. We also provide that, for fractional attaching-entity averages, cost allocators are to

In its recent decisions, the OEB has relied on the actual attacher count evidence submitted by LDCs[43]. For example, in its February 2016 Hydro Ottawa decision (EB-2015-0141), the OEB determined that an average of 1.74 telecom attachers (excluding power) per pole submitted by Hydro Ottawa based on an actual count was appropriate. Previously, the New Brunswick Energy and Utilities Board (NBEUB) in its 2015 (matter no. 272) Decision accepted NB Power's calculation of 2.4 (including power) attachers. NBEUB in its decision noted that "This [2.4 attachers] represents the quotient of the total number on its poles, divided by the number of NB Power joint-use poles"

Based on the above three precedents (FCC, OEB, NBEUB), it can be reasonably argued that it is more appropriate to base the calculation on the total number of joint use poles with an actual number of attachers instead of a presumptive average of attachers - subject to satisfying the following criteria[44]:

- the actual average number of attachers estimate/calculation is based on reasonably reliable and verifiable data;
- the actual average number of attachers justly and reasonably represents the specific usage of individual attachers; and;
- the actual average number of attachers calculation is relatively consistent across all LDCs in the province.

In this context, LDCs were requested to provide attacher data, following the May 20, 2016 PAWG first meeting. London Hydro, Hydro Ottawa, and Horizon submitted the data in accordance with the specified format, which is summarized in Table 17 below.

be interpolated from the whole-number cost allocators." (FCC 15-151, 2015, paragraph 16, p. 8)

[43] The Board relied on its 2005 Order, that provided for that "Any LDC that believes that the province-wide rate is not appropriate can bring an application to have the rates modified based on its own costing" (p. 8).

[44] Some may further argue that the actual average number must meet the market test – that is the number must reasonably reflect the general business environment. For example, typically a joint use pole would include at least two attachers: power (LDC), and telco (ILEC). With presence of cablecos in certain geographies (e.g. urbanized areas), the joint-use pole is likely to have at least 3 three attachers in certain parts of the province. With the emergence of CLECs (competitive communication service providers), and the attachment of street lights in certain parts of the province, the actual attacher count may be 4 to 5.

Table 17: Average Attachers per Pole (excluding Hydro One)

Pole Size (Feet)	London Hydro				Hydro Ottawa				Horizon				Province (excl. Hydro One)			
	Poles		Total Attachers	Attachers per Pole	Poles		Attachers	Attachers per Pole	Poles		Attachers	Attachers per Pole	Poles		Attachers	Attachers per Pole
30	2,149	8%	2,822	1.31	1,472	3%	2,626	1.78	3,623	7%	9,414	2.60	7,244	6%	14,862	2.05
35	**4,937**	**18%**	**9,041**	**1.83**	**6,078**	**13%**	**12,412**	**2.04**	**12,931**	**26%**	**30,879**	**2.39**	**23,946**	**19%**	**52,332**	**2.19**
40	**4,836**	**18%**	**10,929**	**2.26**	**10,650**	**22%**	**22,867**	**2.15**	**11,500**	**23%**	**29,968**	**2.61**	**26,986**	**22%**	**63,764**	**2.36**
45	**5,831**	**21%**	**13,113**	**2.25**	**12,268**	**25%**	**26,811**	**2.19**	**11,513**	**23%**	**34,905**	**3.03**	**29,612**	**24%**	**74,829**	**2.53**
50	3,243	12%	9,775	3.01	5,168	11%	10,757	2.08	6,508	13%	21,336	3.28	14,919	12%	41,868	2.81
55	3,931	14%	11,318	2.88	3,619	8%	8,234	2.28	2,977	6%	10,466	3.52	10,527	8%	30,018	2.85
60	1,701	6%	2,603	1.53	4,098	8%	9,861	2.41	595	1%	1,895	3.18	6,394	5%	14,359	2.25
65	393	1%	681	1.73	1,271	3%	2,874	2.26	73	0%	257	3.52	1,737	1%	3,812	2.19
70	139	1%	216	1.55	373	1%	780	2.09	11	0%	35	3.18	523	0%	1,031	1.97
75	24	0%	40	1.67	132	0%	224	1.70	3	0%	6	2.00	159	0%	270	1.70
80	-	0%	-	n/a	33	0%	50	1.52	-	0%	-	n/a	33	0%	50	1.52
Other	-	0%	-	n/a	3,090	6%	3,375	1.09	-	0%	-	n/a	3,090	2%	3,375	1.09
Sample	**15,604**	**57%**	**33,083**	**2.12**	**28,996**	**60%**	**62,090**	**2.14**	**35,944**	**72%**	**95,752**	**2.66**	**80,544**	**64%**	**190,925**	**2.37**
Total	**27,184**	**100%**	**60,538**	**2.23**	**48,252**	**100%**	**100,871**	**2.09**	**49,734**	**100%**	**139,161**	**2.80**	**125,170**	**100%**	**300,570**	**2.40**

- Sample attachers per pole is based on weighted average of joint use pole sizes 35, 40, and 45 feet, which represent 75% of the total
- Total attachers per pole is based on weighted average of joint use poles of all sizes listed above.

According to Table 17 above, the average number of attachers per pole is estimated at 2.4, based on data provided by Hydro Ottawa (2.09), London Hydro (2.23), and Horizon (2.80). These are overall attacher averages including 1 for power space and 1.4 for telecom space, excluding Hydro One.

Toronto Hydro and CHEC did not submit the attachment data. Hydro One indicated that it does not track attachment data by pole size. However, based on the billing data, Hydro One provided a summary of its attachment data i.e. total number of attachments and poles. If Hydro One's summary of attachments is incorporated, the overall average attachment per pole reduces to 2.3, instead of 2.4 as shown in the Table 18, below.

Table 18: Average Attacher per Pole (including Hydro One)

		Hydro One		Other		Total	
Number of Poles							
A	Power only	1,001,477	64%	138,960	53%	1,140,437	62%
B	Joint Use	572,185	36%	125,170	47%	697,355	38%
C = B + C	Total	**1,573,662**	100%	**264,130**	100%	**1,837,792**	100%
Attachers							
D = C	Power	1,573,662	68%	264,130	60%	1,837,792	67%
E	Telecom + Other	733,753	32%	175,400	40%	909,153	33%
F = D + E	Total	**2,307,415**	100%	**439,530**	100%	**2,746,945**	100%
Average Attacher Per Pole							
G = E / B + 1	per Joint Use Poles	2.28		2.40		2.30	
H = F / C	per All Poles	1.47		1.66		1.49	

The analysis provided in Tables 17 and 18 above was presented at the PAWG's second July 27th, 2016 (2nd) and third November 24th, 2016 (3rd) meetings for feedback and comments. It is worth noting, as stated above, 1.3 average attacher (excluding power) shown in Table 18 above are based on poles data submitted by the four participating LDCs, including Hydro One, Hydro Ottawa, London Hydro, and Horizon

5 Determining Average Annual Common (Indirect) Cost per Pole

As shown in Figure 6 above, a pole is comprised of three main sections – common space, communication space, and power space. Power and communication spaces are referred to as usable space. The two broad categories of costs associated with these sections include:

a) Capital Cost: Refers to the capitalized cost of a pole, which includes items such as the initial installation cost of a pole, replacements, capitalized upgrades, and capitalized repairs, if any.

b) Expenses: Primarily refers to ongoing maintenance and repair of poles.

Nordicity understands that these costs are recorded in the following three Uniform System of Accounts (USoA) accounts as specified in the OEB 2012 Accounting Procedures Handbook (APH):

i) Account # 1830: Poles, Towers, and Fixtures (Capital Cost)

ii) Account # 5120: Maintenance of Poles, Towers and Fixtures

iii) Account # 5135: Overhead Distribution Lines and Feeders - Right of Way

Detailed descriptions of these accounts are provided in the OEB's APH and are reproduced in appendices A1, A2, and A3. According to the account descriptions, these accounts include items that are typically related to power lines – power fixtures. To determine the relevant costs for calculation of the pole attachment rate, power fixture-related costs need to be removed. In the second and third PAWG meetings the LDCs were asked if they maintained sub-accounts to track power fixture-related costs separately. Except for London Hydro, all other LDCs (Hydro Ottawa, Hydro One, Horizon) confirmed that they did not maintain sub accounts to separately track the pole-related costs of assets (common costs) from strictly power fixtures (power-only costs).

5.1 Average Embedded Cost per Pole

It is worth noting that in certain proceedings in the USA and Canada, the accounting cost of poles has been reduced by a factor of 15% to remove the cost of power-specific fixtures. For example, the FCC in its *Order of Reconsideration* determined, "*We also affirmed our adjustment to a utility's net pole investment of 15% for electric utilities and 5% for LECs to eliminate the investment in crossarms and other non-pole related items*" (FCC 01-170, para 32, p. 20-21). The NBEUB in its 2015 Decision noted a "*15% reduction had been agreed upon by the various stakeholders, as referred to in the 2008 Report, which was applied to NB Power's calculation of the average embedded cost*" (para 11, p.3).

The following excerpt from the Order of the Public Service Commission (Kentucky, USA), dated August 12, 1982, provides detailed historical context to the application of the 15% adjustment factor.

"South Central Bell used 78 percent of its gross pole accounts as a "bare pole factor" to exclude investment attributable to appurtenances, i.e., cross arms, guys, anchors, etc. CATV's testimony was that 85 percent of pole accounts was accepted industry standard for bare poles, which standard includes investment in anchors and guy wires and excludes all other appurtenances. General Telephone has also used 85 percent factor, but has testified that this factor excludes "cross arms, anchors and other fixtures," which appears inconsistent with the testimony of other parties.

"Therefore, for telephone utilities the Commission finds that 22 percent of the utility's pole account consists of appurtenances and should be excluded.

"For electric utilities, the cost of major appurtenances such as cross arms can be specifically identified in sub-accounts and excluded, but lesser appurtenances such as aerial cable clamps, pole top pins, and ground wires are not segregated in the basic pole accounts. Kentucky Power offered the only specific evidence on ground wire cost, for which it adds $12.21 to the pole accounts, and estimated that 8.7 per cent of the unsegregated pole accounts represents lesser appurtenances. It was acknowledged generally by CATV operators and the telephone utilities that an exclusion of 15 percent for pole appurtenances would be reasonable, but this percentage did not include the cost of anchors.

"Consistent with our finding that 22 percent of the utility's pole account is a reasonable exclusion for telephone utilities, and the ratio of the cost of anchors to the basis pole accounts should not vary significantly between telephone and electric utilities, the Commission finds that an adjustment of 15 percent and a deduction of $12.50 per ground will reasonably approximate the cost of an average base wooden electric utility pole." (Public Service Commission, Kentucky, USA, 1982, p.8-9)

To determine the gross capital cost (account 1830) attributable to the pole, there were two options:

a) Undertake a detailed analysis and audit of the account 1830 maintained by individual LDCs, or

b) Request LDCs to provide estimated breakdowns based on an analysis of sample data.

Option a) was considered to be time consuming, and not feasible given the specified duration and scope of this study. Accordingly, the participating LDCs were requested to provide an estimated breakdown of account 1830 into “Poles”, “Power Fixtures”, and “Other”[45]. Table 19, below provides a summary of the cost breakdown in account 1830 for the years 2005-2015.

The distribution of embedded cost per pole is separated into three sub-items - poles, power fixtures, and other - based on data submitted by Hydro One, Hydro Ottawa, and London Hydro. For the other two LDCs (Horizon and Toronto Hydro), the distribution was estimated based on the distribution ratios submitted by London Hydro[46] Since CHEC did not respond to the data request, it was not included in the averages shown in Table 19 below.

Table 19: Historical (Embedded) Cost per Pole (2005-2015) – Account 1830

Year	Installed Poles	Total General Submission		Distribution of Capital Cost - Act 1830					
				Poles		Power Fixtures		Other	
2005	1,682,644	$ 1,182.70	100.0%	$ 1,010	85.4%	$ 170.93	14.5%	$ 1.94	0.2%
2006	1,728,781	$ 1,211.74	100.0%	$ 1,035	85.4%	$ 175.03	14.4%	$ 2.02	0.2%
2007	1,736,323	$ 1,271.95	100.0%	$ 1,086	85.4%	$ 183.63	14.4%	$ 2.15	0.2%
2008	1,759,177	$ 1,356.02	100.0%	$ 1,158	85.4%	$ 196.15	14.5%	$ 2.18	0.2%
2009	1,769,658	$ 1,425.86	100.0%	$ 1,217	85.3%	$ 207.32	14.5%	$ 1.97	0.1%
2010	1,781,330	$ 1,481.52	100.0%	$ 1,264	85.3%	$ 215.46	14.5%	$ 2.03	0.1%
2011	1,793,909	$ 1,568.97	100.0%	$ 1,339	85.3%	$ 228.15	14.5%	$ 2.16	0.1%
2012	1,800,004	$ 1,592.92	100.0%	$ 1,357	85.2%	$ 234.98	14.8%	$ 1.19	0.1%
2013	1,810,903	$ 1,715.97	100.0%	$ 1,462	85.2%	$ 252.95	14.7%	$ 1.34	0.1%
2014	1,822,431	$ 1,814.17	100.0%	$ 1,546	85.2%	$ 267.02	14.7%	$ 1.53	0.1%
2015	1,835,514	$ 1,890.97	100.0%	$ 1,611	85.2%	$ 277.87	14.7%	$ 1.73	0.1%
Average	**1,774,607**	**$ 1,501.16**	**100.0%**	**$ 1,280.28**	**85.3%**	**$ 219.04**	**14.6%**	**$ 1.84**	**0.1%**

According to Table 19 above, the overall cost per pole increased by 4.8% annually, from $1,182.70 (2005) to $1,890.97. The 10 year (2005-2015) simple average cost per pole is $1,501.16, including 85.3%

[45] Although the description of Account # 1830 in OEB’s Accounting Procedures Handbook (APH) includes “Towers” LDCs confirmed that towers (if any) are separately recorded and any cost of towers is not included in their respective account 1830.

