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Report for

Ontario Energy Board

Third Generation Incentive Regulation Stretch Factor Updates for 2011 (EB-2009-0392)

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Power System Engineering, Inc.

About Power System Engineering, Inc.

Founded in 1974, PSE is a full-service consulting firm serving the utility industry with offices in Wisconsin, Indiana, Minnesota, Ohio, and South Dakota. PSE's benchmarking experience includes research for regulatory purposes and utility management improvement. Our benchmarking team consists of economists, planning and design engineers, rate and financial analysts, communications infrastructure consultants, and smart grid technology experts. In addition to our statistical cost research, PSE has expertise in the areas of demand response, energy efficiency, value-based reliability planning, T&D reliability benchmarking, merger valuations, load forecasting, T&D system planning and design, resource planning, communication technologies, smart grid integration, rate design, survey design, alternative regulation, and cost of service studies. For more information on PSE and a full list of services, visit our website at www.powersystem.org.

About the Authors

Steven A. Fenrick

Mr. Fenrick is a Senior Economist at PSE and has a decade of consulting experience in the evaluation of utility efficiency. He leads PSE's cost and reliability performance benchmarking efforts. He has provided expert witness testimony on performance benchmarking and authored numerous reports on the topic. Mr. Fenrick has evaluated performance relating to electric and gas distribution, power transmission, power plant performance, and water distribution. These evaluations have been conducted for domestic and international utilities, regulatory agencies, and consumer advocates.

Donald J. Wyhowski

Dr. Wyhowski has served as an economics professor, most notably at the Australian National University, and as a referee for a number of scholarly economic journals, and has years of experience in econometric benchmarking model development. Dr. Wyhowski is an expert econometrician and wrote the GAUSS code that adjusted benchmarking coefficient estimates for groupwise heteroskedacity based on an unbalanced panel dataset schema.

Erik S. Sonju

Mr. Sonju is the Vice President of Power Delivery Planning and Design at PSE. He is a licensed engineer in eleven states. Prior to joining PSE, he was the System Engineer at Great Lakes Energy in Michigan. His expertise is distribution and transmission benchmarking, capital investment planning, strategic operations planning, delivery plant design and project management, reliability assessment, and utility interactions with government agencies and electric consumers. Overall, Mr. Sonju has performed in-depth studies or directed the studies of over 50 electric utility power delivery systems.

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Executive Summary

In November 2009, the Ontario Energy Board (OEB) acquired the professional services of Power System Engineering, Inc. (PSE) to provide benchmarking evaluations of Ontario power distributors' operations, maintenance, and administrative (OM&A) spending levels using data supplied to the OEB by each power distributor. PSE provided the 2010 benchmarking results in the report "Third Generation Incentive Regulation Stretch Factor Updates for 2010" dated February 17, 2010.[1]

This report presents the methodologies and results of a benchmarking study that identifies the 2011 rate year efficiency cohort groupings intended to be used for the Third Generation Incentive Regulation stretch factors for Ontario's power distribution industry.

The 2011 updated study results are the sole product of incorporating new 2009 data and industry amalgamations into a pre-established benchmarking paradigm. The methodologies employed in the 2011 benchmarking study, described in Section 2 of this report, are exactly the same as those employed in the 2010 study and are founded on methods developed in previous consultations on the topic.[2] Similarly, the method of determining efficiency cohort groupings is the same method that was used in 2010. This method is described in the July 14, 2008 Report of the Board on 3rd Generation Incentive Regulation for Ontario's Electricity Distributors, pp. 21-23.[3]

Based on the benchmarking results, and using newly available 2009 data, PSE divides the Ontario industry into three efficiency cohorts. These cohorts are based on both econometric and unit cost index benchmarking results. Local distribution companies (LDCs) in the first cohort have been identified as top performers by both econometric and unit cost index benchmark methods. LDCs located in the third cohort group have been designated as bottom performers by both methods. All other companies are placed in the middle cohort.

The 2011 efficiency cohorts are summarized below. There are 12 members in cohort one, 54 members in cohort two, and 11 members in cohort three. Table 8, found in Section 3, displays the full list of companies with their corresponding cohort grouping.

Cohort 1

- Chatham-Kent Hydro Inc.
- Festival Hydro Inc.
- Grimsby Power Incorporated
- Hydro 2000 Inc.
- Hydro Hawkesbury Inc.

[1] http://www.oeb.gov.on.ca/OEB/_Documents/EB-2009-0392/Report_2010_Stretch_Factor_Updates.pdf
[2] http://www.oeb.gov.on.ca/documents/cases/EB-2006-0268/PEG_Final_Benchmarking_Report_20080320.pdf
[3] http://www.oeb.gov.on.ca/OEB/_Documents/EB-2007-0673/Report_of_the_Board_3rd_Generation_20080715.pdf

- Hydro One Brampton Networks Inc.
- Kitchener-Wilmot Hydro Inc.
- Lakefront Utilities Inc.
- Middlesex Power Distribution Corporation
- North Bay Hydro Distribution Limited
- Northern Ontario Wires Inc.
- Renfrew Hydro Inc.

Cohort 2

- All LDCs not in Group 1 or 3

Cohort 3

- Algoma Power Inc. *
- Centre Wellington Hydro Ltd.
- Chapleau Public Utilities Corporation
- Clinton Power Corporation
- COLLUS Power Corp.
- Erie Thames Powerlines Corporation
- Greater Sudbury Hydro Inc.
- Port Colborne (CNP)
- Toronto Hydro-Electric System Limited
- West Coast Huron Energy Inc.
- West Perth Power Inc.

* Formerly Great Lakes Power Limited

The remainder of this report provides a narrative of the benchmarking methodologies and displays the research results. Following the Introduction, Section 2 offers a summary of the benchmarking approaches used in designating efficiency cohort groupings. Section 2 also reveals the results for each benchmarking technique. Section 3 combines the two benchmarking results into three efficiency cohort groupings. Section 4 concludes this report with a discussion of cost efficiency considerations in Ontario.

1 Introduction

This report presents the methodologies and results of a benchmarking study that identifies the 2011 rate year efficiency cohort groupings intended to be used as an update to the Third Generation Incentive Regulation stretch factors for Ontario's power distribution industry. The study results divide the Ontario industry into three efficiency cohorts which are based on both econometric and unit cost index benchmarking methods.

As a product of this study, each company will be assigned a productivity stretch factor for the 2011 rate year commensurate with their efficiency cohort group. The assigned stretch factor will be the same for all firms in a given cohort but will differ between cohorts. (A full list of cohort groupings can be found in Section 3, Table 8 of this report.)

PSE staff has extensive experience in utility performance benchmarking. Mr. Fenrick leads PSE's regulatory and internal management improvement benchmarking practice. He has testified and authored numerous reports on the topic. He has presented company-specific results to top utility management assisting them in measuring and improving the performance levels and productivity trends of their utilities.[4] Utilities have used PSE's benchmarking research to formulate strategic plans, present results to their Board of Directors and customers in town hall meetings, inform compensation mechanisms, and set goals for future performance evaluations.

Mr. Fenrick is a strong advocate of using accurate benchmarking methods to gauge and enhance performance, not only in the regulatory arena but also for internal management purposes.[5] Given the natural monopoly nature of the power distribution industry, being able to proxy competition and learn from industry peers is paramount to providing end-use customers with reliable service at a reasonable cost.

[4] Increasing a utility's productivity will lower future rate increases and provide better value for customers. Management should strive to increase the productivity trends of their utilities to the extent possible, assuming optimal reliability levels, customer service, and long-term sustainability are preserved. Measuring productivity is essential to a full understanding of the impacts of past strategic decisions and informing current ones.

[5] The OEB benchmarking methodology, implemented in this report, exemplifies high quality benchmarking using two distinct approaches (econometric and unit cost index benchmarking methods).

The process PSE has developed to assist utilities with their objectives is shown in the following graph.

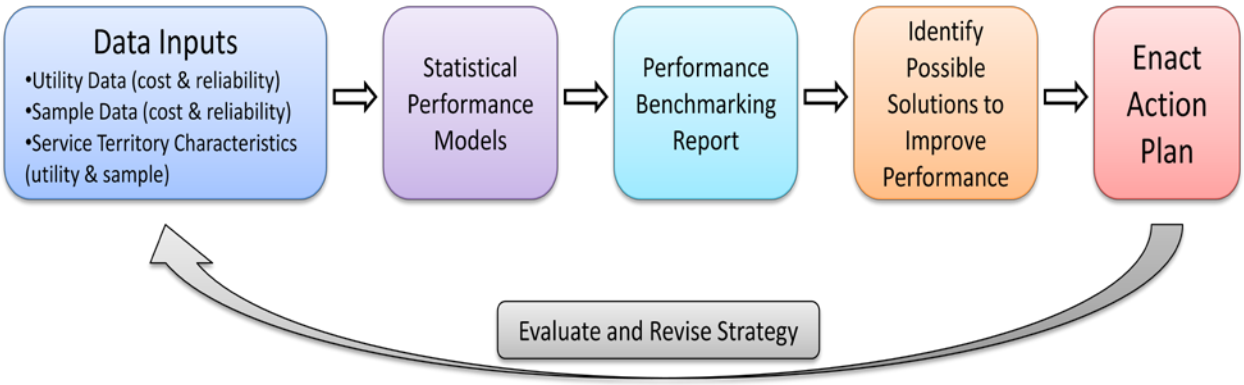

Figure 1: Operational Improvement Process

PSE's performance evaluation studies have included examinations of power distribution reliability, OM&A costs, total costs, productivity trends, and more detailed expenses.[6] Our benchmarking team includes professionals in the areas of economics, smart grid technologies, and professional engineers. These studies have been sponsored by utilities, regulatory commissions, and consumer advocates.

The OEB incentive regulation stretch factor calculation process runs parallel to the benchmarking improvement progression described above. Data inputs are gathered from the LDCs operating in Ontario, statistical benchmarking models and peer groups are created, and a report is generated from the results, leading to the designation of stretch factors reflective of the performance evaluation. LDCs are not locked into this stretch factor designation for the life of the 3rd Generation Incentive Regulation plan. They have an opportunity to improve cost performance annually and have this improvement reflected in updated benchmarking results and resultant stretch factors. This regulatory process closely mimics how PSE recommends utility management itself should measure and improve OM&A cost performance.

As previously indicated, both econometric and unit cost index benchmarking methods were applied. The econometric method uses regression analysis to fashion expected, or benchmark, costs after accounting for the external circumstances of each distributor. Performance is then measured by calculating the ratio of actual cost with benchmark costs. Statistical significance is measured to determine statistically superior and inferior cost performers.

The unit cost indexing method separates the Ontario industry into twelve peer groups based on characteristics found to be significant cost drivers in the econometric research. A unit cost metric is then calculated for each distributor by dividing OM&A cost by a comprehensive output index. The unit cost for each distributor is compared to the mean of its respective peer group to determine the OM&A cost performance of each company. Based on this comparison, top and bottom quartile cost performers are identified.

[6] With LDC trial balance data no longer being confidential, utility management will be able to better leverage this detailed data to derive least-cost strategies to increase utility cost performance.

Cohort groupings are directly determined by the two benchmarking results. To be in efficiency cohort group one, the company is required to attain an evaluation of statistical superiority in the econometric benchmarking and in the top quartile of the unit cost indexing. Efficiency cohort group three members are determined by those utilities that are deemed statistically inferior by the econometric approach and are in the bottom quartile of the indexing results. All remaining utilities are placed in cohort group two.

2 Research Methodologies and Results

This section provides an overview of performance benchmarking, the data sample, definition of OM&A cost, and descriptions of the econometric and unit cost benchmarking methods, procedures, and results.

2.1 Overview of Benchmarking

Benchmarking allows regulators to objectively compare performance across utilities and jurisdictions. Regulators can use benchmarking when regulating electric reliability, determining appropriate cost or salary levels, and in the escalation provisions of multi-year rate or revenue caps. Utility managers can use benchmarking to determine overall performance within the industry, pinpoint areas where cost effective improvements can be made, set challenging yet achievable goals, evaluate strategic options, assist in the development of business cases for specific technologies, and identify best practices.

Performance cost benchmarking enables a comparison between a utility's actual costs to a customized expectation of those costs. Relatively good cost performers will have actual costs below the expected amounts, whereas poor performers will have actual costs above the expected amounts.

$$Performance = \frac{Costs^{Actual}}{Costs^{Expected}} \qquad \textbf{[Equation 1]}$$

Equation 1 shows performance to be a function of two terms. Actual costs are reported directly from the utility, whereas expected costs must be estimated. The research challenge is to calculate expected costs in a fair and accurate way, accounting for the specific advantages and disadvantages inherent in the operating circumstances of each utility. This last point is crucial. For benchmarking to accurately evaluate cost management performance, the relevant external operating conditions encountered by each utility must be adjusted for the differences among sample members. For econometric benchmarking, these differences are adjusted for through the use of regression analysis. In regards to unit cost indexing, external operating conditions are controlled for through the stratification of utilities into separate peer groups.

2.2 Ontario Data Sample

For the 2011 update, the sample includes 77 utilities which are listed in Table 1 below. This sample size is smaller than the 2010 sample, which consisted of 82 utilities. The reduction in number is due to amalgamations of industry members. In such cases, data for the individual companies have been combined to form one successor firm. The individual merged companies cease to be included in the benchmarking analysis.

The sample period for the 2011 update is 2002-2009. This eight-year period allows a large sample to be developed to increase the precision of the parameter estimates of the econometric model.

Table 1: Ontario Power Distributors Included in this Report

List of Ontario Power Distributors

Algoma Power Inc.
Atikokan Hydro Inc.
Bluewater Power Distribution Corporation
Brant County Power Inc.
Brantford Power Inc.
Burlington Hydro Inc.
Cambridge and North Dumfries Hydro Inc.
Centre Wellington Hydro Ltd.
Chapleau Public Utilities Corporation
Chatham-Kent Hydro Inc.
Clinton Power Corporation
COLLUS Power Corp.
Cooperative Hydro Embrun Inc.
E.L.K. Energy Inc.
Enersource Hydro Mississauga Inc.
EnWin Utilities Ltd.
Erie Thames Powerlines Corporation
Espanola Regional Hydro Distribution Corporation
Essex Powerlines Corporation
Festival Hydro Inc.
Fort Erie - Eastern Ontario Power (CNP)
Fort Frances Power Corporation
Greater Sudbury Hydro Inc.
Grimsby Power Incorporated
Guelph Hydro Electric Systems Inc.
Haldimand County Hydro Inc.
Halton Hills Hydro Inc.
Hearst Power Distribution Company Limited
Horizon Utilities Corporation
Hydro 2000 Inc.
Hydro Hawkesbury Inc.
Hydro One Brampton Networks Inc.
Hydro One Networks Inc.
Hydro Ottawa Limited
Innisfil Hydro Distribution Systems Limited
Kenora Hydro Electric Corporation Ltd.
Kingston Hydro Corporation
Kitchener-Wilmot Hydro Inc.
Lakefront Utilities Inc.
Lakeland Power Distribution Ltd.
London Hydro Inc.
Middlesex Power Distribution Corporation
Midland Power Utility Corporation
Milton Hydro Distribution Inc.
Newmarket - Tay Power Distribution Ltd.
Niagara Peninsula Energy Inc.
Niagara-on-the-Lake Hydro Inc.
Norfolk Power Distribution Inc.
North Bay Hydro Distribution Limited
Northern Ontario Wires Inc.
Oakville Hydro Electricity Distribution Inc.
Orangeville Hydro Limited
Orillia Power Distribution Corporation
Oshawa PUC Networks Inc.
Ottawa River Power Corporation
Parry Sound Power Corporation
Peterborough Distribution Incorporated
Port Colborne (CNP)
PowerStream Inc.
PUC Distribution Inc.
Renfrew Hydro Inc.
Rideau St. Lawrence Distribution Inc.
Sioux Lookout Hydro Inc.
St. Thomas Energy Inc.
Thunder Bay Hydro Electricity Distribution Inc.
Tillsonburg Hydro Inc.
Toronto Hydro-Electric System Limited
Veridian Connections Inc.
Wasaga Distribution Inc.
Waterloo North Hydro Inc.
Welland Hydro-Electric System Corp.
Wellington North Power Inc.
West Coast Huron Energy Inc.
West Perth Power Inc.
Westario Power Inc.
Whitby Hydro Electric Corporation
Woodstock Hydro Services Inc.

2.3 Definition of Cost

The costs examined in this report are defined as total distribution OM&A expenses. The data was provided to PSE by the Ontario Energy Board. The data source was built from data submitted by each utility via the OEB Reporting and Record-keeping Requirements (RRR).[7]

2.4 Econometric Benchmarking Methods and Results

This section begins with a brief overview, in general terms, of the econometric benchmarking approach. It is followed by the benchmarking results.

2.4.1 Econometric Benchmarking 101

The econometric approach to benchmarking allows the researcher to fashion an appropriate target (or benchmark) for an examined metric. Econometric benchmarking predicts costs which are customized for the specific operating conditions encountered by each utility. This prediction is interpreted as the expected costs of a utility with identical characteristics and "average" relative performance. The established benchmark can be compared to a company's actual costs to determine performance, as shown in Equation 2 below.

$$Performance = \frac{OM\ \&\ A\ Cost^{\ Actual}}{OM\ \&\ A\ Cost^{\ \text{Model Prediction}}} \qquad \textbf{[Equation 2]}$$

The model prediction of the cost level is attained by choosing a functional form, based on theory, and using regression analysis to estimate the parameters embedded within this functional form. This approach not only allows for simultaneous consideration of multiple cost drivers, but also permits statistical testing of these variables and estimates their respective impact on cost. A simplified illustrative functional form is offered below.

$$Expected\ \ Cost = a + b * No.of\ Customers + c * Percent\ \ undergrounding \qquad \textbf{[Equation 3]}$$

If the researcher postulates that OM&A costs are only linearly influenced by the number of customers and the percent of lines underground, Equation 3 would be the functional form. The coefficient "*a*" is the intercept term; its interpretation is that it costs money to be in business even if output is zero. The coefficient "*b*" signifies the cost of adding an additional customer, and the coefficient "*c*" shows the cost of increasing the proportion of undergrounding.

The researcher would then collect a data sample and use regression analysis to estimate these parameter values. The signs of the estimates would need to conform to theory and hypothesis testing would be conducted to assure the researcher that these variables are indeed statistically significant cost drivers. The values of *a*, *b*, and *c* serve as "weights" to determine the magnitude of the impact of each variable on expected cost.

Equation 3, although simplified, shows the advantage of the econometric benchmarking approach because it permits the simultaneous consideration of multiple variables. The researcher

[7] http://www.oeb.gov.on.ca/OEB/Industry/Media+Room/Publications/RRR+Reports/Yearbook+of+Distributors

can test the significance of hypothetical cost drivers and incorporate them into the analysis. The econometric approach can also be used to better inform peer group selection.

The graph below depicts the impact of undergrounding on O&M cost.[8] The x-axis is a measure of the amount of undergrounding; the y-axis is cost per customer. This figure reveals the relationship between undergrounding and distribution O&M expenses. As undergrounding increases, cost per customer tends to decline. The econometric method is able to capture this tendency and incorporate it in the expected cost value of each company.

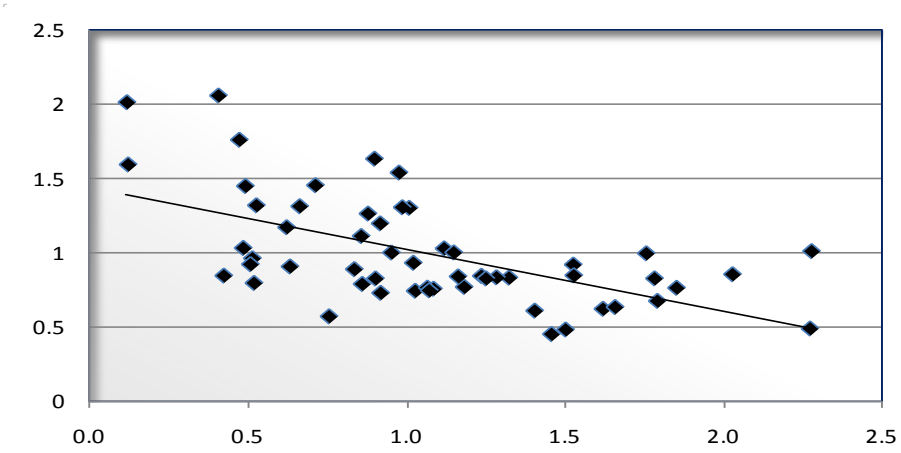

Figure 2: O&M Cost Impacts of Underground Lines

Estimation is enhanced by taking the natural log of each variable. This transforms the parameter estimates from marginal cost to cost elasticity estimates. Cost elasticity measures the *percentage* change in cost relative to a *percentage* change in the cost driver. For example, with this transformation, the interpretation of *b* in Equation 3 is: if the number of customers increases by 10 percent, then cost is predicted to increase by *b* times 10 percent. If *b* equals 0.5, then a 10 percent increase in customers is estimated to increase cost by 5 percent.

Econometric benchmarking is further advanced by the inclusion of additional relevant variables. Each explanatory variable allows for an explicit adjustment of the differing circumstances found within the sampled utilities regarding the incorporated variable.

[8] This graph is based on undergrounding and operation and maintenance expenses of U.S. investor-owned power distributors. Recent research by PSE has quantified the impact of underground lines on both cost and reliability levels. Mr. Fenrick will be presenting a paper on the topic, "Cost-Benefit Considerations of Underground versus Overhead Power Lines" at IEEE's Global ESMO Conference in May 2011.

For example, in the econometric model estimated for this report, seven distinct variables (shown in the figure 3), which factor in external business or service territory conditions are used to formulate the estimated benchmark OM&A level.

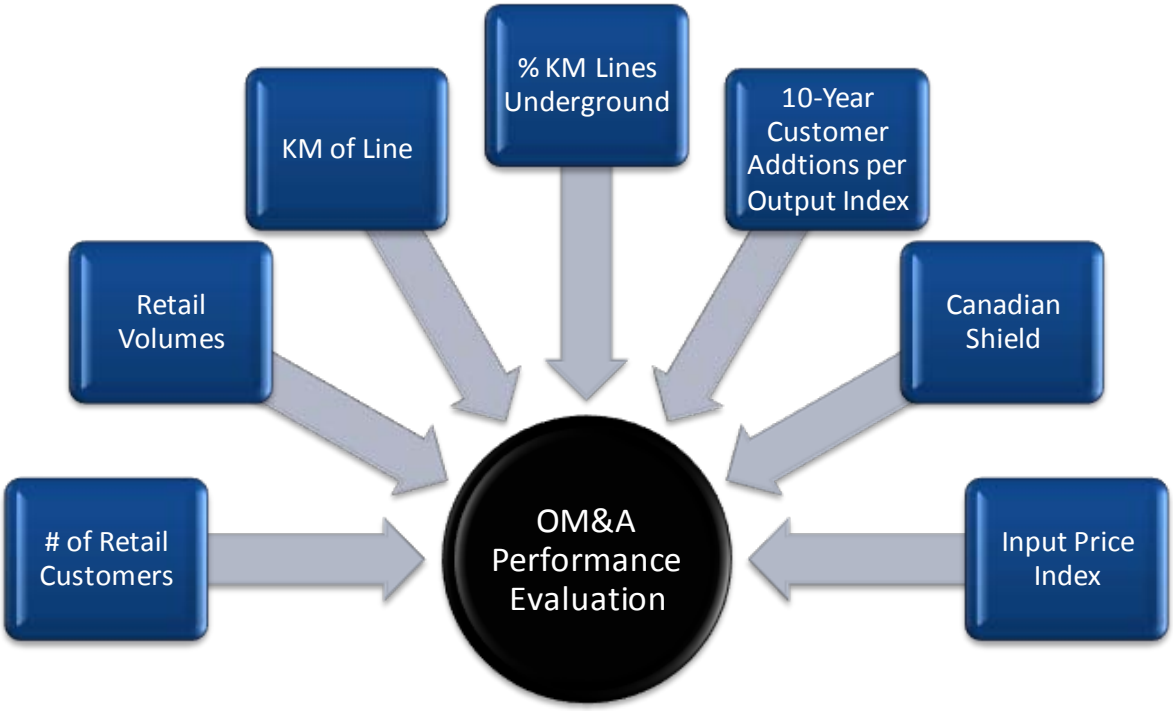

Figure 3: Variables Used to Estimate OM&A Level

After the variables are chosen, industry data is collected. The econometric approach enables a large sample since utilities with vastly differing operating conditions can be integrated into the analysis. Contrary to the peer group approach, since the econometric method adjusts for numerous conditions, a sample with varied operating conditions actually enhances the evaluation. For example, Hydro One Networks in Ontario lacks a suitable comparison group needed to perform benchmarking using the unit cost indexing method. It can be included in the econometric benchmarking because of the ability of this approach to accommodate dissimilar utilities within the analysis.