[46] The updated distribution ratios provided by London Hydro are same as those of Hydro One, which are 85% Poles, and 15% Power Fixtures

cost attributable to poles[47]. The 85.3% ratio is consistent with the 78% to 85% range used in the precedents cited above. However, according to the data submitted by the three LDCs, the ratio of cost attributable to poles varies somewhat, as listed below:

- Hydro Ottawa: 92%,
- Hydro One: 85%, and
- London Hydro: 85%.

The range of 92% to 85% may imply either inconsistency in accounting practices across LDCs or peculiar characteristics of individual LDCs' poles cost structure. Without an independent substantive assessment of LDCs' accounts it is not possible to clearly ascertain the cost attributable to poles in their Account 1830 and other related accounts, if any.

Based on the best available data Nordicity believes it is reasonable to presume an average embedded cost per pole of $1,280.28 for allocation between power and communication attachers, which is based on a 10-year trend and represents 85.3% of account 1830. Table 20 below provides a summary of Nordicity's proposed average embedded cost per pole.

Table 20: Estimated Average Embedded Cost per Pole

Embedded Cost per Pole (1830)	Total *10 Year Average (2005-15)*		Applicable to Poles (%)	Estimated Cost	
Pole	$ 1,280.28	85.3%	100.0%	$ 1,280.28	*100.0%*
Towers	-	-	-	-	-
Power Fixtures	$ 219.04	14.6%	-	-	-
Other	$ 1.84	0.1%	-	-	-
	$ 1,501.16	100.0%		**$ 1,280.28**	***100.0%***

5.2 Net Embedded Cost per Pole

Net embedded cost refers to the net book value of capital assets (poles):

Net Embedded Cost =	**[Gross Book Value of Poles or Account # 1830] – [Accumulated Depreciation of Poles)**

In terms of the OEB's current rate framework, net embedded cost is needed to determine the carrying (financing) cost of net investment in poles. According to the OEB Accounting Procedures Handbook, only five consolidated accumulated depreciation accounts exist for this group of assets, as listed below:

[47] Based on the 2005-2015 cost, the weighted average cost per pole is $1,506.49, which is similar to the simple average of $1,501.16, shown in Table 19 above.

Account #	Description
2105	Accumulated Depreciation of Electric Utility Plant - Property, Plant and Equipment
2120	Accumulated Amortization of Electric Utility Plant - Intangibles
2140	Accumulated Amortization of Electric Plant Acquisition Adjustment
2160	Accumulated Depreciation of Other Utility Plant
2180	Accumulated Depreciation of Non Rate-Regulated Utility Property

It is apparent from the above list that no corresponding accumulated depreciation account is reported by LDCs for the account # 1830 in the OEB's RRR system: Poles, Towers, and Fixtures (Capital Cost). That is, accounting depreciation recorded for poles is embedded in account 2105 and it is not possible to segregate costs in this account in order to compute the net embedded cost of poles, unless the information is acquired through a distributor's rate application. During the consultation process, the LDCs confirmed that they do not maintain any sub-account(s) in their accounting systems to separately account for accumulated depreciation for poles. Based on this understanding, in the first data request, LDCs were requested to provide year-to-year estimates of embedded and net embedded costs per pole, as summarized in Table 21 below.

Table 21: LDCs Estimate of Embedded and Net Embedded Cost per Pole

Year	Average Cost Per Pole ($)											
	Toronto Hydro		London Hydro		Ottawa Hydro		Hydro One		Horizon		Average	
	Embedded	Net Embedded	Embedded	Net Embedded	Embedded	Net Embedded	Embedded	Net Embedded	Embedded	Net Embedded	Embedded	Net Embedded
2005	1,779	1,083	270	235	2,404	1,122	1,061	550	n/a	n/a	1,151	610
2006	1,530	893	308	263	2,439	1,133	1,116	599	n/a	n/a	1,185	641
2007	1,694	961	369	310	2,328	1,065	1,169	647	n/a	n/a	1,246	687
2008	2,253	1,236	443	369	2,494	1,085	1,231	702	1,206	745	1,335	752
2009	2,348	1,233	1,227	625	2,251	1,087	1,286	754	1,340	841	1,398	802
2010	2,455	1,245	1,208	600	1,092	1,092	1,351	815	1,446	921	1,431	856
2011	2,637	1,393	1,271	630	1,242	1,210	1,423	885	1,634	1,073	1,517	935
2012	2,816	1,483	1,354	699	1,399	1,331	1,490	951	1,222	1,164	1,577	1,003
2013	2,910	1,528	1,420	736	1,582	1,475	1,608	1,067	1,337	1,245	1,694	1,112
2014	1,511	1,463	1,505	792	1,792	1,641	1,750	1,210	1,450	1,322	1,721	1,237
2015	1,999	1,883	1,586	837	2,016	1,819	1,793	1,254	1,587	1,420	1,805	1,314
Average	**2,176**	**1,309**	**997**	**554**	**1,913**	**1,278**	**1,389**	**858**	**1,403**	**1,091**	**1,460**	**905**

As shown in Table 21 above, the 10-year average embedded cost per pole based on LDCs estimate is $1,460, which is only 2.7% lower than the $1,501 based on Account # 1830 (see Table 19 above). As also shown in Table 21 above, the 10-year average of net embedded cost per pole, according to LDCs' estimates is $905. This means, accumulated depreciation is estimated to be 38.01% of the poles infrastructure embedded cost [= 1 – ($905 ÷ $1,460)]. Based on this analysis, the net embedded cost of poles is estimated below:

Embedded Cost per Pole (see Table 20)	**= $1,280.28**
Less: Accumulated Depreciation (38% x $1,280.28)	= $ 487.08
Net Embedded Cost	**= $ 793.20**

5.3 Annual Depreciation Cost of Pole

Based on the OEB's current rate model, depreciation is a major element of the annual common cost per pole. The current rate model is based on the straight-line depreciation method for a useful life of 25 years. Based on the data submitted by the five LDCs in response to the first data request, they all have used the straight-line method over the last 10 years (2010-2015). However, as shown in Table 22 below, all five LDCs changed their calculation of the useful life of poles and correspondingly the depreciation rate:

- In 2012 London Hydro changed the useful life from 25 years (4%) to 50 years (2%),
- Hydro Ottawa changed from 25 years (4%) to ~45 years (2.2%),
- Toronto Hydro uses a useful life of 44.44 years (2.25%),
- Horizon changed from 25 years (4%) to 45 years (2.22%), and
- In 2015 Hydro One changed from ~55 years (1.83%) to ~59 years (1.70%).

Table 22: Depreciation Method, Depreciation Rate and Useful Life of Poles used by LDCs

Year	Toronto Hydro			London Hydro			Ottawa Hydro			Hydro One			Horizon		
	Depreciation Method	Rate	Useful Life (Years)	Depreciation Method	Rate	Useful Life (Years)	Depreciation Method	Rate	Useful Life (Years)	Depreciation Method	Rate	Useful Life (Years)	Depreciation Method	Rate	Useful Life (Years)
2005	SL	2.25%	44.44	SL	4.00%	25.00	SL	4.00%	25.00	SL	1.83%	54.64	SL	4.00%	25.00
2006	SL	2.25%	44.44	SL	4.00%	25.00	SL	4.00%	25.00	SL	1.83%	54.64	SL	4.00%	25.00
2007	SL	2.25%	44.44	SL	4.00%	25.00	SL	4.00%	25.00	SL	1.83%	54.64	SL	4.00%	25.00
2008	SL	2.25%	44.44	SL	4.00%	25.00	SL	4.00%	25.00	SL	1.83%	54.64	SL	4.00%	25.00
2009	SL	2.25%	44.44	SL	4.00%	25.00	SL	4.00%	25.00	SL	1.83%	54.64	SL	4.00%	25.00
2010	SL	2.25%	44.44	SL	4.00%	25.00	SL	4.00%	25.00	SL	1.83%	54.64	SL	4.00%	25.00
2011	SL	2.25%	44.44	SL	4.00%	25.00	SL	4.00%	25.00	SL	1.83%	54.64	SL	4.00%	25.00
2012	SL	2.25%	44.44	SL	2.00%	50.00	SL	2.20%	45.45	SL	1.83%	54.64	SL	2.22%	45.00
2013	SL	2.25%	44.44	SL	2.00%	50.00	SL	2.20%	45.45	SL	1.83%	54.64	SL	2.22%	45.00
2014	SL	2.25%	44.44	SL	2.00%	50.00	SL	2.20%	45.45	SL	1.83%	54.64	SL	2.22%	45.00
2015	SL	2.25%	44.44	SL	2.00%	50.00	SL	2.20%	45.45	SL	1.70%	58.82	SL	2.22%	45.00

SL: Straight Line

The summary data provided in Table 22 above, was presented to the second PAWG meeting on July 27,

2016. After discussion, PAWG participants agreed to apply 40 years (2.5% annual straight line depreciation)[48] for rate calculation purposes. Based on this agreement, the annual average depreciation per pole is as follows:

Average Annual Depreciation per Pole	***= Embedded Cost Per Pole* x *Annual Straight Line Depreciation***
	= $1,280.28 (see Table 19) x 2.5%
	= **$32.00**

5.4 Capital Carrying Cost (Cost of Capital)

Capital carrying represents the financing cost of net investment (net embedded cost) in poles. Capital carrying cost is also a major component of the average annual common cost per pole. The 2005 OEB Decision included a $54.59 capital carrying cost, which was based on 11.42% of the $478 net embedded cost. The 11.42% represented the pre-tax weighted average cost of capital, determined by the OEB for its 2005 Decision. In order to estimate the currently applicable cost of capital, LDCs were requested to provide their year-to-year cost of capital rates. Only four LDCs responded - Toronto Hydro, Ottawa Hydro, Hydro One, and Horizon - as summarized in the Table 23 below.

Table 23: LDCs Capital Carrying Cost - Cost of Capital[49]

Year	Toronto Hydro	Ottawa Hydro	Hydro One	Horizon	LDC Simple Average	LDC Weighted Average
2005	n/a	6.75%	n/a	n/a	6.75%	**6.75%**
2006	6.52%	6.75%	8.66%	n/a	7.31%	**8.37%**
2007	6.52%	6.75%	8.66%	n/a	7.31%	**8.38%**
2008	6.60%	6.55%	8.75%	7.02%	7.23%	**8.46%**
2009	6.34%	6.55%	8.75%	7.02%	7.17%	**8.44%**
2010	7.04%	6.55%	8.97%	7.02%	7.40%	**8.69%**
2011	6.94%	6.55%	8.49%	7.17%	7.29%	**8.27%**
2012	6.94%	6.95%	8.49%	7.17%	7.39%	**8.29%**
2013	6.94%	6.70%	8.49%	7.17%	7.33%	**8.29%**
2014	6.94%	7.00%	8.49%	7.17%	7.40%	**8.30%**
2015	6.17%	6.70%	7.87%	5.75%	6.62%	**7.65%**
Average	**6.70%**	**6.71%**	**8.56%**	**6.94%**	7.24%	**8.17%**

Table 23 was presented at the second PAWG meeting on July 27, 2016. According to Table 23, the overall (10 year – 4 LDCs combined) cost of capital is 7.24% (simple average), and 8.17% (weighted

[48] 2.5% depreciation rate = (1 ÷ 40 years useful life) x 100.

[49] The rates submitted by LDCs as shown in Table 23 are the after-tax cost of capital. However, for the purpose of pole the attachment rate calculation, before-tax cost of capital is used to allow for recovery of tax in overall revenue requirement calculation of the LDCs.

average)[50]. Nordicity believes the weighted average better represents the overall cost of capital. Accordingly, the capital carrying cost per pole is estimated below:

Capital Carrying Cost per Pole	= Net Embedded Cost Per Pole x Cost of Capital
	= $793.20 (see section 6.2) x 8.17%
	= $ 64.80

5.5 Average Annual Maintenance Cost of Poles

During the second PAWG meeting, the following two key accounts were identified regarding the maintenance cost of poles:

i) Account # 5120: Maintenance of Poles, Towers and Fixtures

ii) Account # 5135: Overhead Distribution Lines and Feeders - Right of Way

In terms of the APH description, these accounts also include items that are not strictly attributable to poles. During the PAWG consultation process, all LDCs confirmed that they did not maintain sub accounts for these accounts to track pole costs separately. Therefore, LDCs were requested to provide an estimated distribution of costs in the above two accounts for 2005-2015.

5.5.1 Annual Maintenance Cost per Pole - Account # 5120

Table 24 below provides a summary of the distribution of maintenance costs in account 5120.

Table 24: **Annual Maintenance Cost Per Pole – Account 5120**

Year	Installed Poles	Total General Submission		Distribution of Maintenance Cost - Act 5120					
				Poles		Power Fixtures		Other	
2005	1,682,644	35.11	100.0%	1.79	5.1%	33.32	94.9%	0.00	0.0%
2006	1,728,781	42.75	100.0%	2.16	5.1%	40.58	94.9%	0.00	0.0%
2007	1,736,323	11.58	100.0%	0.63	5.5%	10.94	94.5%	0.00	0.0%
2008	1,759,177	13.02	100.0%	0.87	6.7%	12.14	93.2%	0.01	0.1%
2009	1,769,658	12.73	100.0%	0.85	6.7%	11.87	93.3%	0.01	0.1%
2010	1,781,330	12.28	100.0%	0.91	7.4%	11.35	92.5%	0.01	0.1%
2011	1,793,909	16.06	100.0%	1.07	6.7%	14.98	93.3%	0.01	0.1%
2012	1,800,004	13.80	100.0%	1.02	7.4%	12.77	92.5%	0.01	0.1%
2013	1,810,903	14.50	100.0%	1.07	7.4%	13.42	92.5%	0.01	0.1%
2014	1,822,431	13.33	100.0%	0.90	6.7%	12.42	93.2%	0.01	0.1%
2015	1,835,514	11.67	100.0%	0.77	6.6%	10.89	93.4%	0.01	0.1%
Average	**1,774,607**	**13.22**	**100.0%**	**0.90**	**6.8%**	**12.31**	**93.1%**	**0.01**	**0.1%**

[50] Weight based on respective LDC's pole population for the year

The distribution of the annual maintenance cost per pole into three sub-items - poles, power fixtures, and other - is based on data submitted by only two LDCs, namely Hydro One and Hydro Ottawa. For the other three LDCs (London Hydro, Horizon and Toronto Hydro), the distribution was estimated based on distribution ratios submitted by Hydro One. CHEC (which accounts for less than 0.5% approximately of the total pole population) is not included since it did not respond to the data request.

As shown in Table 24 above, the average annual maintenance cost per pole in 2005 ($35.11) and 2006 ($42.75) appears to be abnormally high compared to the following years (2008-2015). As shown in Figure 9 below, the maintenance cost per pole exhibited some fluctuation from year-to-year, but mostly remained consistent, ranging between $11.58 (2007) and $16.06 (2011).

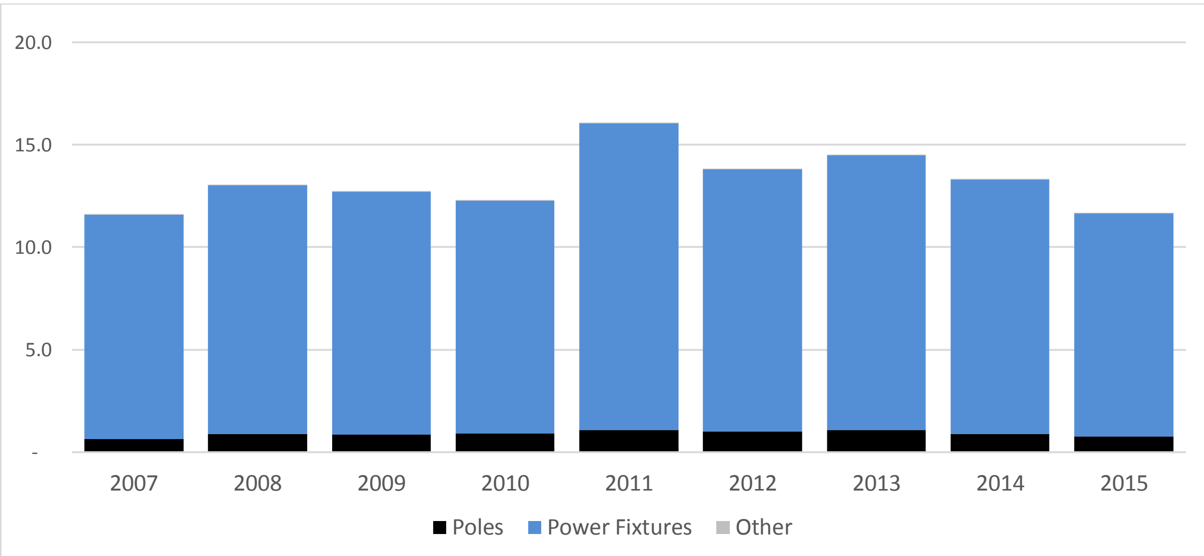


Figure 9: Average Maintenance Cost Per Pole (2007-2015) – Account 5120

As shown in Table 24 above, the eight year (2007-2015) simple average maintenance cost per pole is $13.22, of which 6.8% of the total cost is attributable to poles[51], as summarized Table 25 below.

Table 25: Break up of Annual Maintenance Cost per Pole

Maintenance cost per Pole (5120)	Total	
Poles	$ 0.90	*6.8%*
Towers	-	-
Power Fixtures	$ 12.31	*93.1%*
Other	$ 0.01	*0.1%*
Total	**$ 13.22**	***100.0%***

[51] Based on the 2008-2010 cost, the weighted average maintenance cost per pole is also $13.22, which is similar to the simple average, shown in Table 24 above.

According to the data submitted by the two LDCs, the ratio of cost attributable to poles varies significantly, as listed below:

- Hydro Ottawa: 92%, and
- Hydro One: 5%,

Given Hydro One poles constitute about ~85% of the total pole population, the overall ratio averages at 6.8%. However, the range of 92% to 5% may imply either inconsistency in accounting practices across LDCs or peculiar characteristics of individual LDCs' pole cost structure. Without an independent substantive assessment of LDCs' accounts it is not possible to clearly ascertain the cost attributable to poles in Account 5120 and other related accounts, if any. Based on the available data, Nordicity believes it is reasonable to presume that the allocation factor may range from a minimum of 5% (Hydro One) to a maximum 92% (Hydro Ottawa). Based on this range, the average maintenance cost per pole was estimated to be $6.41 - using a median average of 48.5% (=13.22 x 48.5%).[52]

5.5.2 Annual Repair and Right of Way Costs per Pole - Account # 5135

Table 26 below provides a summary of the LDCs' distribution of the right-of-way costs associated with overhead distribution (Labour, Truck and Other) lines and feeders in account 5135.

Table 26: Annual Repair and Right of Ways Cost per Pole - Account # 5135

Year	Installed Poles	Total General Submission		Distribution of Maintenance Cost - Act 5135 $							
				Labour		Material		Truck		Other	
2005	1,682,644	53.94	100.0%	43.94	81.5%	0.64	1.2%	8.22	15.2%	1.14	2.1%
2006	1,728,781	55.10	100.0%	44.90	81.5%	0.65	1.2%	8.39	15.2%	1.15	2.1%
2007	1,736,323	67.98	100.0%	55.40	81.5%	0.81	1.2%	10.36	15.2%	1.42	2.1%
2008	1,759,177	72.29	100.0%	58.94	81.5%	0.85	1.2%	11.01	15.2%	1.50	2.1%
2009	1,769,658	71.63	100.0%	55.89	78.0%	0.86	1.2%	11.34	15.8%	3.54	4.9%
2010	1,781,330	75.52	100.0%	60.40	80.0%	0.86	1.1%	12.84	17.0%	1.43	1.9%
2011	1,793,909	75.59	100.0%	62.21	82.3%	1.03	1.4%	11.32	15.0%	1.04	1.4%
2012	1,800,004	78.25	100.0%	64.33	82.2%	1.17	1.5%	11.62	14.8%	1.12	1.4%
2013	1,810,903	81.76	100.0%	68.39	83.6%	1.11	1.4%	11.13	13.6%	1.13	1.4%
2014	1,822,431	79.95	100.0%	65.16	81.5%	0.66	0.8%	12.53	15.7%	1.60	2.0%
2015	1,835,514	69.06	100.0%	57.17	82.8%	0.63	0.9%	10.16	14.7%	1.10	1.6%
Average	**1,774,607**	**71.01**		**57.88**	**81.5%**	**0.84**	**1.2%**	**10.81**	**15.2%**	**1.47**	**2.1%**

In the data request, LDCs were also asked to provide for each year the corresponding number of orders

[52] = [(5% + 92%) ÷ 2].

or jobs completed. This order volume information would have enabled further understanding of the year-to- year trends in terms of key cost elements: labour, material, truck, and other, and development of reasonable cost estimates attributable to poles and telecom wires. However, order volume data was not submitted by the LDCs. Only two LDCs (Hydro One and Ottawa Hydro) submitted the (average) cost distribution data as follows:

- Hydro One: Average cost per pole $54.11 including Labour (81.4%), Material (1.2%), Truck (15.2%), and Other 2.1%
- Hydro Ottawa: Average Cost per $62.64 including Labour (85%), and Truck (15%)

It appears that Hydro Ottawa included (assumed) "material" and "other" item costs, if any, as part of its labour cost associated with account 5120.

On this basis, both LDCs appear to have similar cost distribution – Labour versus Truck, however Hydro Ottawa's average cost per pole is 16% higher ($62.64 vs. $54.11). Overall the cost per pole increased by a compounded annual growth rate (CAGR) of 2.5% (from $53.94 in 2005 to $69.06).

As shown in Figure 10 below, the right of way cost increased at a higher rate of 5.3% per year from 2005 to the peak year 2013 ($81.76), and then decreased by 8% in the remaining two years i.e. by 2.2% from 2013 to 2014, and by 13.6% from 2014 to 2015. Nordicity believes the 10-year cost per pole shown in Table 26 above presents a complete cost cycle reflecting peak, bottom and base cost years.

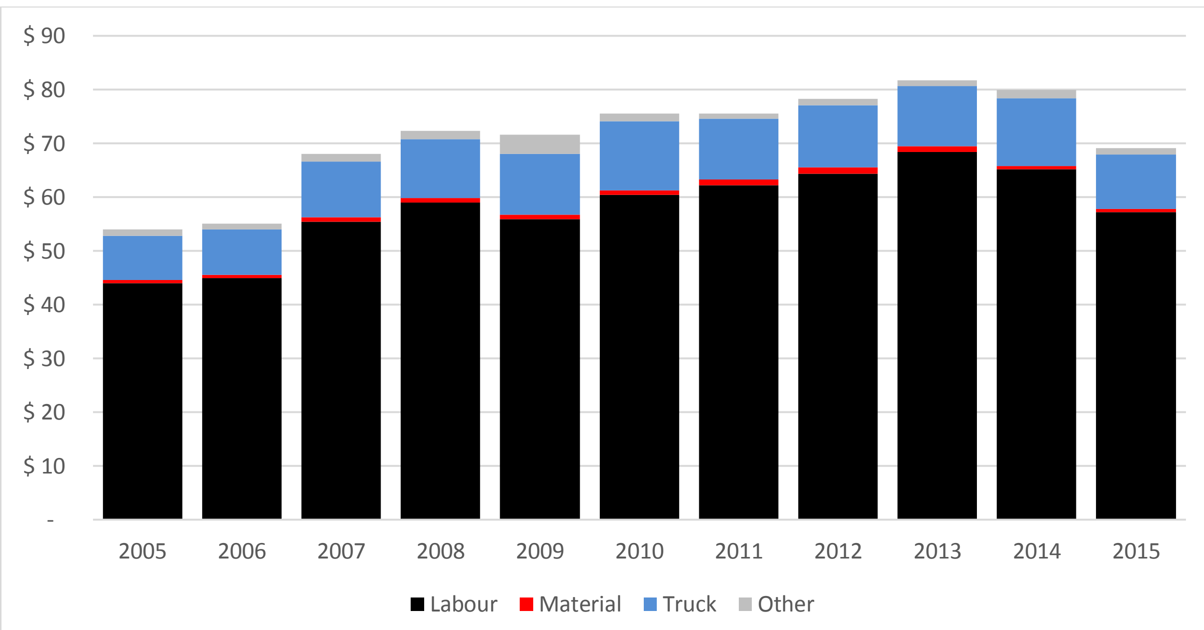


Figure 10: Annual Repair & Right of Way Cost per Pole

Without a detailed field study and examination of related operational data (truck roll/field dispatch orders), it is not possible to clearly ascertain the cost attributable to poles and telecom wires in account 5135. It is also worth noting that during the consultation meeting, telco's argued that they undertake their own repair work when it directly concerns their customers. On this basis, it is reasonable to apply the 6.8% ratio (see Table 24 above) in order to allocate annual repair and right of way (account 5135) cost to poles, thus calculated at $4.83 (= $71.01 x 6.8%).

It is important to note that inclusion of vegetation costs in terms of its definition and dollar estimate has been a major topic of discussion in recent pole attachment rate proceedings, such as 2015 NBEUB (NB Power, matter 272) and 2016 OEB (Ottawa Hydro, Hydro One). Based on the account description of 5135 as provided in the APH, Nordicity believes such vegetation costs are implicitly included in this account. Accordingly, this vegetation cost is fully accounted for in the cost per pole shown in Table 27 below. Based on the above, total maintenance cost including repair and right of way, attributable to poles is $11.24, as summarized in Table 27 below.

Table 27: Summary of Average Annual Maintenance Cost per Pole

			Total		Applicable to Poles (%)	Estimated Cost	
Maintenance cost per Pole (5120)	**Sub-total**	(A)	**$13.22**	***100.0%***	**48.5%**	**$6.41**	***57.0%***
Repair & Right of Way (5135)	Labour		$57.88	*81.5%*	6.8%	$3.94	*35.0%*
	Material		$0.84	*1.2%*	6.8%	$0.06	*0.5%*
	Truck		$10.81	*15.2%*	6.8%	$0.74	*6.5%*
	Other		$ 1.47	*2.1%*	6.8%	$0.10	*0.9%*
	Sub-total	(B)	**$71.01**	***100.0%***		**$4.83**	***43.0%***
Total: C = (A) + (B)			**$84.22**		→	**$11.24**	***100.0%***

6 Updated Annual Common (Indirect) Cost per Pole

Based on the cost inputs discussed in the preceding sections, the updated annual common cost per pole is $103.71, as compared to $93.31 determined in the 2005 Order. Table 28 provides a comparative summary of the updated total annual average common cost per pole.