2.4.2 Methods Used in this Report

The approaches used in this report are derived from methods developed in previous consultations on the topic, which are reiterated in this section in a compressed format.[9] Items such as the functional form of the OM&A econometric model, included variables, estimation procedures, and 2011 rate year parameter estimates are discussed.

[9] For more detail on the benchmarking approaches please see: http://www.oeb.gov.on.ca/documents/cases/EB-2006-0268/PEG_Final_Benchmarking_Report_20080320.pdf

2.4.2.1 Functional Form

The functional form used in this report is identical to that used in last year's update. It is a "quadratic" functional form, which has the following general formula:

$$\ln C = \alpha_o + \sum_i \alpha_i \ln Y_i + \sum_j \alpha_j \ln W_j + \sum_\ell \alpha_\ell \ln Z_\ell + \alpha_t T + \frac{1}{2}\left[\sum_i \gamma_i \ln Y_i \ln Y_i + \sum_j \gamma_j \ln W_j \ln W_j\right] + \varepsilon. \qquad \textbf{[Equation 4]}$$

Here, Y_i denotes one of several variables that quantify output and W_j denotes the input price. The *Z*-variables denote the additional business conditions, *T* is a trend variable, and ε denotes the error term. Also, $\alpha's$ and $\gamma's$ represent the econometric parameter estimates. These are elasticity estimates of the impact of each variable on OM&A costs.

2.4.2.2 Included Variables

There are seven explanatory variables included in the OM&A econometric model. These variables can be separated into three categories. The first is an output category which quantifies the amount of output put forth by each distributor. Explanatory variables in the output category are: the number of customers, total volumes (kilowatt hours), and total kilometers of line.

The second category is an input price which is an external measure of the composite market price of procuring inputs. This input price encapsulates both area-specific labour and non-labour price estimations to customize the index to the service territory of each LDC. The weighting for the input price index was, on average, fifty percent on a customized estimate of labour price specific to each LDC, and a fifty percent weight on the non-labour price estimation which was based on the gross domestic product implicit price index (GDP-IPI) of Ontario. Thus, the non-labour price does not vary by LDC, only by year. Whereas, the labour price component of the input price index varies by LDC and by year.

The labour price variation for each LDC was calculated by computing the average employment income by level of educational attainment in various Ontario cities. This data was gathered from the 2001 census. A mapping of LDCs to the cities used in the analysis formed the basis for the labour price assignment. Labour price values were then escalated for years subsequent to 2001 by adjusting the index for labour cost trends in Ontario.

The third category of explanatory variables is the business condition category, also known as Z-variables. This category includes such variables as the percent of distribution lines underground, ten year customer growth divided by an output index,[10] and a binary variable of whether most or all of the service territory of the utility is on the Canadian Shield.

[10] Customer information derived from the prior regulator was assembled to calculate ten year customer growth numbers which allowed the construction of this variable.

The percentage of distribution lines underground is calculated by dividing the reported amount of underground kilometers of line by the total reported kilometers of line. As previously discussed, a higher prevalence of underground lines tends to reduce OM&A unit costs. Thus, the parameter estimate in the econometric model would be expected to have a negative sign.

$$\%\ Underground = \frac{KM\ of\ line\ underground}{Total\ KM\ of\ line} \qquad \textbf{[Equation 5]}$$

In calculating the ten-year customer growth variable, the Board provided data on the number of customers served by each LDC (or predecessor utilities) in 1992 and 1997. The number of customers in each year was then estimated based on the 1992, 1997, and the sample data of 2002 through 2009. This variable is a measure of the age of the distribution system. The expectation is that as the system becomes newer, OM&A expenses would decline. The variable is calculated by taking the current year's number of customers and subtracting the number of customers ten years ago. This difference is then divided by a measure of the size of the utility inclusive of number of customers, volumes, and kilometers of line. This allows us to normalize or scale the ten year customer growth based on the size of each LDC.

$$Ten\ Year\ Customer\ Growth = \frac{N_t - N_{t-10}}{Output\ Index} \qquad \textbf{[Equation 6]}$$

The binary variable indicates whether most or all of the LDC's service territory is located on the Canadian Shield. If the LDC is determined to be on the Canadian Shield, it receives a value of "1", likewise, if it is not on the Shield it receives a value of "0" in the econometric dataset. This variable was developed using a map from an authoritative text on Ontario's geography.[11] The Canadian Shield is a physiographic region characterized by shallow, rocky soils and numerous lakes. The land is unsuited for agriculture and is typically forested. We would expect OM&A costs to be higher for LDCs located on the Shield. Correspondingly, the estimated model coefficient value should have a positive sign.

The latest year of available values of the included model variables for each utility are presented in Table 2 below. This table reveals the actual reported data by each company through the latest available year. Please note that OM&A costs are reported in thousands of dollars.

[11] L.J. Chapman and D.F. Putnam, "The Physiography of Southern Ontario", Toronto: University of Toronto Press, 1996.

Table 2: Size and Scope of Included Variables[12]

Size and Scope of Variables Used in Econometric Research by LDC

LDC	OM&A Cost ('000)	Customers	Total Volume (MWh)	Kilometers of Line	Input Price Index	Percent Lines Underground	Canadian Shield	Customer Growth/ Output Index
Algoma Power Inc.	8,762	11,688	186,827	1,845	1.088	0.2%	Yes	336
Atikokan Hydro Inc.	893	1,670	23,073	92	1.155	0.5%	Yes	-1,805
Bluewater Power Distribution Corporation	10,173	35,580	1,004,963	751	1.251	23.6%	No	673
Brant County Power Inc.	4,246	9,614	271,572	320	1.173	11.9%	No	2,290
Brantford Power Inc.	7,868	37,668	907,514	541	1.173	50.8%	No	2,225
Burlington Hydro Inc.	13,705	63,558	1,584,518	1,718	1.318	38.1%	No	3,030
Cambridge and North Dumfries Hydro Inc.	9,912	50,201	1,410,431	1,105	1.280	35.9%	No	2,754
Centre Wellington Hydro Ltd.	1,710	6,382	147,575	146	1.232	47.3%	No	3,231
Chapleau Public Utilities Corporation	500	1,326	28,675	27	1.170	3.7%	Yes	-1,785
Chatham-Kent Hydro Inc.	5,550	32,168	697,061	810	1.195	28.0%	No	385
Clinton Power Corporation	551	1,660	29,677	21	1.202	19.0%	No	631
COLLUS Power Corp.	3,915	14,908	306,784	338	1.116	37.0%	No	2,952
Cooperative Hydro Embrun Inc.	409	1,941	29,476	27	1.362	44.4%	No	6,632
E.L.K. Energy Inc.	2,529	11,112	233,194	147	1.404	39.5%	No	2,500
Enersource Hydro Mississauga Inc.	51,190	189,738	7,498,988	5,300	1.372	65.4%	No	2,478
EnWin Utilities Ltd.	20,938	84,726	2,463,049	1,127	1.404	36.7%	No	1,238
Erie Thames Powerlines Corporation	4,379	14,040	401,845	270	1.202	21.5%	No	1,112
Espanola Regional Hydro Distribution Corporation	1,127	3,383	65,263	137	1.170	8.0%	Yes	703
Essex Powerlines Corporation	5,307	28,202	535,521	458	1.404	52.2%	No	2,508
Festival Hydro Inc.	3,707	19,531	549,507	276	1.174	33.3%	No	1,627
Fort Erie - Eastern Ontario Power (CNP)	4,918	19,167	336,890	699	1.157	7.6%	No	4,458
Fort Frances Power Corporation	1,326	3,768	82,504	84	1.155	9.5%	Yes	73
Greater Sudbury Hydro Inc.	11,459	46,539	957,200	944	1.170	22.6%	Yes	161
Grimsby Power Incorporated	1,770	10,073	171,241	172	1.318	19.2%	No	3,977
Guelph Hydro Electric Systems Inc.	9,833	49,299	1,485,531	1,063	1.232	59.8%	No	3,361
Haldimand County Hydro Inc.	7,042	20,911	543,863	1,731	1.173	5.1%	No	706
Halton Hills Hydro Inc.	4,165	21,184	470,763	1,363	1.345	35.3%	No	2,785
Hearst Power Distribution Company Limited	847	2,764	79,207	68	1.170	16.2%	Yes	170
Horizon Utilities Corporation	41,196	234,666	5,279,120	3,363	1.318	54.8%	No	1,309
Hydro 2000 Inc.	268	1,184	26,230	21	1.067	14.3%	No	1,310
Hydro Hawkesbury Inc.	803	5,453	169,625	66	1.067	15.2%	No	1,800
Hydro One Brampton Networks Inc.	18,523	131,027	3,608,712	2,778	1.372	70.5%	No	5,804
Hydro One Networks Inc.	519,828	1,193,767	23,459,000	120,750	1.299	3.5%	Yes	1,035
Hydro Ottawa Limited	55,309	298,855	7,560,275	5,387	1.362	49.7%	No	2,903
Innisfil Hydro Distribution Systems Limited	3,732	14,645	229,263	741	1.287	18.4%	No	2,228
Kenora Hydro Electric Corporation Ltd.	1,789	5,579	108,850	98	1.229	10.2%	Yes	-528
Kingston Hydro Corporation	5,445	26,991	714,182	357	1.115	34.7%	No	255
Kitchener-Wilmot Hydro Inc.	12,776	85,998	1,777,333	1,854	1.280	44.2%	No	3,178
Lakefront Utilities Inc.	1,931	9,534	247,365	115	1.179	17.4%	No	2,768
Lakeland Power Distribution Ltd.	2,930	9,387	213,657	350	1.189	18.6%	Yes	1,199
London Hydro Inc.	27,357	146,787	3,150,821	2,705	1.202	51.1%	No	2,480
Middlesex Power Distribution Corporation	1,635	7,911	184,694	125	1.195	20.8%	No	1,973
Midland Power Utility Corporation	1,820	6,905	203,110	115	1.096	31.3%	No	2,167
Milton Hydro Distribution Inc.	5,441	27,506	677,369	866	1.318	37.0%	No	7,981
Newmarket - Tay Power Distribution Ltd.	6,786	32,827	700,601	1,053	1.330	44.4%	No	3,121
Niagara Peninsula Energy Inc.	13,260	50,823	1,171,202	1,944	1.157	24.1%	No	2,803
Niagara-on-the-Lake Hydro Inc.	1,860	7,880	173,476	341	1.157	27.9%	No	2,597
Norfolk Power Distribution Inc.	4,619	18,895	363,134	765	1.173	14.1%	No	2,634
North Bay Hydro Distribution Limited	5,056	23,776	552,881	616	1.091	16.1%	Yes	445
Northern Ontario Wires Inc.	2,025	6,069	123,575	370	1.214	1.4%	Yes	-798
Oakville Hydro Electricity Distribution Inc.	10,818	62,858	1,471,674	1,428	1.345	61.4%	No	4,427
Orangeville Hydro Limited	2,375	11,126	243,157	173	1.330	41.0%	No	2,772
Orillia Power Distribution Corporation	3,958	12,962	309,606	307	1.287	19.2%	No	1,412
Oshawa PUC Networks Inc.	9,175	52,488	1,087,955	950	1.372	46.2%	No	2,351

[12] Values reflect the latest year of available data for each LDC. For most companies, this is 2009.

continued

Size and Scope of Variables Used in Econometric Research by LDC

LDC	OM&A Cost ('000)	Customers	Total Volume (MWh)	Kilometers of Line	Input Price Index	Percent Lines Underground	Canadian Shield	Customer Growth/ Output Index
Ottawa River Power Corporation	2,419	10,462	191,997	146	1.004	13.0%	Yes	1,186
Parry Sound Power Corporation	1,221	3,378	89,932	128	1.229	8.6%	Yes	717
Peterborough Distribution Incorporated	6,684	35,037	791,578	550	1.108	30.2%	No	1,615
Port Colborne (CNP)	3,543	9,124	190,211	313	1.157	5.1%	No	167
PowerStream Inc.	60,557	320,695	8,039,883	7,681	1.372	64.1%	No	4,297
PUC Distribution Inc.	7,914	32,825	707,757	732	1.088	15.8%	Yes	376
Renfrew Hydro Inc.	1,032	4,180	96,981	55	1.004	3.6%	No	678
Rideau St. Lawrence Distribution Inc.	1,631	5,863	110,634	89	1.161	10.1%	No	328
Sioux Lookout Hydro Inc.	1,135	2,740	71,779	211	1.155	2.8%	Yes	56
St. Thomas Energy Inc.	3,365	16,243	289,185	243	1.202	35.8%	No	2,937
Thunder Bay Hydro Electricity Distribution Inc.	11,992	49,922	974,297	1,186	1.155	19.7%	Yes	539
Tillsonburg Hydro Inc.	2,096	6,738	184,231	156	1.238	34.6%	No	1,903
Toronto Hydro-Electric System Limited	190,701	690,243	24,588,093	9,794	1.372	57.6%	No	741
Veridian Connections Inc.	19,542	111,994	2,454,094	2,201	1.379	41.8%	No	2,958
Wasaga Distribution Inc.	2,031	11,869	117,509	236	1.287	47.0%	No	6,451
Waterloo North Hydro Inc.	9,083	51,089	1,360,025	1,541	1.280	31.3%	No	2,868
Welland Hydro-Electric System Corp.	4,930	21,916	402,159	443	1.157	25.5%	No	1,086
Wellington North Power Inc.	1,159	3,588	87,132	76	1.169	13.2%	No	1,523
West Coast Huron Energy Inc.	1,435	3,763	155,319	65	1.280	20.0%	No	509
West Perth Power Inc.	716	2,052	58,761	36	1.174	30.6%	No	1,542
Westario Power Inc.	4,688	21,805	475,054	436	1.057	28.9%	No	1,522
Whitby Hydro Electric Corporation	8,409	39,513	840,204	1,034	1.379	52.1%	No	5,229
Woodstock Hydro Services Inc.	3,443	14,838	354,090	245	1.238	37.1%	No	1,920

2.4.2.3 Estimation Procedures

Benchmarking performance results are calculated by taking three-year averages of the most recently available scores. For nearly all of the Ontario distributors, this entails a 2007-2009 average.

The software package, GAUSS, is the same econometric software package used in last year's update. The use of GAUSS allows for custom estimation procedures to be developed. In the case of this research, corrections for groupwise heteroskedasticity were developed. This allowed for more precision in coefficient estimates relative to an Ordinary Least Squares (OLS) regression.

2.4.2.4 2011 Rate Year Parameter Estimates

Parameter estimates are provided in Table 3 below. All parameter estimates are signed according to theory and are plausible in magnitude. All first order variables are statistically different from zero, at a 95% confidence level.

The model quantifies the relationship between OM&A cost and the included variables. As expected, as outputs (customers, volumes, kilometer of line) increase, so does predicted OM&A cost. Similarly, higher input prices result in higher expected OM&A costs, all else being equal. OM&A expenses tend to be higher the older a system is and if the system is on the Canadian Shield. Expenses tend to decrease as the percent of underground lines increase.

The adjusted R^2 statistic is also reported in Table 3. This is a measure of the explanatory power of the model relative to the overall variation in sampled OM&A costs. A value of 1.0 indicates that all variation in OM&A expenses among distributors is explained by the model, whereas a

value of 0.0 indicates that none of the variation is explained. The R^2 value for the 2011 update is 0.981.

Table 3: Econometric Parameter Estimates

Econometric Model of OM&A Expenses

VARIABLE KEY

N= Number of Customers
V= Total Volumes
M= Total Kilometers of Line
W= Input Price Index
UN= Percent of Distribution Lines Underground
CG= 10 Year Customer Growth / Output Index
CS= Canadian Shield (binary)

EXPLANATORY VARIABLE	PARAMETER ESTIMATE	T-STATISTIC	EXPLANATORY VARIABLE	PARAMETER ESTIMATE	T-STATISTIC
N	0.503	13.92	**W**	0.483	5.70
NN	-0.102	-5.43	**WW**	-1.406	-2.21
V	0.341	9.96	**UN**	-0.121	-11.51
VV	0.084	5.22			
			CG	-0.064	-8.65
M	0.125	5.42			
MM	0.013	1.41	**CS**	0.013	2.27
MCS	0.003	1.20			
Constant	16.354	775.87			
Trend	0.021	7.05			

Other Results

Rbar-Squared	0.981
Sample Period	2002-2009
Number of Observations	609

2.4.3 Econometric Benchmarking Results

The OM&A performance evaluations are presented in Table 4 below. The ratio of the average actual OM&A costs of each company in the last three years to the model's benchmark cost projections over the same years is reported. A lower ratio of actual cost to predicted cost implies better performance. Distributors have been ranked according to this ratio.

P-value statistical tests were conducted for each utility to test the hypothesis of it being an average cost performer. If a distributor is a good cost performer with a p-value between 0 and 0.10, the hypothesis of average performance is rejected in favor of a statistically superior performer designation. Likewise, if a distributor is a poor cost performer with a p-value between 0 and 0.10, the hypothesis of average performance is rejected in favor of a statistically inferior performer designation. Fifteen distributors fit into each the statistically superior and statistically inferior classification.

Table 4: Econometric Benchmarking Results

Performance Rankings Based on Econometric

	Years Benchmarked	Actual/ Predicted [1]	P-Value	Rank[1]
Hydro Hawkesbury Inc.	2007-2009	**0.600**	0.000	1
Chatham-Kent Hydro Inc.	2007-2009	**0.729**	0.003	2
Northern Ontario Wires Inc.	2007-2009	**0.748**	0.005	3
Hydro One Brampton Networks Inc.	2007-2009	**0.769**	0.010	4
Hydro 2000 Inc.	2007-2009	**0.790**	0.019	5
Grimsby Power Incorporated	2007-2009	**0.791**	0.019	6
Waterloo North Hydro Inc.	2007-2009	**0.797**	0.022	7
Kitchener-Wilmot Hydro Inc.	2007-2009	**0.798**	0.023	8
Cambridge and North Dumfries Hydro Inc.	2007-2009	**0.817**	0.037	9
Middlesex Power Distribution Corporation	2007-2009	**0.829**	0.049	10
Renfrew Hydro Inc.	2007-2009	**0.834**	0.055	11
Festival Hydro Inc.	2007-2009	**0.837**	0.057	12
Oshawa PUC Networks Inc.	2007-2009	**0.854**	0.081	13
North Bay Hydro Distribution Limited	2007-2009	**0.860**	0.090	14
Lakefront Utilities Inc.	2007-2009	**0.862**	0.093	15
Halton Hills Hydro Inc.	2007-2009	**0.874**	0.117	16
Hearst Power Distribution Company Limited	2007-2009	**0.889**	0.148	17
Kingston Hydro Corporation	2007-2009	**0.895**	0.163	18
Veridian Connections Inc.	2007-2009	**0.898**	0.170	19
E.L.K. Energy Inc.	2007-2009	**0.930**	0.260	20
Newmarket - Tay Power Distribution Ltd.	2007-2009	**0.931**	0.262	21
Horizon Utilities Corporation	2007-2009	**0.931**	0.265	22
Oakville Hydro Electricity Distribution Inc.	2007-2009	**0.934**	0.273	23

continued

Performance Rankings Based on Econometric

	Years Benchmarked	Actual/ Predicted [1]	P-Value	Rank[1]
Niagara-on-the-Lake Hydro Inc.	2007-2009	**0.945**	0.308	24
Hydro Ottawa Limited	2007-2009	**0.945**	0.310	25
Rideau St. Lawrence Distribution Inc.	2007-2009	**0.949**	0.321	26
Milton Hydro Distribution Inc.	2007-2009	**0.958**	0.351	27
PUC Distribution Inc.	2007-2009	**0.958**	0.354	28
Peterborough Distribution Incorporated	2007-2009	**0.962**	0.366	29
Wasaga Distribution Inc.	2007-2009	**0.968**	0.388	30
Kenora Hydro Electric Corporation Ltd.	2007-2009	**0.969**	0.390	31
Welland Hydro-Electric System Corp.	2007-2009	**0.974**	0.409	32
Lakeland Power Distribution Ltd.	2007-2009	**0.976**	0.416	33
Orangeville Hydro Limited	2007-2009	**0.987**	0.454	34
Innisfil Hydro Distribution Systems Limited	2007-2009	**0.991**	0.469	35
Burlington Hydro Inc.	2007-2009	**1.001**	0.498	36
Espanola Regional Hydro Distribution Corporation	2007-2009	**1.007**	0.476	37
Guelph Hydro Electric Systems Inc.	2007-2009	**1.009**	0.469	38
Atikokan Hydro Inc.	2007-2009	**1.011**	0.461	39
Cooperative Hydro Embrun Inc.	2007-2009	**1.028**	0.405	40
Ottawa River Power Corporation	2007-2009	**1.028**	0.404	41
Essex Powerlines Corporation	2007-2009	**1.030**	0.397	42
PowerStream Inc.	2007-2009	**1.036**	0.376	43
St. Thomas Energy Inc.	2007-2009	**1.040**	0.365	44
Thunder Bay Hydro Electricity Distribution Inc.	2007-2009	**1.044**	0.353	45
London Hydro Inc.	2007-2009	**1.045**	0.350	46
Westario Power Inc.	2007-2009	**1.047**	0.341	47
Sioux Lookout Hydro Inc.	2007-2009	**1.049**	0.337	48
Woodstock Hydro Services Inc.	2007-2009	**1.050**	0.334	49
Haldimand County Hydro Inc.	2007-2009	**1.054**	0.318	50
Parry Sound Power Corporation	2007-2009	**1.066**	0.285	51
Bluewater Power Distribution Corporation	2007-2009	**1.077**	0.254	52
Tillsonburg Hydro Inc.	2007-2009	**1.079**	0.250	53
Enersource Hydro Mississauga Inc.	2007-2009	**1.080**	0.246	54
Norfolk Power Distribution Inc.	2007-2009	**1.086**	0.233	55
Brantford Power Inc.	2007-2009	**1.087**	0.229	56
Brant County Power Inc.	2007-2009	**1.097**	0.205	57
Hydro One Networks Inc.	2007-2009	**1.133**	0.134	58
Whitby Hydro Electric Corporation	2007-2009	**1.140**	0.123	59
EnWin Utilities Ltd.	2007-2009	**1.145**	0.116	60
Wellington North Power Inc.	2007-2009	**1.147**	0.112	61
Fort Frances Power Corporation	2007-2009	**1.155**	0.102	62
Midland Power Utility Corporation	2007-2009	**1.162**	0.092	63
Orillia Power Distribution Corporation	2007-2009	**1.167**	0.086	64
Niagara Peninsula Energy Inc.	2007-2009	**1.172**	0.079	65
Centre Wellington Hydro Ltd.	2007-2009	**1.184**	0.067	66
Greater Sudbury Hydro Inc.	2007-2009	**1.192**	0.060	67
COLLUS Power Corp.	2007-2009	**1.194**	0.058	68
Toronto Hydro-Electric System Limited	2007-2009	**1.217**	0.042	69
Chapleau Public Utilities Corporation	2007-2009	**1.228**	0.035	70
West Coast Huron Energy Inc.	2007-2009	**1.230**	0.034	71
West Perth Power Inc.	2007-2009	**1.236**	0.030	72
Clinton Power Corporation	2007, 2009	**1.267**	0.018	73
Fort Erie - Eastern Ontario Power (CNP)	2007-2009	**1.271**	0.017	74
Erie Thames Powerlines Corporation	2007-2009	**1.365**	0.003	75
Port Colborne (CNP)	2007-2009	**1.403**	0.001	76
Algoma Power Inc.	2007-2009	**1.518**	0.000	77

1 Lower values imply better performance.

2.5 Unit Cost Indexing Methods and Results

This section begins with a brief overview, in general terms, of the unit cost benchmarking approach. It is followed by information specific to the benchmarking methods found in this report.