Table 28: Update Annual Average Common Cost per Pole

Cost Components per Pole			2005 OEB	2017 NGL
Direct Cost	Administration Cost		$ 0.69	$ 2.85
	Loss in Productivity		$ 1.23	n.a
	Total Direct Cost		**$ 1.92**	**$ 2.85**
Indirect Direct (Common) Cost	Net Embedded Cost per pole	A	$ 478.00	$ 793.20
	Capital Carrying Cost Rate %	B	11.42%	8.17%
	Depreciation Expense	C	$ 31.11	$ 32.01
	Pole Maintenance Expense	D	$ 7.61	$ 11.24
	Capital Carrying Cost	E = A x B	$ 54.59	$ 64.81
	Utility Tax Cost	F	-	-
	Loss in Productivity	G	incl. above	incl. above
	Total Indirect (Common) Cost	K=C+D+E+F+G	**$ 93.31**	**$ 108.06**
Capital Cost Base	Embedded Cost per pole		$ 777.75	$ 1,280.28
	Accumulated Depreciation		$ 299.75	$ 487.08
	Percent Accumulated Depreciation		38.54%	38.05%

7 Determining Average Annual Direct Cost per Pole

In terms of the 2005 OEB Order, there are two cost items that are incurred by LDCs but are directly attributable to telecom space (third party) attachers. These cost items are:

- Administration Cost
- Productivity Loss

Table 29 below provides a comparative summary of direct costs per pole across jurisdictions.

Table 29: Comparative Summary of Direct Cost Pole from Past Decisions in Canadian Jurisdictions

Cost Components per Pole			2005 OEB	2016 OEB (Hydro Ottawa)	2016 NBEUB (NB Power)	1999 CRTC
Direct Cost	Administration Cost	A	$ 0.69	$ 2.28	$ 0.62	$ 0.62
	Productivity Loss	B	$ 1.23	$ 1.96	**	$ 3.15
	Total Direct Cost	C = A+B	**$ 1.92**	**$ 4.23**	**$ 0.62**	**$ 3.77**

** *NBP Power cost of loss in productivity is $5.43 which is included as a line item in Common (Indirect) Cost (NBEUB 2016, matter 272).*

7.1 Administration Costs

Administration costs are defined as net incremental costs incurred by LDCs for the placement of the cable companies' facilities (third party attachers) on LDC poles (CRTC 1999). That is, administration costs include functions such as issuance and management of permits, invoices and back office support activities. The annual administration cost generally has been lower than $1.00; for example, $0.62 in case of the NBEUB's 2016 Decision (matter no. 272) and CRTC (1999), and $0.69 in case of the 2005 OEB Decision. However, in case of 2016 Hydro Ottawa, the OEB determined an administration cost of $2.28, which is 3.3 times higher than that of 2005 OEB Decision.

In the first data request LDCs were requested to provide, on a yearly basis, administration costs attributable to third party attachers, for the years 2005-2015. Only Toronto Hydro responded to this request and it provided cost for only four years (2012-2015), as shown below:

	Toronto Hydro - Annual Administration Cost Per Pole				
Year	**2012**	**2013**	**2014**	**2015**	**Average**
Cost per pole	$ 6.19	$ 7.79	$ 9.25	$ 9.10	$ 8.08

According to the above table, Toronto Hydro's administration cost per pole increased by 47% in four years from $6.19 (2012) to $9.10 (2015). This significant increase in the administration cost of Toronto Hydro implies either major year-to-year changes in their cost structure or accounting practice. On this basis, it is not reasonable to rely solely on Toronto Hydro's administration costs for the updated rate model.

Nordicity believes detailed cost data analysis is required to develop an average rate that is directly attributable to hosting third party wires on LDC poles. Such analysis would necessarily include an examination of cost drivers such as annual volumes of permits processed, flow process (handling time per touch point), and fixed support and upgrade costs.

In the absence of such analysis, Nordicity believes it is reasonable - in the context of the current exercise - to estimate administration costs using the median (average) of the available minimum (lowest) and maximum (highest) amounts, adjusted to the 2015 price level using the consumer price index (CPI). For this purpose, Nordicity considers the minimum as $0.69 (2005 OEB Order), and the maximum as $6.19 (2012 Toronto Hydro, as above). Nordicity used Statistics Canada's Consumer Price Index (historical summary table for 1996-2015) of 107.0 for 2005, 121.7 for 2012, and 126.6 for 2015[53] to escalate the costs to 2015 dollars. On this basis, the administration cost is estimated to $3.63 per pole as shown below:

	Administration Cost Per Pole	
Minimum Base	$ 0.82	= $0.69 (2005 Order) x (126.6 ÷ 107)
Maximum Base	$ 6.44	= $6.19 (2012 Toronto Hydro) x (126.6 ÷ 121.7)
Median (Average)	**$ 3.63**	

7.2 Loss of Productivity

The loss of productivity refers to the incremental costs resulting from power utility crews having to work around cable companies' facilities (CRTC 1999, para 188). The OEB and the CRTC in their decisions included loss of productivity as a direct cost. However, NBEUB in its 2015 Decision included loss of productivity as common (indirect) cost.

Based on the discussion in the fourth PAWG meeting, Nordicity understands that LDCs do not separately track and maintain records of loss in productivity. This means the loss of productivity cost is subject to variation from LDC to LDC depending on accounting and business processes, and lacks verifiability. Nordicity also believes that such loss of productivity (e.g. cost of extra hours worked by LDC technicians) are implicitly captured in maintenance (account # 5120), and repair and right of way (account # 5135) accounts.

On this basis, Nordicity believes that proper inclusion of maintenance and repair cost attributable to poles, as discussed above, would also capture the cost associated with the loss of productivity. In other words, if loss of productivity is included in the rate as a separate line item, there are reasonable chances of duplication, and therefore it should not be considered as a separate item. Since loss of productivity has been extensively discussed in all of the past proceedings, there may be a need to show this cost as a separate item in the rate calculation. In that case, and to avoid double counting, there will be a need to

[53] 2002 is the base year (CPI = 100) as per Statistics Canada CPI summary table.

require LDCs to create a sub-account to separately track the costs associated with loss of productivity.

8 Pole Attachment Rate Model

As discussed above, the pole attachment rate model comprises three key elements as follows:

(a) annual cost per pole;

(b) ratio to allocate common (indirect) cost to the two types of attachers (power, and telecom); and

(c) average number of attachers.

The 2005 OEB Rate Model used an equal sharing approach to allocate common costs based on 3.5 as the presumptive number of attachers including 1 power, and 2.5 telecom.

Using the 2005 OEB Rate Model framework (presumptive attachers, and equal sharing), the allocation ratio attributable to a telecom attacher is calculated as follows:

2005 OEB Common Cost Allocation Methodology			
Pole Space Type	**Attacher Type**	**Calculation**	**Space Allocated per Telecom Attacher**
Common space	Power + Telecom	23.25 feet ÷ 3.5 attachers	6.64 feet
Telecom space	Telecom	5.25 feet ÷ 2.5 attachers	2.10 feet
Space allocated	Telecom	6.64 feet + 2.10 feet	**8.74 feet**
Allocation Ratio	Telecom	8.74 feet ÷ 40 feet	**21.85%**

It is worth noting that based on data submitted by LDCs in the process, the actual average number of attachers is 1.3 (see Table 18 above). If actual average number of attachers were used instead of the presumptive number of telecom attachers (2.5), the allocation ratio of 21.85% shown above would increase to 35.375%, as shown below:

2005 OEB Common Cost Allocation Methodology *(based on 1.3 actual number of telecom attachers shown in Table 18 above)*			
Pole Space Type	**Attacher Type**	**Calculation**	**Space Allocated per Telecom Attacher**
Common space	Power + Telecom	23.25 feet ÷ 2.3 attachers	10.11 feet
Telecom space	Telecom	5.25 feet ÷ 1.3 attachers	4.04 feet
Space allocated	Telecom	10.11 feet + 4.04 feet	**14.15 feet**
Allocation Ratio	Telecom	14.15 feet ÷ 40 feet	**35.375%**

The main argument used to support equal sharing is to avoid duplication of pole infrastructures, LDCs are mandated to add extra space on their joint use poles to accommodate telecom attachers. Otherwise telecom operators would be required to install poles. To meet Ontario safety standards, the telecom operators' poles require the same common space (23.25 feet) including clearance space (17.25 feet), and buried space (6 feet). It is argued that since telecom operators avoid incurring this cost for common space, they should share it equally with LDCs, as they are attachers (users of LDCs' poles).

In this context of this argument Nordicity believes a more appropriate approach to applying an equal sharing methodology would be as follows:

Step 1: Equally divide the common space between the two types of attachers – power and telecom. In the current model, the LDC is counted as one attacher, whereas telecom attachers are counted as more than one (2.5 as per 2005 OEB Decision). Consequently, the current model allocates common space relatively more to telecom attachers than to the power attacher. As shown above, the total space allocated to a telecom attacher is 21.85%. This implies that total allocation of common space to all telecom attachers is more than 50%, i.e. 54.625% (= 21.85% x 2.5 telecom attachers). It is worth noting that the total allocation to telecom attacher could vary significantly, depending on the number of attachers used in the calculation. For example, if the actual number of average attachers 1.3, (instead of 2.5 presumptive attachers) were used then the total allocation to telecom attachers will in fact be less that 50% i.e. 45.99% (= 35.375% x 1.3 telecom attachers)

Step 2: Determine total pole space attributable to telecom attachers, which is:

= 5.25 feet (telecom space) + ½ of 23.25 feet (common space)

= 5.25 feet + 11.625 feet

= 16.875 feet

Step 3: Divide the total pole space of 16.875 feet (attributable to telecom attacher space calculated in step 2) among the telecom attachers. Based 2.5 telecom attachers used in the 2005 OEB rate model, pole space attributable to a telecom attacher is 6.75 feet (=16.875 feet ÷ 2.5 attachers), or 16.875% (6.75 feet ÷ 40 feet). Using this approach, the total space attributable to all telecom attachers is equal to 42.1875% (= 2.5 attachers x 16.875%), which Nordicity believes is reasonable given that the utilization (space, and volume and weight of attachments) of LDCs poles by telecom attachers is relatively less than that of the power attachers.

The second critical factor in the rate model is whether to use the presumptive or the actual number of attachers. The question of using number of attachments instead of attacher was also raised during the consultation process. To address this question, in the second data request LDCs were asked to provide attachment data. As pointed out in Section 5.3 above, no response was received from LDCs in this regard as LDCs only track attachers.

Given the cost impacts, Nordicity believes a feasibility study should be undertaken, after completion of this study, in order to examine the cost and benefits of developing a system to accurately track the number of attachments on a regular basis. To the best of Nordicity's knowledge there is no precedent of using the number of attachments instead of attachers; it is therefore reasonable to use the number of attachers in the rate model.

In its 2005 Decision, the OEB used the presumptive number of attachers. However, in subsequent decisions (e.g. 2016 Hydro Ottawa, 2015 Hydro One, and 2015 Toronto Hydro) the OEB applied the actual number of attachers in rate calculations. The CRTC in its 1999 Decision applied the presumptive number of attachers. However, later in Telecom Decisions CRTC 2010-900, and CRTC 2016-228 (TELUS) it used the actual number of attachers[54]. The FCC (USA) established a rebuttable presumptive number of attachers at 2,3,4 and 5 according to service area categories, for example 5 for urban, and 2 for non-urban – for example see FCC 15-151. In its 2015 (FCC 15-151) Order FCC also noted:

"……..pole owners in fact often rebut the Commission's presumptions with much lower average numbers. For example, if the owner rebuts the urban presumption (5 attaching entities) with an actual count average of 2.6 attaching entities, the telecom rate can be as much as 70 percent higher…"(FCC 15-151, para 13, p.7-7).

The OEB determination of 2.5 telecom attachers in its 2005 Order was based on the assumption that the number of attachers in future will increase:

"The OEB considers 2.5 attachers to be reasonable. Things have changed since the days of the CRTC decision. If anything, there will be more than 2.5 attachers in the future" (2005 OEB Order, p. 7).