2.5.1 Unit Cost Benchmarking 101

When implementing the unit cost index benchmarking approach, the analyst calculates the ratio of the relevant statistic being measured (e.g., OM&A cost) to a measure of output (e.g., number of customers). This ratio is compared to the mean metric of a group of firms sharing similar business and operating conditions to the company being investigated. This group of firms is called a peer group. The peer group's mean serves as an estimate for the expected unit cost of the target utility. If a firm's unit cost ratio is below the peer group average, they are classified as an above average performer, if the unit cost ratio of a company is above the peer group average, they are classified as a below-average cost performer.

$$Performance = \frac{OM\ \&\ A\ Unit\ Cost^{\ Actual}}{OM\ \&\ A\ Unit\ Cost^{\ Peer\ Group\ \ Average}} \qquad \textbf{[Equation 7]}$$

As is the case for the econometric approach, multiple outputs can be integrated in devising an appropriate measure of output. A multi-output index can incorporate the cost impacts inherent in multiple output measures such as the number of customers, volumes, or kilometers of line. The weights for each individual output measure can be derived from the cost elasticity measurements of the econometric model to calculate a more accurate output index than would be present if only one measure of output were used. A multi-output index is used in this research and will be discussed in further detail in Section 2.5.2 below.

It should be noted that the unit cost indexing approach does not explicitly adjust for the reality that utilities encounter significantly different external circumstances. Adjustments for heterogeneous conditions rest solely upon the selection of an appropriate peer group. Therefore, peer group selection must be done with care. This is the reason for dividing the Ontario industry into twelve peer groups based on identified significant cost drivers which resulted from the econometric research.

2.5.2 Methods Used in this Report

The Ontario power distribution industry was divided into twelve separate peer groups.[13] The peer groups were based on the criteria of location, size, geography, percent undergrounding, and customer growth. The original determination of peer groups was based on 2002 through 2006 data and will remain constant through the end of the 3rd Generation Incentive Regulation plan, except where industry amalgamations necessitate adjustments. These variables were identified

[13] This number includes the "Large Northern" peer group which only consists of one utility, Hydro One Networks. No other Ontario power distributors are similar enough to offer a fair comparison to Hydro One Networks using the unit cost indexing approach.

on the basis of the OM&A econometric model previously estimated. Table 5 below displays the peer groups and the variable data that was used in the development of peer group divisions.

A unit cost index was constructed for each distributor and for each year of available data. The construction of this index has total OM&A expenses as the numerator and a multi-output index as the denominator. This unit cost index is constructed according to Equation 8 for utility *h* in year *t*.

$$\text{Unit Cost}_{h,t} = Cost_{h,t} / Output\ Index_{\text{h,t}} \quad \textbf{[Equation 8]}$$

The output index in Equation 8 is calculated by weighting up the identified outputs and creating a composite output index. The estimated output elasticities for customers, volumes, and kilometers of lines were 0.50, 0.34, and 0.13, respectively. The corresponding elasticity weights were 0.52, 0.35, and 0.13 and sum to 1.[14] These output elasticities result from the econometric model. Equation 9 offers the formula for calculating this output index.

$$\ln \text{Output } Index_{\text{h,t}} = \sum_i se_i \cdot (\ln Y_{i,h,t} . - \overline{\ln Y_{i,t}}) \quad \textbf{[Equation 9]}$$

Here for each company h in year *t*,

$Y_{i,h,t}$ = quantity of output dimension *i*

$\overline{\ln Y_{i,t}}$ = sample mean of the logged quantity of output dimension *i* provided by all utilities

se_i = share of output dimension *i* in the sum of the econometric estimates of the cost elasticities of the output quantities.

[14] The weights are derived by summing the output elasticities and dividing each component output elasticity by this sum.

Table 5: Peer Group Divisions

Peer Groups for Ontario LDCs

Peer Group Designation & Distributor	Customers[1]	% Under-grounding[1]	Canadian Shield	Customer Growth/Output Index[1]
Small Northern Low Undergrounding				
Algoma Power Inc.	11,688	0.2%	Yes	336
Atikokan Hydro Inc.	1,670	0.0%	Yes	-1,805
Chapleau Public Utilities Corporation	1,326	3.7%	Yes	-1,785
Espanola Regional Hydro Distribution Corpor	3,383	8.0%	Yes	703
Fort Frances Power Corporation	3,768	9.5%	Yes	73
Northern Ontario Wires Inc.	6,069	1.4%	Yes	-798
Parry Sound Power Corporation	3,378	8.6%	Yes	717
Renfrew Hydro Inc.	4,180	3.6%	No	678
Sioux Lookout Hydro Inc.	2,740	2.8%	Yes	56
Small Northern Medium Undergrounding				
Hearst Power Distribution Company Limited	2,764	16.2%	Yes	170
Kenora Hydro Electric Corporation Ltd.	5,579	10.2%	Yes	-528
Lakeland Power Distribution Ltd.	9,387	18.6%	Yes	1,199
Ottawa River Power Corporation	10,462	13.0%	Yes	1,186
Mid-Size Northern				
Greater Sudbury Hydro Inc.	46,539	22.6%	Yes	161
North Bay Hydro Distribution Limited	23,776	16.1%	Yes	445
PUC Distribution Inc.	32,825	15.8%	Yes	376
Thunder Bay Hydro Electricity Distribution In	49,922	19.7%	Yes	539
Large Northern				
Hydro One Networks Inc.	1,193,767	3.5%	Yes	1,035
Small Southern Low & Medium Undergrounding				
Brant County Power Inc.	9,614	11.9%	No	2,290
Clinton Power Corporation	1,660	19.0%	No	631
Hydro 2000 Inc.	1,184	14.3%	No	1,310
Hydro Hawkesbury Inc.	5,453	15.2%	No	1,800
Lakefront Utilities Inc.	9,534	17.4%	No	2,768
Port Colborne (CNP)	9,124	5.1%	No	167
Rideau St. Lawrence Distribution Inc.	5,863	10.1%	No	328
Wellington North Power Inc.	3,588	13.2%	No	1,523
Small Southern Medium-High Undergrounding				
Middlesex Power Distribution Corporation	7,911	20.8%	No	1,973
Midland Power Utility Corporation	6,905	31.3%	No	2,167
Tillsonburg Hydro Inc.	6,738	34.6%	No	1,903
West Coast Huron Energy Inc.	3,763	20.0%	No	509
West Perth Power Inc.	2,052	30.6%	No	1,542
Small Southern Medium-High Undergrounding with Rapid Growth				
Centre Wellington Hydro Ltd.	6,382	47.3%	No	3,231
Cooperative Hydro Embrun Inc.	1,941	44.4%	No	6,632
Grimsby Power Incorporated	10,073	19.2%	No	3,977
Niagara-on-the-Lake Hydro Inc.	7,880	27.9%	No	2,597
Orangeville Hydro Limited	11,126	41.0%	No	2,772
Mid-size Southern Low & Medium Undergrounding				
Fort Erie - Eastern Ontario Power (CNP)	19,167	7.6%	No	4,458
Haldimand County Hydro Inc.	20,911	5.1%	No	706
Innisfil Hydro Distribution Systems Limited	14,645	18.4%	No	2,228
Norfolk Power Distribution Inc.	18,895	14.1%	No	2,634
Orillia Power Distribution Corporation	12,962	19.2%	No	1,412

continued

Peer Groups for Ontario LDCs

Peer Group Designation & Distributor	Customers[1]	% Under-grounding[1]	Canadian Shield	Customer Growth/Output Index[1]
Mid-size Southern Medium-High Undergrounding				
Bluewater Power Distribution Corporation	35,580	23.6%	No	673
Chatham-Kent Hydro Inc.	32,168	28.0%	No	385
COLLUS Power Corp.	14,908	37.0%	No	2,952
E.L.K. Energy Inc.	11,112	39.5%	No	2,500
Erie Thames Powerlines Corporation	14,040	21.5%	No	1,112
Essex Powerlines Corporation	28,202	52.2%	No	2,508
Festival Hydro Inc.	19,531	33.3%	No	1,627
Kingston Hydro Corporation	26,991	34.7%	No	255
Niagara Peninsula Energy Inc.	50,823	24.1%	No	2,803
Peterborough Distribution Incorporated	35,037	30.2%	No	1,615
St. Thomas Energy Inc.	16,243	35.8%	No	2,937
Wasaga Distribution Inc.	11,869	47.0%	No	6,451
Welland Hydro-Electric System Corp.	21,916	25.5%	No	1,086
Westario Power Inc.	21,805	28.9%	No	1,522
Woodstock Hydro Services Inc.	14,838	37.1%	No	1,920
Large City Southern Medium-High Undergrounding				
EnWin Utilities Ltd.	84,726	36.7%	No	1,238
Hydro Ottawa Limited	298,855	49.7%	No	2,903
Toronto Hydro-Electric System Limited	690,243	57.6%	No	741
Veridian Connections Inc.	111,994	41.8%	No	2,958
Large City Southern High Undergrounding				
Enersource Hydro Mississauga Inc.	189,738	65.4%	No	2,478
Horizon Utilities Corporation	234,666	54.8%	No	1,309
Hydro One Brampton Networks Inc.	131,027	70.5%	No	5,804
London Hydro Inc.	146,787	51.1%	No	2,480
PowerStream Inc.	320,695	64.1%	No	4,297
Mid-size GTA Medium-High & High Undergrounding				
Brantford Power Inc.	37,668	50.8%	No	2,225
Burlington Hydro Inc.	63,558	38.1%	No	3,030
Cambridge and North Dumfries Hydro Inc.	50,201	35.9%	No	2,754
Guelph Hydro Electric Systems Inc.	49,299	59.8%	No	3,361
Halton Hills Hydro Inc.	21,184	35.3%	No	2,785
Kitchener-Wilmot Hydro Inc.	85,998	44.2%	No	3,178
Milton Hydro Distribution Inc.	27,506	37.0%	No	7,981
Newmarket - Tay Power Distribution Ltd.	32,827	44.4%	No	3,121
Oakville Hydro Electricity Distribution Inc.	62,858	61.4%	No	4,427
Oshawa PUC Networks Inc.	52,488	46.2%	No	2,351
Waterloo North Hydro Inc.	51,089	31.3%	No	2,868
Whitby Hydro Electric Corporation	39,513	52.1%	No	5,229

[1] Latest year of available data.

2.5.3 Unit Cost Indexing Results

The OM&A performance evaluations for each year of available data are presented in Table 6 below. The ratio of the average actual OM&A unit cost index of each company in the last three years to the peer group's average OM&A unit cost index over the same years is reported. A lower ratio of actual unit cost to peer group unit cost implies better performance. Table 7 ranks each power distributor according to this ratio.

Two lines have been drawn on Table 7 demarcating the first quartile and the fourth quartile. The utilities on the top (efficiency rankings 1-19) are labeled as top quartile cost performers. The utilities on the bottom (efficiency rankings 58-76) are classified as bottom quartile cost performers according to the unit cost benchmarking method.[15] Hydro One Networks is not included in Table 7 given its lack of suitable Ontario peers.

The overall process used to calculate the unit cost indexing results is shown in Figure 4 below.

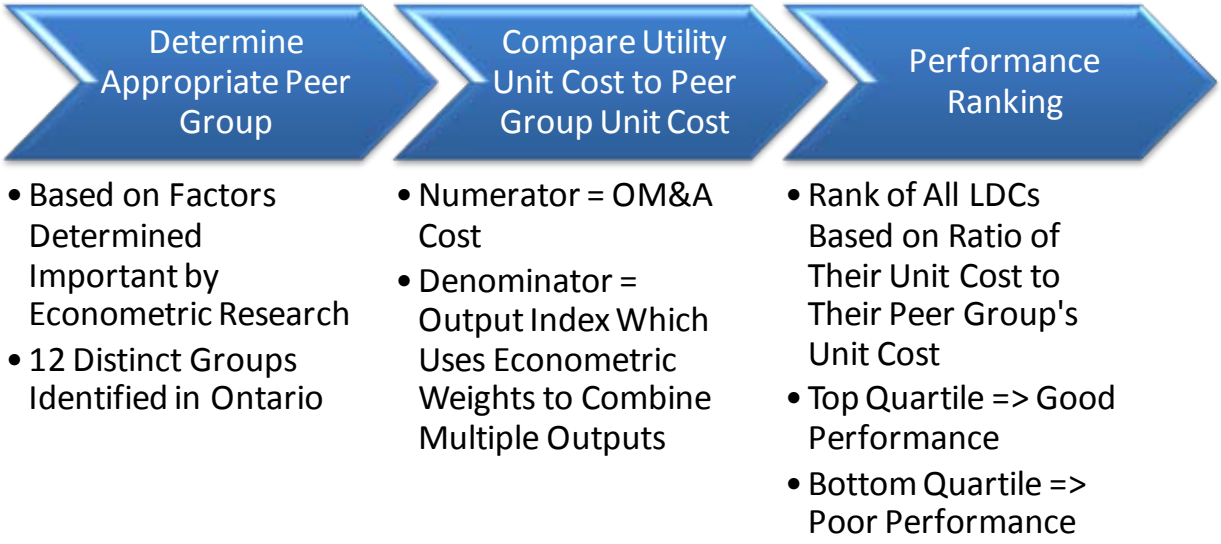

Figure 4: Process for Calculating Unit Cost Indexing Results

[15] This was calculated by dividing 76 by 4. This puts 19 LDC's in each of the four quartiles.

Table 6: Unit OM&A Cost Indexes by Peer Group

Unit OM&A Cost Indexes

	2002	2003	2004	2005	2006	2007	2008	2009	Average of Last 3 Available Years[1]	Average / Group Average[1] [A]	Percentage Differences[1] [A - 1]
Small Northern Low Undergrounding											
Renfrew Hydro Inc.	0.911	0.975	0.904	0.798	0.984	1.080	1.199	1.205	1.161	**0.670**	-33.0%
Northern Ontario Wires Inc.	1.249	1.115	1.225	1.077	1.150	1.241	1.350	1.400	1.330	**0.767**	-23.3%
Parry Sound Power Corporation	0.945	1.143	1.150	1.213	1.263	1.240	1.422	1.467	1.377	**0.794**	-20.6%
Espanola Regional Hydro	1.286	1.070	0.997	1.056	1.361	1.350	1.386	1.502	1.413	**0.815**	-18.5%
Sioux Lookout Hydro Inc.	1.019	0.823	1.178	1.274	1.302	1.428	1.517	1.543	1.496	**0.863**	-13.7%
Fort Frances Power Corporation	1.150	1.161	1.181	1.251	1.288	1.386	1.520	1.638	1.515	**0.874**	-12.6%
Chapleau Public Utilities Corporation	1.582	1.643	1.668	1.842	1.766	2.292	2.136	1.784	2.071	**1.194**	19.4%
Atikokan Hydro Inc.	1.350	2.509	1.591	1.496	1.499	1.841	2.341	2.603	2.262	**1.305**	30.5%
Algoma Power Inc.	2.340	2.419	2.544	2.714	2.795	2.861	3.049	3.028	2.979	**1.718**	71.8%
Group Average									**1.734**		
Small Northern Medium Undergrounding											
Hearst Power Distribution Company	0.652	0.629	0.787	0.773	0.852	0.891	1.029	1.281	1.067	**0.887**	-11.3%
Lakeland Power Distribution Ltd.	0.974	1.174	0.819	0.823	0.979	0.881	1.218	1.341	1.147	**0.953**	-4.7%
Ottawa River Power Corporation	0.911	1.019	0.995	0.963	1.038	1.167	1.186	1.217	1.190	**0.988**	-1.2%
Kenora Hydro Electric Corporation	1.053	1.074	1.105	1.068	1.100	1.237	1.395	1.603	1.412	**1.173**	17.3%
Group Average									**1.204**		
Mid-Size Northern											
North Bay Hydro Distribution Limited	1.094	0.977	0.964	0.855	1.104	0.970	0.989	0.951	0.970	**0.855**	-14.5%
PUC Distribution Inc.	0.834	0.903	1.031	1.006	0.985	1.118	1.038	1.128	1.095	**0.965**	-3.5%
Thunder Bay Hydro Electricity	1.027	1.114	1.068	0.961	1.010	1.112	1.124	1.155	1.130	**0.997**	-0.3%
Greater Sudbury Hydro Inc.	0.990	0.959	1.084	0.967	1.028	1.705	1.132	1.186	1.341	**1.183**	18.3%
Group Average									**1.134**		
Large Northern											
Hydro One Networks Inc.	1.142	0.938	0.895	0.963	1.153	1.352	1.573	1.732	1.552	**1.000**	0.0%
Group Average									**1.552**		
Small Southern Low & Medium Undergrounding											
Hydro Hawkesbury Inc.	0.527	0.551	0.504	0.602	0.568	0.614	0.659	0.656	0.643	**0.501**	-49.9%
Lakefront Utilities Inc.	0.700	0.622	0.712	0.847	0.909	0.928	0.934	0.961	0.941	**0.733**	-26.7%
Hydro 2000 Inc.	0.556	0.633	0.634	1.142	0.910	0.961	0.987	1.082	1.010	**0.787**	-21.3%
Brant County Power Inc.	1.188	1.339	1.398	1.399	1.547	0.672	1.394	1.786	1.284	**1.001**	0.1%
Rideau St. Lawrence Distribution	1.011	1.045	1.041	1.138	1.166	1.220	1.321	1.434	1.325	**1.033**	3.3%
Wellington North Power Inc.	1.120	1.021	1.069	1.115	1.177	1.155	1.487	1.459	1.367	**1.066**	6.6%
Clinton Power Corporation	1.215	1.271	1.091	1.194	1.558	1.752	NA	1.786	1.769	**1.379**	37.9%
Port Colborne (CNP)	0.710	0.801	0.874	1.995	2.009	2.193	1.840	1.740	1.924	**1.500**	50.0%
Group Average									**1.283**		
Small Southern Medium-High Undergrounding											
Middlesex Power Distribution	0.967	1.128	0.980	1.089	0.954	0.919	0.916	0.983	0.939	**0.810**	-19.0%
Tillsonburg Hydro Inc.	0.808	1.268	1.263	1.387	0.975	0.967	1.002	1.333	1.100	**0.948**	-5.2%
Midland Power Utility Corporation	1.140	1.107	1.083	1.007	1.119	1.093	1.112	1.148	1.118	**0.964**	-3.6%
West Perth Power Inc.	1.150	1.163	1.067	0.903	1.157	1.117	1.294	1.525	1.312	**1.131**	13.1%
West Coast Huron Energy Inc.	1.162	1.172	1.149	1.443	1.478	1.220	1.304	1.469	1.331	**1.147**	14.7%
Group Average									**1.160**		
Small Southern Medium-High Undergrounding with Rapid Growth											
Grimsby Power Incorporated	0.682	0.690	0.757	0.796	0.765	0.837	0.892	0.926	0.885	**0.852**	-14.8%
Niagara-on-the-Lake Hydro Inc.	0.825	0.771	0.847	0.780	0.861	0.954	0.955	1.007	0.972	**0.936**	-6.4%
Orangeville Hydro Limited	0.866	0.913	0.812	0.882	0.886	0.951	1.054	1.042	1.015	**0.978**	-2.2%
Centre Wellington Hydro Ltd.	1.172	1.113	1.053	1.052	1.064	1.076	1.133	1.220	1.143	**1.101**	10.1%
Cooperative Hydro Embrun Inc.	0.925	0.997	0.897	1.059	1.070	1.171	1.174	1.185	1.177	**1.133**	13.3%
Group Average									**1.038**		