Based on the recent precedents and attacher data provided by LDCs in this consultation process it is apparent that the actual number of telecom attachers (1.3) is much less than the 2.5 presumptive number. Therefore, it is reasonable to use actual number of attachers in the rate model. Accordingly, the revised allocation ratio to attribute common (indirect) costs to telecom attachers, using the 2005 OEB framework, would be as follows:

Common Cost Allocation Ratio per Telecom Attacher (Based on actual average number of attachers)			
Pole Space Type	**Attacher Type**	**Calculation**	**Space Allocated per Telecom Attacher**
Common space	Power + Telecom	23.25 feet ÷ 2.3 attachers	10.1087 feet
Telecom space	Telecom	5.25 feet ÷ 1.3 attachers	4.0385 feet
Space allocated	Telecom	10.1087 feet + 4.0385 feet	**14.1472 feet**
Allocation Ratio	Telecom	14.1472 feet ÷ 40 feet	**35.368%**

Using the three-step alternative approach, described above, the allocation ratio will be as shown below:

Pole Space Type	**Calculation**	**Space Allocated**
Common space	A = 23.25 feet ÷ 2 (equal share)	11.625 feet
Add Telecom space	B	5.25 feet
Total Space Attributable to Telecom Attacher	C = A + B	**16.875 feet**
Space per telecom attacher	16.875 feet ÷ 1.3 attachers	**12.9808 feet**
Allocation Ratio per telecom attacher	12.9808 feet ÷ 40 feet	**32.4519%**

[54] CRTC refers to *"number of annual billing units"* instead of attachers

Based on updated cost inputs as shown above and actual number of attacher, the updated pole attachment rate per telecom attacher is calculated below:

Updated Pole Attachment Rate per Telecom Attacher			
Item	Explanation	2005 OEB Approach (Equal Sharing)	Hybrid Approach (Equal Sharing-Proportional)
Total Annual Common (Indirect) Cost	A	$ 108.06	$ 108.06
Equal Sharing Allocation Ratio per telecom attacher	B	35.368%	32.4519%
Annual Common (Indirect) cost per telecom attacher	C = A x B	$ 38.56	$ 35.07
Direct Annual Cost per telecom attacher	D	$ 3.63	$ 3.63
Annual Attachment rate per telecom attacher	**E = C + D**	**$42.19**	**$38.70**
Note: As discussed in Section 8.2 above, the above rates per attacher exclude loss of productivity, to avoid double counting			

9 Overlashing, and Associated Revenues

In the third PAWG meeting, telecom operators pointed out that LDCs receive $22.35 per overlasher they host on their attachments. LDCs confirmed the same. LDCs also confirmed that that the attacher data they provided was based on their invoicing data, and was therefore reflective of the overlashers. On this basis, Nordicity believes, this issue is not relevant for pole attachment rate model. It is worth noting that, this issue has not been raised any other Canadian jurisdiction, to the best of Nordicity's knowledge. In the USA, this issue has been addressed by the FCC below:

"We expect and encourage the overlashing and host attaching entities to negotiate a just and reasonable rate of compensation between them for the overlashing, which will represent some sharing of the usable and unusable space costs. Until our intervention is necessary to facilitate pole attachments for these parties, we will rely on all parties to act in good faith to develop their own just and reasonable compensation." (FCC 01-170, 2001, para 76)

We also believe that the inclusion of overlashing will increase the complexity of the rate calculation framework.

10 Proposed Rate Calculation Framework

As shown in Figure 8, a typical pole attachment rate framework that is "just and reasonable" will encompass the following key elements:

1) Costing approach to estimate cost base for input to the rate model
2) Allocation Methodology
3) Rate Methodology

All PAWG participants agreed on Nordicity's proposed conceptual framework, shown in Figure 8 above. However, in terms of the specific methodology to be used for the above three elements there were certain differences in the respective positions of the carrier, LDC, and rate payer groups, as expressed in the PAWG consultation process.

10.1 Costing Approach

To ascertain a "just and reasonable" average cost per pole two main questions need to be addressed:

- What is the basis of cost determination (cost base)?
- What key elements comprise the cost per pole (cost components)?

Cost Base: Section 5.1 identifies three main approaches to determine cost of poles including (a) historical cost, referred to as embedded cost, (b) forward looking or replacement cost, and (c) standard (benchmark) cost. These three approaches were presented in the first PAWG meeting. All PAWG members agreed to use historical (embedded) cost, as discussed in Section 6. The rate payers group in each of the four PAWG meetings, however, emphasized that the cost base should reflect the forward-looking view based on the LDCs' pole replacement plan over the next three to five years. As noted in Section 5.1 this position of rate payer group is based on the understanding that current embedded cost is likely to be understated given significant pole replacements envisaged by the LDCs, as per their filings (financial forecasts) submitted to the OEB. Nordicity believes the costing approach explained in Section 6 above is adequate for the following reasons:

i.) Expenditure estimates of planned replacements lack objectivity, reliability, and verifiability compared to incurred costs;

ii.) The cost of poles is not subject to factors, other than inflation, that may cause significant cost increases or decreases over time such as technological changes, techniques of installation and maintenance of poles, and so forth;

iii.) Regulatory precedents to date do not provide support to include forward-looking cost estimates in the pole attachment rate calculation;

iv.) The 10-year (2005-2015) actual data presented in Section 6 provide a reasonable long term view of the trends in the cost structure of poles in Ontario, and do not indicate any extraordinary variation in the year-over-year historical cost of poles.

v.) Based on historical trends an annual adjustment factor may be used to account for inflation and normal replacements.[55]

Cost Components: The cost analysis provided in Section 6 above was discussed in detail during the third

[55] According to Table 19 above, the overall cost per pole increased by 4.8% annually, from $1,182.70 (2005) to $1,890. 97 (2015). This rate may be used to adjust the pole attachment rate annually.

and fourth PAWG meetings. The PAWG members generally agreed that account description provided for in USoAs 1830, 5120 and 5135 reasonable the poles capital, maintenance and repair cost, provided power related items are excluded. Breakout sessions were held at the end of 3rd PAWG meeting to determine what items should be removed from these accounts, being power related items. Since sub-accounts are not maintained by LDCs it was agreed to apply a percentage factor to exclude power related items. Accordingly, based on the data provided by LDCs' percentage factor was determined as detailed in Section 6 above. However, LDCs argued there are certain other accounts that include items which should be included in the cost base to calculate pole attachment rate. For USoA 1835 for the cost of neutral that run across poles, and USoA 5020 for pole inspection cost. However, LDCs and carriers presented different views with respect to the causality of cost associated with neutrals. The carrier group argued that neutrals are strictly causal to power lines. The LDCs emphasised that neutrals are causal to both power and telecom attachments, and therefore the associated costs should be included in the common cost of pole. In support of the LDCs' position, a Kinetrics report previously submitted to OEB on this issue was also cited. To the best of Nordicity's knowledge no regulatory precedent exists to support the inclusion of cost of neutrals in the common cost of poles. On this basis, Nordicity does not recommend including the cost of neutrals in the common cost of poles.

10.2 Allocation Methodology and the Cross-subsidization Issue

As discussed in Section 5.4 above, the two most frequently applied methodologies to allocate common costs are (a) **equal sharing**, and (b) **proportionate use**. As shown in Table 6 above, the proportionate use methodology has been used in more jurisdictions (NBEUB, CRTC, NSURB) than that of equal sharing (OEB, AEUB). The proportionate use allocation rate is based on the ratio of usable space dedicated for the telecom attachers.

In Canada, the application of proportionate use originates from the CRTC's 99-13 Decision. In this decision, the CRTC approved the proportionate use methodology on the basis that the cable companies (third party attachers) do not have **the right of ownership of poles**. In para 222 of its Decision CRTC noted:

> *"The Commission is of the view that in determining the appropriate costs to be recovered from the cable companies, it is important to consider that they do not have the rights of ownership of the pole. Accordingly, the Commission considers that the fully distributed costing approach proposed by the MEA is not appropriate and that an allocation factor based on the percentage of usable space consumed is more reflective of a user's actual use and therefore is a more appropriate means of allocating costs."* (CRTC 99-13, para. 222)

In its 2002 decision, the Nova Scotia Utility and Review Board accepted CRTC's proportionate use approach:

> *"the Board finds the CRTC's approach to determining space allocation to be helpful."* (NSUARB-P-873, 2002 NSUARB 1, par. [58])

Most recently NBEUB-New Brunswick Energy and Utility Board (November 15, 2015, matter 272) approved the proportionate use methodology on the same basis – "the right of ownership of poles" argument. In para 93, NBEUB stated that the proportionate sharing model recognizes the practical and economic disparities between NB Power, as pole owner, and third party attachers; third party communications attachers do not have the rights of ownership of the pole.

In summary, "the right of ownership of poles" has been the main argument accepted by regulators (CRTC, NBEUB, NSURB) in support of the proportionate use allocation methodology.

It is pertinent to note that in para 94 of the Decision, the NBEUB also noted that both the cost allocation methodologies (equal sharing and proportionate use sharing) they reviewed during the proceeding above can be viewed as yielding fair rates.

In this Decision, the NBEUB also established the principle that the pole attachment rate should not cause the LDCs' other customers (rate payers) to cross-subsidize the cost of poles, stating:

"The Board considers it reasonable that those customers that benefit from the use of NB Power's distribution poles should pay an appropriate rate so that NB Power's other customers do not incur or cross-subsidize any additional cost of providing such a benefit." (NBEUB matter 272, para 89)

It appears that the issue of cross-subsidization between the two attacher groups (power and telecom) has been considered in the above-cited decisions in Canadian jurisdictions strictly within the framework of the economic efficiency principle. That is, it is economically efficient to share poles:

- If the incremental cost of joint-use poles is less than the standalone-cost of separate LDCs and Telecom poles (referred to as the "standalone-cost" test), and
- If no firm (attacher) subsidizes the incremental cost of joint-use poles (referred to as "incremental-cost" test)

We understand that the regulatory boards based their decisions, cited above, on the principle of economic efficiency and determined that a rate is deemed to be "subsidy-free" if it satisfies the "increment-cost" and "standalone-cost" tests. In other words, an economically efficient rate is deemed to be subsidy-free if it accounts for the cost that is higher than the incremental cost of a joint-use pole and lower that the standalone cost of a single-use pole. The underlying rationale is that since sharing of poles results in net cost savings[56], the welfare interest of rate payers is better served as long as the telecom attacher's rate is within the lower (greater than incremental cost – floor price) and upper (lower than standalone cost – ceiling price) levels. This implies that any rate within this range is deemed to be subsidy-free. In this sense, rates determined using both proportionate use and equal sharing have been deemed to be "subsidy-free".

We believe application of the economic efficiency principle in those cases is restrictive. That is, it

[56] Net cost savings represents standalone-cost of telecom only pole less the incremental cost; The example of incremental cost may include the cost equal to the cost of LDC joint-use pole less the cost of LDC power only (single-use).

provides the low and high boundaries of a range for efficient rates. However, without further examination and analysis, the conventional (simplistic) application of the economic efficiency principle does not address the overarching issues such as the equitable distribution of efficiency gains (net cost savings) between the two rate payer groups – electricity versus telecom. That is, once the subsidy-free price range is established, the next step is to determine the appropriate price point within that range. For this purpose, a proper (quantitative) analysis that is based on relevant data according to the given situation is required to determine the appropriate price point.

It is worth noting that Dr. Roger Ware, in his expert report (dated May 14, 2015) followed this approach to advance his line of argument only in theoretical terms in order to support the proportionate use methodology. Dr. Ware, stated:

"26. The proportionate use methodology occupies a middle ground between the two more extreme approaches of equal sharing and incremental cost. It is the only methodology that attempts to capture the different demands made by users on a common capital input, and reflects differences– legal or operational–in rights and advantages provided by pole ownership relative to tenancy. For both these reasons, proportionate use is the appropriate methodology for computing pole attachment rates for cable attachers in New Brunswick."[57]

However, Dr. Ware did not present any analysis based on real data to demonstrate that the proportionate use method is appropriate in the context of demand for pole attachments in New Brunswick.

Dr. Faulhaber, professor at the Business Policy Department, Wharton School, University of Pennsylvania, pointed to the limitations of a simplistic application of the incremental cost and standalone cost rule in the following words:

"Thirty years have passed since the publication of "Cross-subsidization: Pricing in Public Enterprises." The article rigorously defined cross-subsidization and is now a standard citation of regulators and scholars addressing the pricing of regulated multiproduct firms. The incremental cost test and the stand-alone cost test, however, have been misunderstood and misapplied"[58]

The observation by Professor Faulhaber suggests that the conventional application of the economic efficiency principle to allocate common costs on poles has certain limitations, as explained in terms of the following key questions below:

i) **What is the relevant incremental cost**?

For example, assume the standalone cost of a single-use (power only) LDC pole is $100, the standalone cost of a telecom only pole is $75, and cost of a LDC joint-use pole is $125. In order to

[57] Dr. Roger Ware, (May 4, 2015), Expert Report, NB Power 2015/16 General Rate Application, Matter No. 0272.
[58] Faulhaber, G. F. (2005). *Cross-Subsidy Analysis with More than Two Services*. Journal of Competition Law and Economics 1(3), 441-448.

conduct a subsidy analysis in this example, the alternative methods of calculation underlying the question: *What should be the proper measurement of incremental cost?* must first be resolved:

(a) $125 - $ 75 = $50, which is 40% of joint-use LDC pole cost of $125?, or

(b) $125 - $100 = $25, which is 20% of the joint-use LDC pole cost of $125?

In this regard, it is important to understand the distinction between "incremental cost" and "marginal cost". That is, these two terms sometime are used interchangeably in the literature. In simple terms, marginal cost refers to the additional cost to produce an additional unit of output. In incremental cost refers to the additional cost for the incremental capacity required to produce incremental output.

To illustrate the difference, assume an existing LDC pole is 35 feet in height and can only accommodate power attachers. To accommodate telecom attachers, an additional 5 feet of space is required on the pole, totalling to 40 feet in height.

If the existing 35 feet can be extended to 40 feet then marginal and incremental cost would be same. However, practically this is not possible – 5 feet cannot be added to the same pole and a pole with more height requires additional strength to meet the public safety standards. Such distinction between a single-use (power only) and joint-use poles is well established in regulatory decisions. That is to say, a joint-use pole is required to accommodate telecom attachers because additional space and pole strength (as per technical specifications) are needed. For example, according to the Alberta Energy and Utilities Board:

"The Board notes that shared use poles are of a greater height and strength than single-use poles." (EUB Decision 2000-86, p. 20).