continued

Unit OM&A Cost Indexes

	2002	2003	2004	2005	2006	2007	2008	2009	Average of Last 3 Available Years[1]	Average / Group Average[1] [A]	Percentage Differences[1] [A - 1]
Mid-size Southern Low & Medium Undergrounding											
Innisfil Hydro Distribution	0.916	1.073	1.119	0.941	1.002	1.073	1.170	1.201	1.148	**0.906**	-9.4%
Norfolk Power Distribution Inc.	1.062	1.028	0.967	0.954	0.948	1.123	1.275	1.103	1.167	**0.922**	-7.8%
Orillia Power Distribution Corporation	0.914	1.016	1.047	1.172	1.143	1.230	1.325	1.368	1.308	**1.033**	3.3%
Haldimand County Hydro Inc.	1.075	1.014	1.094	1.030	1.098	1.387	1.392	1.246	1.342	**1.060**	6.0%
Fort Erie - Eastern Ontario	1.328	1.257	1.198	1.291	1.463	1.515	1.377	1.211	1.367	**1.080**	8.0%
Group Average									**1.266**		
Mid-size Southern Medium-High Undergrounding											
Chatham-Kent Hydro Inc.	0.660	0.653	0.688	0.679	0.687	0.705	0.769	0.794	0.756	**0.738**	-26.2%
Festival Hydro Inc.	0.782	0.736	0.751	0.724	0.809	0.800	0.829	0.858	0.829	**0.809**	-19.1%
Kingston Hydro Corporation	0.930	1.022	1.011	0.936	0.844	0.842	0.921	0.940	0.901	**0.879**	-12.1%
Peterborough Distribution	0.789	0.734	0.793	0.773	0.876	0.906	0.980	0.919	0.935	**0.913**	-8.7%
Essex Powerlines Corporation	1.028	0.926	1.029	1.148	1.122	1.038	0.991	0.959	0.996	**0.973**	-2.7%
E.L.K. Energy Inc.	0.932	0.983	0.835	0.570	0.840	0.874	0.989	1.150	1.004	**0.980**	-2.0%
Westario Power Inc.	0.956	1.099	1.114	0.978	0.967	0.925	1.103	1.017	1.015	**0.991**	-0.9%
Wasaga Distribution Inc.	0.740	0.784	0.851	0.940	1.003	0.982	1.025	1.068	1.025	**1.001**	0.1%
Welland Hydro-Electric System	0.798	0.881	0.955	0.820	0.763	0.982	0.999	1.128	1.036	**1.011**	1.1%
St. Thomas Energy Inc.	0.778	0.813	0.879	0.958	1.088	1.030	1.003	1.092	1.042	**1.017**	1.7%
Woodstock Hydro Services Inc.	0.838	0.907	0.928	0.940	0.973	1.005	1.032	1.089	1.042	**1.017**	1.7%
Niagara Peninsula Energy Inc.	0.938	0.966	0.980	1.052	1.054	1.000	1.092	1.113	1.068	**1.043**	4.3%
Bluewater Power Distribution	0.978	1.053	1.022	1.042	1.116	1.057	1.081	1.226	1.121	**1.094**	9.4%
COLLUS Power Corp.	0.823	0.788	0.829	0.823	0.987	1.027	1.127	1.247	1.133	**1.106**	10.6%
Erie Thames Powerlines Corporation	1.051	1.239	1.286	1.344	1.289	1.546	1.495	1.347	1.463	**1.428**	42.8%
Group Average									**1.024**		
Large City Southern Medium-High Undergrounding											
Hydro Ottawa Limited	0.840	0.761	0.640	0.593	0.716	0.687	0.836	0.842	0.788	**0.838**	-16.2%
Veridian Connections Inc.	0.946	1.109	0.915	0.815	0.858	0.757	0.846	0.825	0.809	**0.861**	-13.9%
Toronto Hydro-Electric System	0.864	0.894	0.923	0.870	0.863	0.934	1.079	1.149	1.054	**1.122**	12.2%
EnWin Utilities Ltd.	1.284	1.143	1.141	1.052	1.097	1.055	1.156	1.113	1.108	**1.179**	17.9%
Group Average									**0.940**		
Large City Southern High Undergrounding											
Hydro One Brampton Networks	0.583	0.567	0.520	0.518	0.562	0.529	0.618	0.611	0.586	**0.741**	-25.9%
PowerStream Inc.	0.618	0.703	0.715	0.715	0.669	0.716	0.799	0.831	0.782	**0.989**	-1.1%
Horizon Utilities Corporation	0.624	0.711	0.638	0.760	0.670	0.755	0.822	0.857	0.811	**1.026**	2.6%
London Hydro Inc.	0.728	0.714	0.708	0.711	0.778	0.812	0.861	0.895	0.856	**1.083**	8.3%
Enersource Hydro Mississauga	0.738	0.738	0.767	0.801	0.841	0.885	0.878	0.992	0.918	**1.161**	16.1%
Group Average									**0.791**		
Mid-size GTA Medium-High & High Undergrounding											
Kitchener-Wilmot Hydro Inc.	0.589	0.603	0.598	0.614	0.669	0.680	0.715	0.709	0.701	**0.836**	-16.4%
Waterloo North Hydro Inc.	0.814	0.787	0.788	0.745	0.763	0.736	0.761	0.743	0.747	**0.890**	-11.0%
Cambridge and North Dumfries	0.622	0.612	0.666	0.604	0.600	0.691	0.759	0.843	0.765	**0.912**	-8.8%
Oakville Hydro Electricity Distribution	0.783	0.860	0.859	0.808	0.868	0.811	0.745	0.781	0.779	**0.928**	-7.2%
Oshawa PUC Networks Inc.	0.878	0.943	0.912	0.674	0.687	0.740	0.844	0.852	0.812	**0.968**	-3.2%
Milton Hydro Distribution Inc.	0.844	0.798	0.776	0.785	0.766	0.778	0.834	0.845	0.819	**0.976**	-2.4%
Guelph Hydro Electric Systems Inc.	0.751	0.837	0.786	0.746	0.750	0.856	0.843	0.834	0.844	**1.006**	0.6%
Halton Hills Hydro Inc.	0.901	0.815	0.833	0.773	0.924	0.834	0.985	0.794	0.871	**1.039**	3.9%
Newmarket - Tay Power Distribution	0.798	0.897	0.872	0.816	0.813	0.801	0.903	0.926	0.877	**1.045**	4.5%
Burlington Hydro Inc.	0.730	0.761	0.786	0.775	0.841	0.871	0.919	0.936	0.909	**1.083**	8.3%
Whitby Hydro Electric Corporation	0.888	0.954	0.856	0.879	0.922	0.960	0.943	0.980	0.961	**1.146**	14.6%
Brantford Power Inc.	0.746	0.851	0.915	0.893	0.793	0.976	0.974	0.995	0.982	**1.170**	17.0%
Group Average									**0.839**		

[1] Lower values imply better performance

Table 7: Performance Rankings Based on Unit Cost Indexes

Updated Performance Rankings Based on Unit Cost Indexes

	Average / Group Average[1] [A]	Percentage Differences[1] [A - 1]	Efficiency Ranking [1, 2]
Hydro Hawkesbury Inc.	**0.501**	-49.9%	1
Renfrew Hydro Inc.	**0.670**	-33.0%	2
Lakefront Utilities Inc.	**0.733**	-26.7%	3
Chatham-Kent Hydro Inc.	**0.738**	-26.2%	4
Hydro One Brampton Networks Inc.	**0.741**	-25.9%	5
Northern Ontario Wires Inc.	**0.767**	-23.3%	6
Hydro 2000 Inc.	**0.787**	-21.3%	7
Parry Sound Power Corporation	**0.794**	-20.6%	8
Festival Hydro Inc.	**0.809**	-19.1%	9
Middlesex Power Distribution Corporation	**0.810**	-19.0%	10
Espanola Regional Hydro Distribution Corpoı	**0.815**	-18.5%	11
Kitchener-Wilmot Hydro Inc.	**0.836**	-16.4%	12
Hydro Ottawa Limited	**0.838**	-16.2%	13
Grimsby Power Incorporated	**0.852**	-14.8%	14
North Bay Hydro Distribution Limited	**0.855**	-14.5%	15
Veridian Connections Inc.	**0.861**	-13.9%	16
Sioux Lookout Hydro Inc.	**0.863**	-13.7%	17
Fort Frances Power Corporation	**0.874**	-12.6%	18
Kingston Hydro Corporation	**0.879**	-12.1%	19
Hearst Power Distribution Company Limited	**0.887**	-11.3%	20
Waterloo North Hydro Inc.	**0.890**	-11.0%	21
Innisfil Hydro Distribution Systems Limited	**0.906**	-9.4%	22
Cambridge and North Dumfries Hydro Inc.	**0.912**	-8.8%	23
Peterborough Distribution Incorporated	**0.913**	-8.7%	24
Norfolk Power Distribution Inc.	**0.922**	-7.8%	25
Oakville Hydro Electricity Distribution Inc.	**0.928**	-7.2%	26
Niagara-on-the-Lake Hydro Inc.	**0.936**	-6.4%	27
Tillsonburg Hydro Inc.	**0.948**	-5.2%	28
Lakeland Power Distribution Ltd.	**0.953**	-4.7%	29
Midland Power Utility Corporation	**0.964**	-3.6%	30
PUC Distribution Inc.	**0.965**	-3.5%	31
Oshawa PUC Networks Inc.	**0.968**	-3.2%	32
Essex Powerlines Corporation	**0.973**	-2.7%	33
Milton Hydro Distribution Inc.	**0.976**	-2.4%	34
Orangeville Hydro Limited	**0.978**	-2.2%	35
E.L.K. Energy Inc.	**0.980**	-2.0%	36
Ottawa River Power Corporation	**0.988**	-1.2%	37

continued

Updated Performance Rankings Based on Unit Cost Indexes

	Average / Group Average[1] [A]	Percentage Differences[1] [A - 1]	Efficiency Ranking [1, 2]
PowerStream Inc.	**0.989**	-1.1%	38
Westario Power Inc.	**0.991**	-0.9%	39
Thunder Bay Hydro Electricity Distribution In	**0.997**	-0.3%	40
Wasaga Distribution Inc.	**1.001**	0.1%	41
Brant County Power Inc.	**1.001**	0.1%	42
Guelph Hydro Electric Systems Inc.	**1.006**	0.6%	43
Welland Hydro-Electric System Corp.	**1.011**	1.1%	44
St. Thomas Energy Inc.	**1.017**	1.7%	45
Woodstock Hydro Services Inc.	**1.017**	1.7%	46
Horizon Utilities Corporation	**1.026**	2.6%	47
Orillia Power Distribution Corporation	**1.033**	3.3%	48
Rideau St. Lawrence Distribution Inc.	**1.033**	3.3%	49
Halton Hills Hydro Inc.	**1.039**	3.9%	50
Niagara Peninsula Energy Inc.	**1.043**	4.3%	51
Newmarket - Tay Power Distribution Ltd.	**1.045**	4.5%	52
Haldimand County Hydro Inc.	**1.060**	6.0%	53
Wellington North Power Inc.	**1.066**	6.6%	54
Fort Erie - Eastern Ontario Power (CNP)	**1.080**	8.0%	55
London Hydro Inc.	**1.083**	8.3%	56
Burlington Hydro Inc.	**1.083**	8.3%	57
Bluewater Power Distribution Corporation	**1.094**	9.4%	58
Centre Wellington Hydro Ltd.	**1.101**	10.1%	59
COLLUS Power Corp.	**1.106**	10.6%	60
Toronto Hydro-Electric System Limited	**1.122**	12.2%	61
West Perth Power Inc.	**1.131**	13.1%	62
Cooperative Hydro Embrun Inc.	**1.133**	13.3%	63
Whitby Hydro Electric Corporation	**1.146**	14.6%	64
West Coast Huron Energy Inc.	**1.147**	14.7%	65
Enersource Hydro Mississauga Inc.	**1.161**	16.1%	66
Brantford Power Inc.	**1.170**	17.0%	67
Kenora Hydro Electric Corporation Ltd.	**1.173**	17.3%	68
EnWin Utilities Ltd.	**1.179**	17.9%	69
Greater Sudbury Hydro Inc.	**1.183**	18.3%	70
Chapleau Public Utilities Corporation	**1.194**	19.4%	71
Atikokan Hydro Inc.	**1.305**	30.5%	72
Clinton Power Corporation	**1.379**	37.9%	73
Erie Thames Powerlines Corporation	**1.428**	42.8%	74
Port Colborne (CNP)	**1.500**	50.0%	75
Algoma Power Inc.	**1.718**	71.8%	76

[1] Lower values imply better performance

[2] Hydro One Networks Inc. is alone in their peer group so is omitted here

3 Efficiency Cohort Groupings

A company will be in efficiency cohort one if it is statistically superior based on the econometric benchmarking results (found in Table 4) and in the top quartile of the unit cost benchmarking rankings (found in Table 7). A company will be in efficiency cohort three if it is statistically inferior based on the econometric benchmarking results and in the bottom quartile of the unit cost benchmarking rankings. All remaining companies are placed in efficiency cohort two. PSE's analysis of distributors' OM&A cost performance indicates that there are 12 firms in cohort one, 54 firms in cohort two, and 11 firms in cohort three.

Figure 5 below details the ten companies which changed cohorts from the 2010 update to the 2011 update.

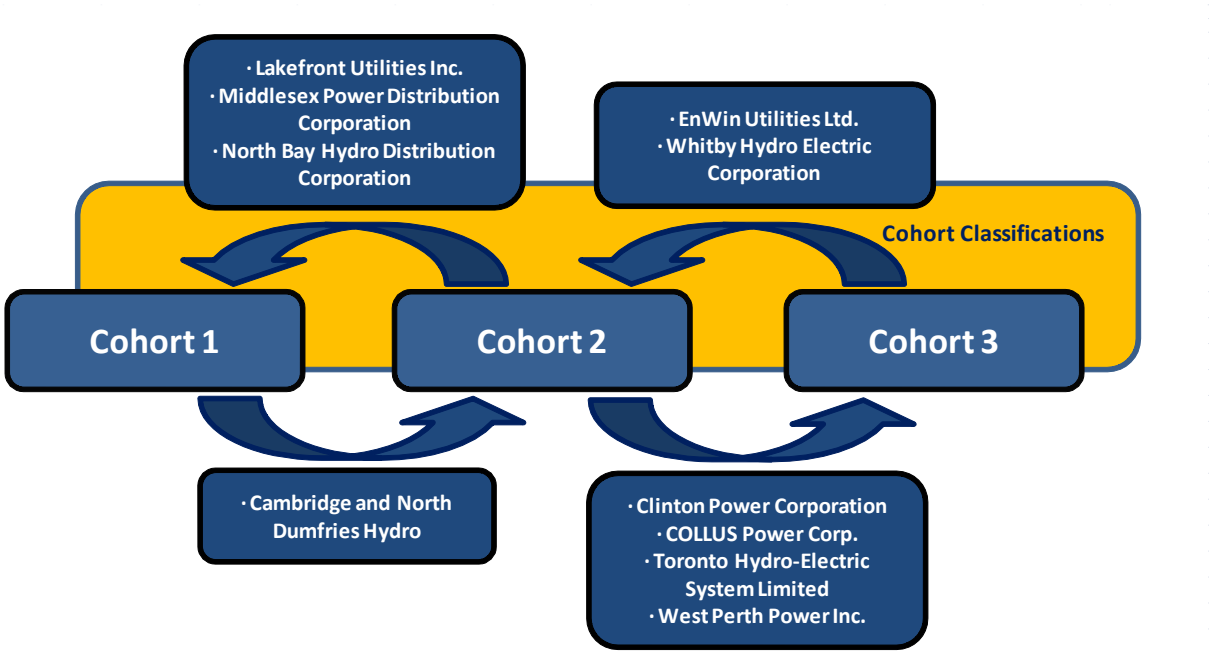

Figure 5: Cohort Changes from 2010 Update to 2011 Update

Table 8 below presents the full sample of Ontario power distributors and their corresponding efficiency cohorts for the 2011 update.

Table 8: Efficiency Cohort Groupings

Efficiency Cohort Grouping Results

Company	Cohort
Chatham-Kent Hydro Inc.	1
Festival Hydro Inc.	1
Grimsby Power Incorporated	1
Hydro 2000 Inc.	1
Hydro Hawkesbury Inc.	1
Hydro One Brampton Networks Inc.	1
Kitchener-Wilmot Hydro Inc.	1
Lakefront Utilities Inc.	1
Middlesex Power Distribution Corporation	1
North Bay Hydro Distribution Limited	1
Northern Ontario Wires Inc.	1
Renfrew Hydro Inc.	1
Atikokan Hydro Inc.	2
Bluewater Power Distribution Corporation	2
Brant County Power Inc.	2
Brantford Power Inc.	2
Burlington Hydro Inc.	2
Cambridge and North Dumfries Hydro Inc.	2
Cooperative Hydro Embrun Inc.	2
E.L.K. Energy Inc.	2
Enersource Hydro Mississauga Inc.	2
EnWin Utilities Ltd.	2
Espanola Regional Hydro Distribution Corporation	2
Essex Powerlines Corporation	2
Fort Erie - Eastern Ontario Power (CNP)	2
Fort Frances Power Corporation	2
Guelph Hydro Electric Systems Inc.	2
Haldimand County Hydro Inc.	2
Halton Hills Hydro Inc.	2
Hearst Power Distribution Company Limited	2
Horizon Utilities Corporation	2
Hydro One Networks Inc.	2
Hydro Ottawa Limited	2
Innisfil Hydro Distribution Systems Limited	2
Kenora Hydro Electric Corporation Ltd.	2
Kingston Hydro Corporation	2

continued

Efficiency Cohort Grouping Results

Company	Cohort
Lakeland Power Distribution Ltd.	2
London Hydro Inc.	2
Midland Power Utility Corporation	2
Milton Hydro Distribution Inc.	2
Newmarket - Tay Power Distribution Ltd.	2
Niagara Peninsula Energy Inc.	2
Niagara-on-the-Lake Hydro Inc.	2
Norfolk Power Distribution Inc.	2
Oakville Hydro Electricity Distribution Inc.	2
Orangeville Hydro Limited	2
Orillia Power Distribution Corporation	2
Oshawa PUC Networks Inc.	2
Ottawa River Power Corporation	2
Parry Sound Power Corporation	2
Peterborough Distribution Incorporated	2
PowerStream Inc.	2
PUC Distribution Inc.	2
Rideau St. Lawrence Distribution Inc.	2
Sioux Lookout Hydro Inc.	2
St. Thomas Energy Inc.	2
Thunder Bay Hydro Electricity Distribution Inc.	2
Tillsonburg Hydro Inc.	2
Veridian Connections Inc.	2
Wasaga Distribution Inc.	2
Waterloo North Hydro Inc.	2
Welland Hydro-Electric System Corp.	2
Wellington North Power Inc.	2
Westario Power Inc.	2
Whitby Hydro Electric Corporation	2
Woodstock Hydro Services Inc.	2
Algoma Power Inc.	3
Centre Wellington Hydro Ltd.	3
Chapleau Public Utilities Corporation	3
Clinton Power Corporation	3
COLLUS Power Corp.	3
Erie Thames Powerlines Corporation	3
Greater Sudbury Hydro Inc.	3
Port Colborne (CNP)	3
Toronto Hydro-Electric System Limited	3
West Coast Huron Energy Inc.	3
West Perth Power Inc.	3

4 Cost Efficiency Considerations in Ontario

The burden on power distribution utilities and, by extension, on their regulators has substantially increased in recent years. LDCs are not only being asked to connect households and businesses reliably to electricity systems but also to enact programs that will modify the load shapes of these customers, integrate distributed generation, and collect and analyze immense amounts of interval use data. To do this, power distribution utilities now have to develop robust communication infrastructures, large dataset management capabilities, and market research expertise.

What is the impetus behind these developments? The notion is that power supply costs, future power supply price risks, outage costs to consumers, and environmental damage costs can be mitigated through initiatives directed towards a greener economy. The objective is that the resultant increase in distribution costs will be less than the ensuing decrease in these other costs, resulting in a net benefit to society. The hoped-for outcome is illustrated below in Figure 6. Notice that distribution costs are portrayed as increasing, however, less than the decrease in power supply and other costs.

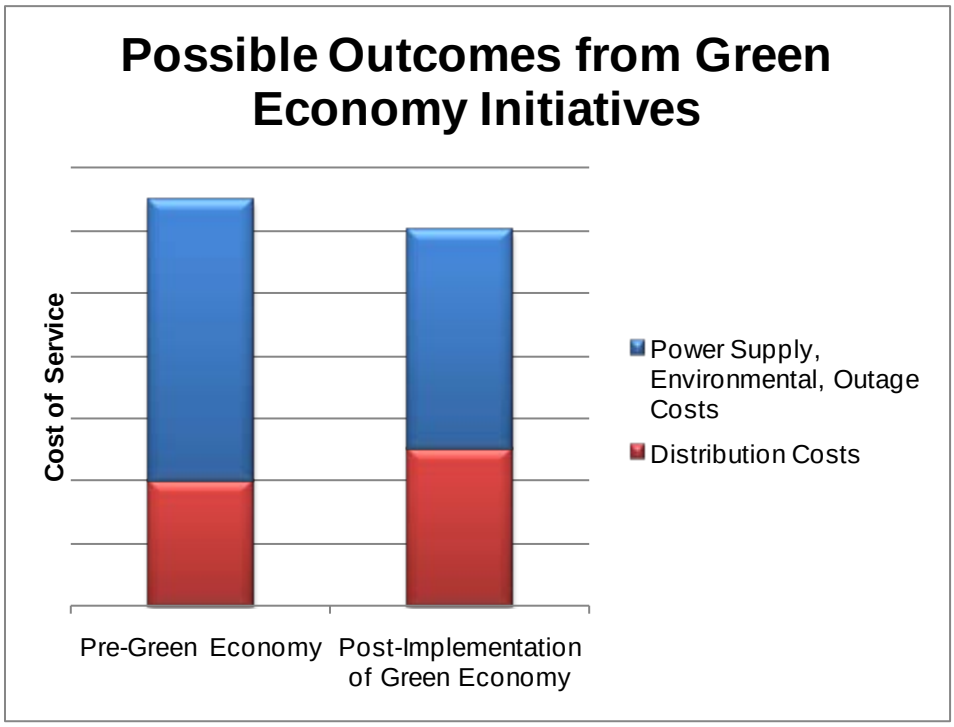

Figure 6: Possible Outcomes from Green Economy Initiatives

In this new green environment, distribution performance needs to be monitored and evaluated more rigorously than ever before. The added capital and OM&A expenditures needed to deliver quantifiable benefits will require higher revenue requirements and escalated electric delivery rates. We see this consequence at work in the econometric benchmarking model presented in Table 3. The parameter of the trend variable is 0.021. What does this imply? It implies that

over the sample study period (2002-2009) *real* unit OM&A costs have averaged an annual increase of 2.1 percent, for a LDC serving the same quantity of outputs (number of customers, volumes, kilometers of line).[16]

Further evidence of the cost escalation can be shown using rate economics. Rate economics implies that unit costs (which ultimately drive rates) will increase by the trend in an input price index (IPI) minus the trend in productivity. Productivity is defined as the efficiency of a utility in converting inputs (employees, materials, capital) into outputs (customers, volumes).

$$\Delta Unit\ Costs = \Delta IPI - \Delta Productivity \qquad \textbf{[Equation 10]}$$

Average unit cost increases over the last three years can be calculated from Table 6. The average unit cost increase from 2006 to 2007 was 4.3 percent, the average increase from 2007 to 2008 equaled 5.2 percent, and the increase from 2008 to 2009 was 4.1 percent. If we insert the input price index trend calculated in the econometric cost model, we are then able to calculate the OM&A partial factor productivity (PFP) trend of the Ontario industry using Equation 10. The results are shown in the table below.

Table 9: Productivity Trends of the Ontario Power Distribution Industry

Ontario Power Distribution Industry Recent PFP Trends			
Study Years	**OM&A Unit Cost Trend [A]**	**OM&A IPI Trend [B]**	**OM&A PFP Trend [B-A]**
2006 to 2007	4.3%	1.8%	-2.5%
2007 to 2008	5.2%	2.9%	-2.3%
2008 to 2009	4.1%	2.5%	-1.6%
Average Annual Trend			
2006-2009	4.5%	2.4%	**-2.1%**

It is noteworthy that the estimated average annual PFP trend of -2.1 percent from 2006 to 2009 is substantially lower than the targeted Total Factor Productivity (TFP) growth rate of 0.72 percent found in the 3rd Generation Incentive Regulation plan.[17] This TFP target was informed by historic productivity trends both in Ontario and in other jurisdictions.[18]

It is justifiable that distribution PFP is declining assuming that Ontario ratepayers are accruing a higher level of benefits (or future benefits) flowing from this decline. As stated earlier, such benefits could include:

[16] Recall that the model in Table 3 is only evaluating OM&A spending levels. Capital investments and the associated capital carrying costs are currently not being evaluated but are certainly relevant to this discussion.

[17] http://www.oeb.gov.on.ca/OEB/Industry/Regulatory+Proceedings/Policy+Initiatives+and+Consultations/3rd+Generation+Incentive+Regulation

[18] The difference between TFP and PFP is the incorporation of capital as an input factor. It would be valuable to calculate current TFP growth to have a full picture of the cost efficiency trajectory of the industry.

- Power supply savings.
- Mitigation of future power supply risks.
- Reduction in outages and the resultant economic costs incurred by consumers during outages.
- Reduction in environmental damage.

Utility managers and their regulators will desire to provide the potential value of these green initiatives as efficiently and effectively as possible. To do this, evaluation tools such as the performance benchmarking and productivity analysis found in this report are highly relevant in deciding on proper total cost levels, OM&A levels, more granular spending levels, and service quality provision. These tools can be used both in a regulatory context (e.g., stretch factor calibration, revenue requirement evaluation) and in a business improvement framework.