It has also been argued that since the joint-use pole already exists (sunk cost), the incremental cost only represents (the marginal/variable) cost to attach an additional attacher to an existing pole. This presumption is not consistent with well-established "fully distributed cost" or "fully allocated cost[59]" pricing approach used by energy boards and telecom regulators, as also noted by Dr. Roger Ware in his expert report submitted to the 2015 NBEUB proceeding (matter no. 272):

"…..an example of a very standard approach in regulatory pricing, used and endorsed by regulatory agencies around the world, known as Fully Distributed Cost (FDC) pricing"[60]

[59] "Fully Allocated Cost is an accounting method to distribute all costs among a firm's various products and services; hence, the FAC may include costs not directly associated with a particular product or service." (http://regulationbodyofknowledge.org/glossary/f/fully-allocated-cost%20FAC/)

[60] Expert Report by Dr. Ware, NB Power 2015/16 General Rate Application, Matter No. 0272, para 20, p.20.

As noted above, in the 2001 Alberta Energy Board (200-96) proceeding, TransAlta submitted that the costs for shared-use poles it installs are significantly greater than for single-use poles, and provided the following capital cost estimate[61]:

Pole Description	Pole Class	Pole Height	Cost	Ratio
Shared-use	Class 4	40 ft.	$564	100.00%
Single-use	Class 5	35 ft.	$360	63.83%
Incremental Cost			**$204**	**36.17%**

Based on TransAlta's capital cost estimates, the incremental cost for a joint-use pole over those for single use pole is $204, which is 36% of its overall joint-use pole cost.[62]

This price differential corresponds with data from American Timber and Steel (http://www.americantimberandsteel.com) wherein the current price differential of a 40-foot versus a 35 foot bare pole (not installed/embedded cost) is US $161.45, which is 35.6% of the 40-foot. pole price as shown below:

Pole Description	Pole Class	Pole Height	Price (US $	Ratio
Class 4 SYP Unframed CCA Treated Pole 40	Class 4	40 ft.	$453.70	100.00%
Class 5 SYP Unframed CCA Treated Pole 35	Class 5	35 ft.	$292.25	64.42%
Incremental Cost			**$161.45**	**35.58%**
Source: American Timber and Steel @ **http://www.americantimberandsteel.com/poles-pilings-utility-poles-unframed-cca.html**				

It is worth noting that New Brunswick Energy and Utility Board in its 2015 Decision determined the common cost allocation ratio of 35.33% attributable to telecom attachers (see Table 15 above), based on the following calculations: 5.3 feet. (telecom space) ÷ 15 foot total usable space. This ratio is slightly lower that the incremental cost ratio of 36% shown above.

This analysis implies that without a detailed examination of incremental cost there is a possibility that the proportionate use allocation may not satisfy the incremental cost test. For example, a typical telecom equipment such as digital switches can be upgraded to accommodate incremental subscribers (users) without replacing the entire equipment. Whereas, utility poles, generally installed on public land are subject to public safety standards and regulations. Therefore, a single-use (power only) pole cannot be simply upgraded or modified to provide for additional space for telecom attachers. Instead a single-use pole needs to be replaced with a pole that has adequate specifications for joint-use, according to applicable safety standards. In this sense, the appropriate basis to determine the incremental cost is to determine the difference between the cost of a single-use pole and cost of a joint-use pole.

[61] The cost estimates submitted by the TranAlta were accepted by the Board. See section 3.1. (p.17) of the Alberta Utility Board 2000 Decision (2000-86)

[62] = $204 ÷ $564 x 100 = 36.17%

ii) **Is the demand elasticity of attacher's service relevant?**

The service demand of the two rate payers group may be different – inelastic versus elastic, or the same - "inelastic" or "elastic". Under these different demand scenarios, determination of what is the more appropriate (efficient) cost allocation methodology – proportionate use or equal sharing, for optimum distribution of cost savings between both rate-payer groups will depend on the elasticity of demand for the particular service. For example, traditionally, electricity demand is inelastic, whereas the demand for broadband (internet) services has been viewed as inversely elastic. For example, FCC's allocation methodology is driven by its policy consideration of promoting competition and investment for broadband growth[63]. If broadband demand is elastic, then an allocation methodology such as proportionate use - which allocates a lesser cost to the telecom user, may be more appropriate in order to achieve such a policy objectives rather that the alternative equal sharing methodology[64].

However, if the demand for broadband is inelastic and the OEB is not subject to such a policy mandate, then proportionate use would require further examination and analysis, as discussed later in this section.

iii) **Are "subsidization of service" and "subsidization of rate-payers" the same?**

The analysis based on the conventional application of the economic efficiency principle only allows one to address the issue of subsidies between commodities (services). The underlying rationale is that the welfare of the rate payers of the service will be same or better off than before. In the words of Professor Faulhaber,

"Subsidy-free prices do no more than insure that the production and sale of each commodity makes all consumers at least as well off as they would otherwise be"[65].

This implies that this approach is restricted from considering whether the efficiency gains (cost savings) are optimally distributed among the individual rate payers in each group of rate payers – it does not address the question whether the efficiency gains are distributed equitably among all rate payers.

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[63] See para 39 (p.19), "ORDER ON RECONSIDERATION", FCC 15-151 (November 2015)

[64] . In that case, the inverse elasticity rule would also provide support for proportionate use methodology. Drawn from the efficient commodity taxation principle, which is based on Ramsey pricing, the inverse elasticity rule suggests that if the demand for each good depends only on its own price so there are no cross-price effects, then consumer welfare may be maximized and required level of tax revenue (revenue requirement in our case) may be obtained by taxing goods relatively high that have low elasticities of demand.

[65] Gerald R. Faulhaber, G. R., The American Economic Review, Vol. 65, No. 5 (Dec., 1975), p. 967

> To answer this question, the analysis needs to be extended to examine the impact of the efficiency gains on individual payers. If the impact is not equitable, it implies that the issue of "just and reasonable" distribution of efficiency gains among different group of rate payers – electricity and telecom may exist and this needs to be further investigated empirically.

In the above-cited Canadian decisions, which approved the proportionate use methodology, the issue of cross-subsidy as well as equitable distribution of efficiency gains between electricity and telecom rate payers does not appear to have been examined empirically.

For instance, if the "proportionate use" allocation methodology is used, instead of the two equal-sharing approaches discussed in Section 9, the common cost allocated (paid) by the telecom attacher would be 31.34% of the total $108.06, as shown below:

Power Space (*see line A in Table 16 above*)	**11.5 feet**	**68.66%**
Telecom Space, including separation space *(see Lines B and D in Table 16 above)*	5.25 feet	31.34%
Total Usable Space = Power + Telecom (*also see line D in Table 16 above)*	16.75 feet	100.00%

As noted above, the incremental cost may be up to 36% of the joint use pole cost. In that case, the allocation ratio based the proportionate-use methodology may not satisfy the incremental cost test. That is, given the actual average telecom attachers are 1.3 per pole, the allocation ratio per attacher, based on the proportionate use methodology, is 24.11% (= 31.34% ÷ 1.3). This means that according to proportionate use, the common cost attributable to telecom rate payers is $33.87 (= $108.06 x 24.11% x 1.3 attachers). The remaining $74.19 common cost (=$108.06 - $33.87) is then attributable to the LDCs' rate payers.

We believe the critical step missing in the analysis leading to the regulatory preference for the proportionate use methodology has been the understanding of the impact of the resulting allocated cost on individual electricity and telecom rate payers. Nordicity's analysis - presented in Appendix B, attempts to fill this gap. The analysis clearly demonstrates that the equal sharing methodology is most appropriate to allocate common cost between two types of attachers on joint-use poles.

11 Conclusion and Recommendations

Based on the above analysis, the pole attachment rate is $42.19 per attacher, using OEB's current equal sharing methodology to allocate indirect cost. This rate represents an increase of 88.8% from $22.35 determined in 2005 OEB Decision. This increase is due to the following two reasons:

- Increase in cost per pole including (a) 15.8% increase in the indirect cost per pole from $93.31 (2005) to $108.06, and (b) increase in direct (administration) cost from $0.69 (2005) to $3.63.
- Decrease in average telecom attachers per pole from 2.5 (2005) to the current average of 1.3.

If Nordicity's proposed equal sharing approach, (explained in Section 8), is used, then the updated pole attachment rate is $38.70 per telecom attacher, instead of $42.19.[66] These rates are based on the rate calculation framework illustrated in Section 4, which comprises three key elements:

- Costing approach (methodology)
- Cost Allocation methodology
- Rate Calculation Methodology

For the costing approach, all PAWG members agreed to use embedded (historical) cost. Accordingly, the updated indirect cost of $108.06 was calculated using pertinent USoAs for capital cost, maintenance and repair expense - annually submitted by LDCs to the OEB, for the period 2005-2015.

The main issue in using this approach is that USoAs also include costs strictly associated with the power assets installed on the poles. This issue would not exist if LDCs maintained sub-accounts for the main categories of the different cost elements included in the USoA. Since LDCs currently do not maintain such sub-accounts, a percentage adjustment factor was used to remove the power-related cost to arrive at a $108.06 indirect cost. For example, the adjustment factor of 14.7% to remove power related costs from the capital cost base (USoA 1830) was estimated, based on the data submitted by LDCs in response to the data request during the PAWG consultation process. This approach is supported by various regulatory precedents in the USA (e.g. FCC) and Canada (e.g. NBEUB).

This adjustment factor can have a significant impact on the rate, as evident during the PAWG consultation process and thus subject to major disagreements on interpretations of which items to include or remove from the cost base, depending on the interests of different types of attachers such as LDCs (pole owners) and carriers (third party attachers).

To avoid this situation on going forward basis, it is recommended that LDCs be required to set up appropriate sub-accounts and submit detailed accounts as part of their annual general submissions to the OEB. The implementation of sub-accounts system would allow to automatically updates to the cost input to the pole attachment rate model. As a result, major pole attachment-related regulatory hearings could be avoided in future. This would also ensure long term rate stability and predictability, critical to the effectiveness of a regulatory framework.

For the cost allocation methodology two methods were primarily considered in the PAWG consultation process: proportionate use and equal sharing. The carrier group argued for the proportionate use, and LDCs indicated their preference for equal sharing.

Both methodologies have been extensively discussed in several pole attachment rate proceedings in Canada over the past several years. It has been well established that both methodologies conform to the principle of economic efficiency and avoid any potential issue of cross-subsidization. That is, in theoretical terms, both methodologies satisfy the minimum incremental cost and maximum standalone

[66] $38.70 is also based on the same cost per pole of $108.06 and current average of 1.3 telecom attachers.

cost range of economic efficiency. However, the empirical evidence that is based on relevant data according to the specific case under consideration is sparse to support this view.

The second issue is that a wide range of possible rates can be set within such minimum and maximum economically efficient cost thresholds. Consequently, different types of attachers argue for the approach which will determine a rate that suits their best interest. Thus, carrier groups - interested in the lowest possible rate, argue for incremental cost (minimum possible), or proportionate use methodologies. Whereas, LDCs, seeking to recover the maximum possible cost from third party attachers, prefer equal sharing.

Because of these opposing interests there is a need to determine a rate that is optimum from the perspectives of both attacher groups. An optimal rate that is empirically proven would help avoid future rate proceedings due to issues related to the cost allocation methodology. The analysis presented in Section 10 demonstrates that the equal-sharing methodology produces an optimum rate from the perspective of both telecom and electricity rate payers. Therefore, the equal sharing methodology is recommended to allocate indirect costs in the determination of the pole attachment rate. Consideration of any other methodology would require a detailed assessment of costs such as incremental cost (minimum threshold) and standalone cost (maximum threshold) in the Ontario context.

For the rate calculation methodology, the main issue discussed during the PAWG consultation process was how to determine the number of attachers. In the 2005 OEB Decision, the presumptive number of attachers (2.5 telecom or 3.5 including power) was used to determine the pole attachment rate. However, in subsequent rate proceedings (2005 NBEUB), (2015-16 OEB), the evidence demonstrated that the actual number of telecom attachers are generally less than 2 attachers: 1.4 (2015 NBEUB – NB Power), 1.74 (2015 OEB – Hydro Ottawa), 1.30 (2015 OEB – Hydro One), and 1.61 (2014 OEB – Toronto Hydro). In the USA, although FCC follows the presumptive number of attachers approach but the evidence submitted by utilities in their rebuttals demonstrated a relatively very low number of attachers.

During the PAWG consultation process there was general agreement among the members to use an average based on the actual number of attachers. However, carrier group argued that such average should be based on joint use poles that excludes poles with Bell only attachments, given their agreement with Hydro One. That is, according to the carrier group, only poles that have third party (carrier) attachers should be counted in determining the average of telecom attachers. Intuitively, this approach would lead to number of telecom attachers per pole of 2 or more. Based on the data submitted by LDCs during the PAWG process, the overall average number of telecom attachers is 1.3. The average attacher approach carrier posited is not consistent with the cost per pole which is based on the overall pole population. If the carriers' proposed approach were to be retained, there would be a corresponding need to determine the cost per pole for the subpopulation of poles with third party attachments. Given the limitations of the group asset accounting system used by LDCs, it would not be practical to objectively determine cost per pole of third party poles only.

In light of the evidence considered above, it is recommended that the OEB use the number of 1.3 average attachers per pole which is based on overall pole data submitted by LDCs in the PAWG process. To ensure transparency and reliability of attachers' data, it is also recommended that the LDCs be required to enhance the attacher tracking system - linked to the invoicing system, and to include the attachers' data as part of their annual general submission to the OEB. The recommended process will allow automatic updates to the pole attachment rate, and will help avoid future rate proceedings on this issue.

Another important question raised was whether there should be a single pole attachment rate for the entire province or it should vary according to geographic location. During the PAWG consultation process, participants were particularly requested to provide their position on this issue. Generally, the participants agreed on a single province-wide rate on the basis that it would be simple to administer. However, the carrier group stated its preference for an LDC-specific rate. Based on the data submitted by LDCs during the PAWG consultation process, it was not possible to determine the cost per pole according to different geographic locations, such as rural versus urban, and to identify cost differences. The examination of data submitted by LDCs also did not reveal major systemic cost differences. On this basis, a single province-wide rebuttable rate is recommended. That is, LDCs may be allowed to apply to vary the rate if they believe that the provincial rate does not represent their cost structure, which they would demonstrate through submission of a detailed cost study.

Finally, an effective framework is required to implement updates to the rate on going-forward basis. As noted in this report, the major factor that can cause major year-to-year fluctuations in the rate is the number of pole replacements vis-à-vis declining net book value (net embedded cost) balance due to depreciation expense. This issue may be addressed through a levelised approach – as proposed in Section 2 above. The other factors include inflation, higher cost (due to increase in labour rate), and productivity improvement (due to operational efficiencies). These factors can be accounted for if the rate model is periodically updated (every three to five years), using LDCs' annual USoA general submissions along with attacher data as described above.

Appendix A: List of Issues Submitted by the Carrier Group

Framework	Costing Approach	Allocation Methodology	Rate Methodology
• Rate Framework Approach and Inputs • Nature and quantum of the joint use pole-sharing arrangement that exists between the hydro company and the local telephone company • Whether there should be a province-wide rate or a company-specific rate • Relationship between pole attachment rates and electricity rates to consumers • Time period and process for pole rate review • Future Proofing	• Historical versus Forecasted Costs • How power-specific assets on the pole should be treated to ensure that they are not recovered through the pole attachment rate • How special circumstances and events should be treated (ice storms, fires, large pole replacement programs)	• Direct and Indirect Costs • Cost Allocation / Accounting Principles/ Cost Sharing Model • How the common costs of a pole should be allocated among the various users of the pole • Appropriate space on a pole that should be allocated to each of the different attachers	• Third Party Attachers / Overlashing / Access (Shared Access) • Number and types of all possible attachers, including actual and potential, third party power and wireless service providers • Joint use poles that are not used by communications attachers

Appendix B: Why the Equal Sharing Allocation Methodology is Appropriate for Ontario

For this purpose of this analysis, Nordicity considers the typical telecom rate payer is an Internet (broadband) user, given broadband penetration is the key driver of telecom infrastructure deployment.

We believe it is reasonable to assume that 100% of households are electricity users (rate payers). Internet penetration in Canada is estimated to be 88.5% in 2016[67]. To understand how the proportionate use cost allocation impacts the two types of rate payers viz. electricity and telecom, observe the following example:

(A) Assume a LDC joint use pole serves 100 electricity rate payers and 88.5 telecom rate payers in the province.

(B) The cost per joint-use LDC pole is $108.06, as shown in Table 28 above.

(C) If the incremental cost of joint-use pole is 36% of joint-use pole, as shown above, the cost per single-use (power only) then may be estimated as $108.06 ÷ 1.36 = $79.46

(D) In the 2015 New Brunswick Energy Board (matter 272) hearing, Dr. Roger Ware, expert for Rogers Communication Inc. advanced the argument that the proportionate use methodology takes into account the differences in demand generated by different users of the pole, i.e. electricity attachers versus telecom attachers. In his testimony, Dr. Ware stated:

"*The proportionate use methodology is an example of fully distributed cost pricing in which users pay a price that reflects the differential demands that they make on a common capital input, namely the buried and clearance 10 sections of the pole*" (Dr. Ware, Hearing Day 9 Transcript, p. 1376, lines 7-11)[68]

On the basis of this argument, it may be assumed that since electricity attachers place relatively much heavier demand (weight and space) than telecom attachers, the stand-alone cost of a telecom-only pole would be less. For the purpose of this analysis, the cost of an LDC standalone pole is assumed to cost 25% more than the telecom standalone pole. Based on this assumption, the standalone telecom cost per pole may be estimated at $63.56 = $79.46 (C) ÷ 1.25

Based on the above cost estimates, if both rate payers were to pay their respective standalone pole costs, the total cost to the rate payers would be $143.02 = $79.46 + $63.56. There is clear economic efficiency if a joint-use pole is used given the cost to all rate payers will be reduced to $108.06 from $143.02 - a net saving of $34.96 (24.4%).

The question however, is how this economic efficiency shown above is shared by individual rate payers in the two groups. To understand this, the pole cost per rate payer if both groups were to pay for their respective standalone-cost is examined first. In that case, as shown below, the telecom rate payer will pay $0.72, and the electricity rate payer will pay $0.79, resulting in a combined average of $0.76.

[67] See http://www.internetlivestats.com/internet-users/canada/
[68] http://www.nbeub.ca/opt/M/browserecord.php?-action=browse&-recid=457

		Total	Electricity	Telecom
A	Number of rate payers per pole assumed	188.50	100.00	88.50
B	Single Use (Standalone) Cost Per Pole	$143.02	$79.46	$63.56
C	Pole cost per rate payer (B ÷ A)	$ 0.76	$ 0.79	$ 0.72

If a joint-use pole is used, the combined average cost per rate payer will be reduced to $0.57 (=$108.06 ÷ 188.5), from $0.76, a net saving (economic efficiency) of $0.19.

The next step is to determine the optimal distribution of these savings between the two groups of rate payers. That is, the savings should be distributed equally, on the principle of equity and fairness. If common costs are allocated using the proportionate use methodology, the telecom rate payers receive 85% of the savings, as shown below:

		Total	Electricity	Telecom
A	Allocation Ratio (Proportionate Use)	100.00%	68.66%	31.34%
B	Allocated Cost ($108.06 x A)	$108.06	$74.19	$33.87
C	Single Use (Standalone) Cost Per Pole	$143.02	$79.46	$63.56
D	Net Savings (C - B)	**$34.96**	**$5.26**	**$29.70**
E	Share of Net Savings	100%	15%	85%

Based on the proportionate use methodology, since there are savings for both rate payer groups: $5.26 (15%) for electricity rate payers, and $29.70 (85%) for telecom rate payers, both are better off than they otherwise would be under any other solution. However, on a cost per rate payer basis, the savings for electricity rate payers are relatively very small. As shown below, the cost per electricity rate payer decreased only by 6.6% (from $0.79 to $0.74), whereas in case of telecom attachers the cost per rate payer decreases to almost half, 46.7%, from $0.72 to $0.38. That is, based on the proportionate use methodology, the efficiency gain for telecom rate payers is 7 times more than for electricity rate payers.

		Total	Electricity	Telecom
A	**Number of rate payers per pole assumed**	**188.50**	**100.00**	**88.50**
B	Allocated Cost (Proportionate Use)	$108.06	$74.19	$33.87
C	**Pole cost per rate payer (B ÷ A)**	**$ 0.57**	**$ 0.74**	**$ 0.38**
D	Pole cost per rate payer (as shown above)	$ 0.76	$ 0.79	$ 0.72
E	Net Savings (D - C)	$ 0.19	$ 0.05	$ 0.34
F	Net Savings % (E ÷ D)	24.4%	6.6%	46.7%

If the economic efficiency gains are not distributed equitably among the impacted individual rate payers, then the resulting rates cannot be claimed to be "*just and reasonable*" from the perspective of the rate payers' groups.[69]. Nordicity believes such problem could be avoided if the allocation ratio of common

[69] See for example, Faulhaber, G. R. (2005), , Faulhaber, G. R. , and Levinson, S.B. (1981),

cost is such that it results in the same or equitable pole cost per rate payer. The analysis shown above demonstrates that the allocation ratio based on the proportionate use methodology does not address this problem.

As illustrated in Figure 11 below, the potential problem of inequitable distribution of efficiency gains among rate payers can be avoided if the overall allocation of common cost between telecom and power attachers is 47% and 53% (=100% - 47%), respectively.

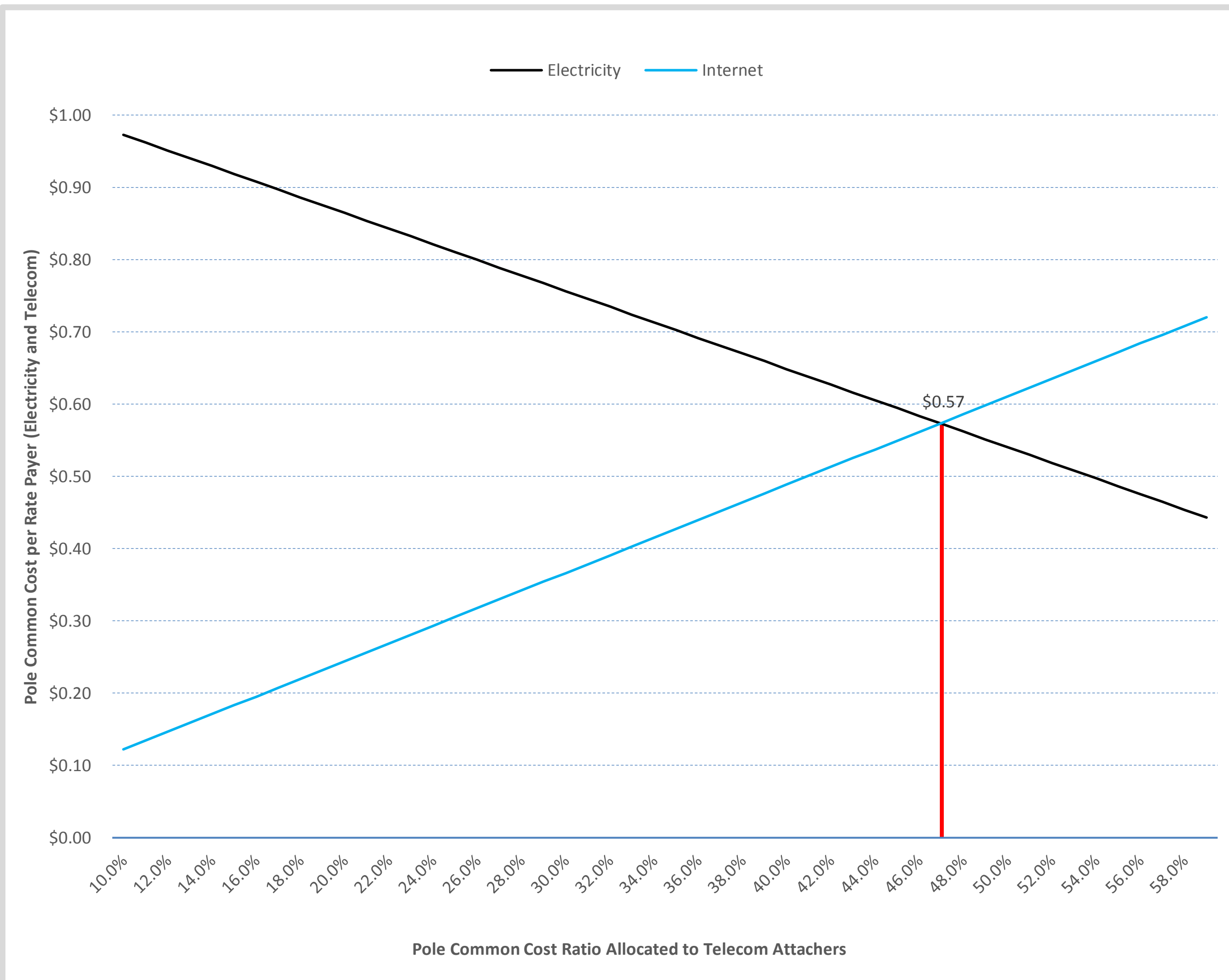

Figure 11: Common Cost per Pole - Allocated to Rate Payers (Electricity vs. Telecom)

As shown in section 9 above[70], based on OEB's current equal sharing methodology, the total allocation ratio to telecom rate payers is 45.99% (=35.368% x 1.3 attachers). Using Nordicity's proposed alternative approach of equal sharing, the total allocation ratio to the telecom rate payer is 42.19% (= 32.4519% x 1.3. attachers). In comparison, based on proportionate use, the total allocation ratio to telecom rate payers is 31.34%. In light of the 47% ratio that ensures equitable distribution of efficiency gains among rate payers, the OEB's current equal sharing method (45.99%) provides the desired outcome[71]. However, if the average number of attachers increases, the current OEB allocation methodology may result in exceeding the 47% threshold, which may result in inequitable distribution of efficiency in favour of electricity rate payers relative to telecom rate payers. Such a situation can be prevented if Nordicity's proposed three-step, equal-sharing methodology is used.

The proportionate use approach primarily originated from telecommunications regulators, such as the FCC in USA. The FCC's arguments in support of proportionate use have mainly been focused on its policy mandate (*the Telecommunications Act*, USA) to promote investment and competition in broadband and make it affordable for its citizens. For example, the FCC in its 2011 (FCC 11-50) *"Report and Order and Order on Reconsideration*", stated:

"The Order is designed to promote competition and increase the availability of robust, affordable telecommunications and advanced services to consumers throughout the nation" (para 1, FCC 11-50).

In its more recent 2015 Decision, "Order on Reconsideration" (FCC 15-151), the FCC reiterated its policy objective regarding pole attachment rates in the following words:

"By keeping pole attachment rates unified and low, we further our overarching goal to accelerate deployment of broadband by removing barriers to infrastructure investment and promoting competition." (para 4, FCC 15-151).

It may be noted that CRTC 99-13 relied on the "pole ownership" argument instead of the above noted FCC argument to accelerate broadband deployment and promote competition. However, during the PAWG meetings, carriers expressed their concern regarding Bell Canada's reciprocity arrangement with LDCs to use each other poles at no cost. For example, during the fourth PAWG meeting on January 31, 2017, Mr. Michael Piaskoski (Rogers Communications Inc.) commented as follows:

"….Let's imagine a world where Hydro One and Bell cooperate on building poles and let each other use the poles without charging each other. This works in a situation with no competition.

[70] Section 8 Table entitled 'Updated Pole Attachment Rate per Telecom Attacher'

[71] For example, common cost of $108.06 allocated to telecom rate payer will be equal to $108.06 x 45.99% = $49.70, which is $0.56 per telecom rate payer (=49.76 ÷ 88.5 internet users). The remaining $58.36 (= $108.06 - $49.70), will be allocated to electricity rate payers, which is $0.58 per electricity rate payer, higher by a negligible difference of $0.02 than that of telecom rate payer

“Then other players come along and they need access too. My argument is that Bell has made a capital contribution to all the poles that Hydro One has access to. You can’t treat Bell as a rate paying attacher because it has already paid for the pole by building all the other poles. Hydro One has already recovered let’s say 40% of those poles from Bell. The balance is what it needs to recover from the other Carriers.”
(January 31, 2017 Fourth PAWG Meeting Minutes)

We believe the empirical evidence does not suggest that Bell’s arrangement with LDCs provides it any competitive advantage. For example, cablecos and other carriers (excluding Bell – Incumbent TSP), have larger share of Internet subscribers as shown in figure 12, below.

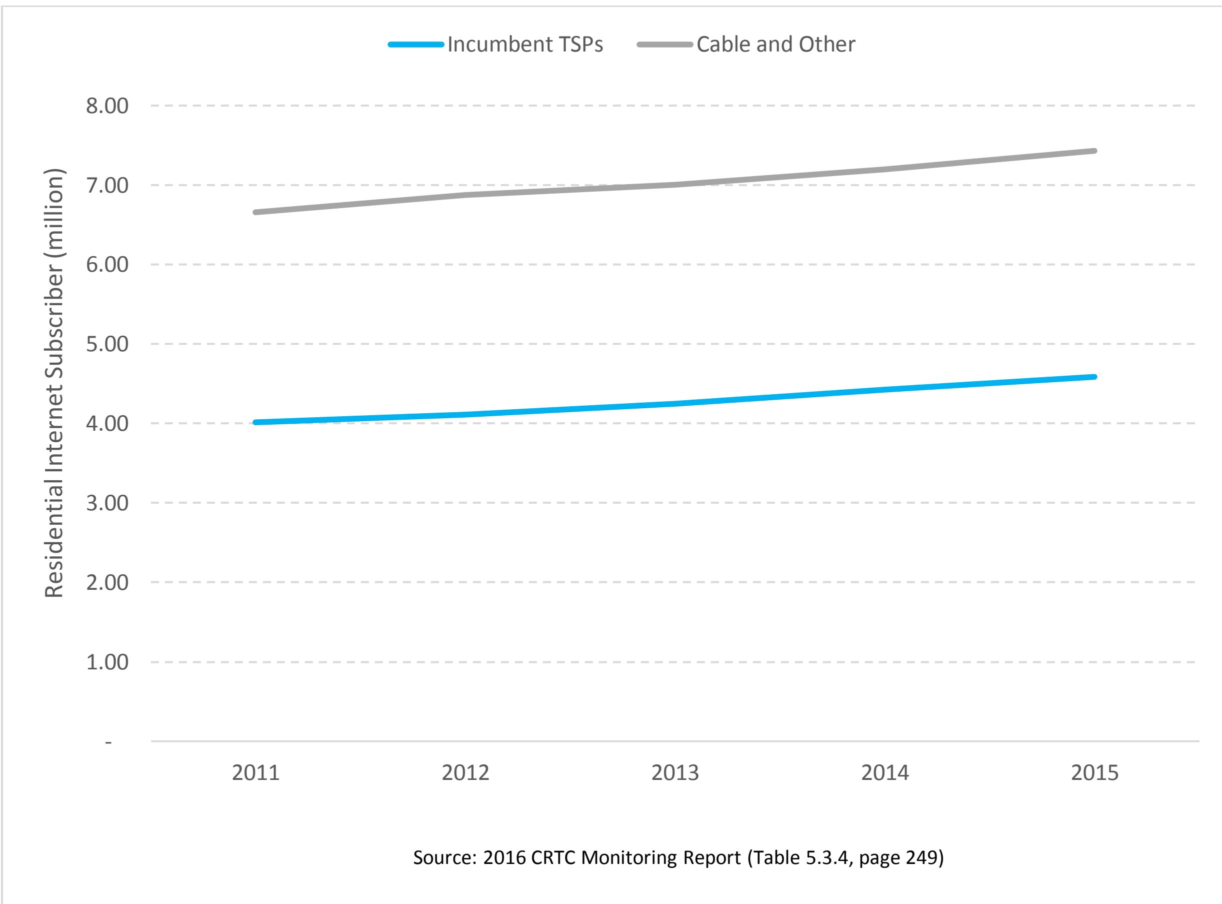

Figure 12: Share of Residential Internet Service Subscribers, by type of service provider

The proponents of the proportionate use methodology also rely on the Ramsey pricing principle, discussed in the Review of Network Economics, Vol. 9 [2010], Issue 3:

“*When fixed, costs must be recovered, as in the case of a utility pole, prices must be set above marginal costs, and the challenge for the regulator is to ensure that those mark-ups reduce welfare to the least degree possible. It is well known that the best (most socially efficient) linear prices, which recover costs, are the inverse-elasticity based prices known as Ramsey prices”*.[72]:

“*When fixed, costs must be recovered, as in the case of a utility pole, prices must be set above marginal costs, and the challenge for the regulator is to ensure that those mark-ups reduce welfare to the least degree possible. It is well known that the best (most socially efficient) linear prices, which recover costs, are the inverse-elasticity based prices known as Ramsey prices”*.

That is to say, electricity prices are deemed to be price-inelastic, which means the demand for electricity does not decrease or increase due to an increase or decrease in electricity prices. Whereas, broadband services have typically been viewed as price (inverse) elastic. That is, this view suggests that higher prices will result in low demand for broadband, and vice versa. Therefore, to encourage broadband penetration, telecoms prices should be lowered by encouraging competition and reducing investment barriers to entry. In this context, increasing pole attachment rates may be considered as increasing relative cost of broadband service in a competitive market, thus undermining competition.

However, in the Canadian context, the empirical evidence does not lend support to this view giver the current socio-economic trends, where broadband is increasingly becoming a necessity in every-day life. For example, as shown in Figure 13 below, Internet prices significantly increased by over 40% in the period 2011-2015. Furthermore, cable and other carriers could maintain relatively higher prices than that of incumbent TSPs (such as Bell Canada). Despite these price increases, demand for Internet service also increased as shown in Figure 12 above. These trends clearly suggest that the demand for broadband cannot be viewed to be elastic. Some recent empirical studies also provide support that broadband

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[72] *“….When fixed, costs must be recovered, as in the case of a utility pole, prices must be set above marginal costs, and the challenge for the regulator is to ensure that those mark-ups reduce welfare to the least degree possible. It is well known that the best (most socially efficient) linear prices, which recover costs, are the inverse-elasticity based prices known as Ramsey prices” …… Establishing feasible rates for a mixed-use facility like utility poles ordinarily requires that the fixed costs of constructing the facility be recovered from users of that facility. However, this cost recovery requires that rates deviate from the first-best marginal cost rate. It is arguably the task of the regulator to divide those fixed costs among users of the facility in a way that recovers them, yet ideally maximizes welfare. Ramsey pricing, a form of elasticity-based price setting, achieves this goal by assigning the shares of fixed costs to users of the facility to reflect their elasticities of demand for the facility's services. The Ramsey, inverse-elasticity rule is, in fact, the optimal uniform price mechanism for doing this (Brown and Sibley, 1986, Ch. 3; Mitchell and Vogelsang, 1991, Ch. 4). The goal of this approach, though, is efficiency, not uniformity—indeed, a Ramsey pricing approach often requires different users of a pole attachment to pay a substantially different share of the fixed costs of that facility while consuming essentially identical services. Still, from the public interest perspective, Ramsey prices are highly desirable.*
……the evidence presented above suggests that the allocation of the costs of unusable space between electric utilities and the communications industry needs to be re-examined. The demand for electricity remains highly inelastic today, while the demand for broadband and triple-play communications services is relatively elastic. An efficient Ramsey pricing approach to pole attachment rates supports lowering the allocation of the cost of unusable space collectively paid by the broadband network operators, and commensurately increasing the allocation of these costs to electric utility companies. Prior to setting a specific rate, however, further analysis is warranted, particularly if policymakers wish to change significantly attachment rates across industries.” Review of Network Economics, Vol. 9 [2010], Issue 3.

demand, particularly in OECD countries, is in elastic range[73]. Therefore, although it is beyond the scope of the OEB mandate in the light of the 2003 Supreme Court decision, the argument of competition and cost of broadband services versus its demand does not appear to be relevant given emerging socio-economic trends.

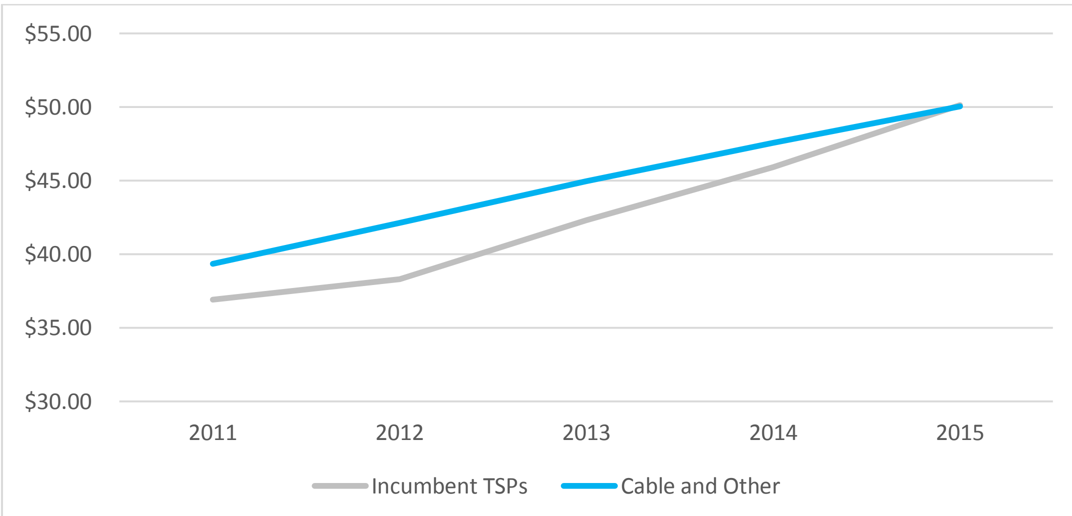

Figure 13: Comparative Prices of Residential Internet Service, by type of service provider

[73] For example, see (A) Cadman, R.,& Dineen, C.(2008). *Price and income elasticity of demand for broadband subscriptions: A cross-sectional model of OECD countries*. London: SPC Network, (B) Galperin, H., and Ruzzier, C., "*Price elasticity of demand for broadband: Evidence from Latin America and the Caribbean*", Telecommunications Policy, 2013, vol. 37, issue 6, 429-438., and (C) Haucap, J., Heimeshoff, U., and Lange. M.R.J., "*The impact of tariff diversity on broadband penetration—An empirical analysis Original Research Article*", Telecommunications Policy, 40(8), August 2016, pp 743-754.

Glossary

APH:	OEB's Accounting Procedures Handbook
CATV:	Community Access Television
CCTA:	Canadian Cable Television Association
CHEC:	Cornerstone Hydro Electric Concepts Inc. (an association of 15 LDCs in Ontario)
CPI:	Consumer Price Index
CRTC:	Canadian Radio-television and Telecommunications Commission
EDA:	Electricity Distribution Association
FCC:	Federal Communications Commission (USA)
ILEC:	Incumbent Local Exchange Carrier
LDC:	Local Electricity Distribution Company
MEA:	Municipal Electric Association (Ontario)
NB:	New Brunswick
NBEUB:	New Brunswick Energy and Utility Board
NBP:	New Brunswick Power
NSURB	Nova Scotia Utility and Review Board
OEB:	Ontario Energy Board
OEBA	The Ontario Energy Board Act
PAWG:	Pole Attachment Working Group
RFP:	Request for Proposal
RRR:	Reporting and Record-keeping Requirements
TSP:	Telecom Service Provider
USoA	Uniform System of Accounts

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OEB (EB-2015-0004) Hydro Ottawa.

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