Hydro One Networks, Inc.

Stakeholder Consultation Meeting Notes

Density Cost Allocation Studies in Support of Hydro One Rate Applications

March 22, 2011
Special Event Room, Ground Floor
483 Bay Street, North Tower
Toronto, Ontario

Prepared by London Economics International LLC and
PowerNex Associates, Inc.

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1   Introductions and Review of Agenda

Enza Cancilla (Manager, Public Affairs, HONI) welcomed participants and provided an overview of the day's agenda. She then invited participants to introduce themselves. In attendance were representatives of the Association of Major Power Consumers of Ontario, Canadian Energy Efficiency Alliance, Canadian Manufacturers and Exporters, Electricity Distributors Association, Energy Probe, EnviroCentre, Federation of Ontario Cottagers' Associations, Horizon Utilities, Ontario Energy Board, Ontario Federation of Agriculture, PowerStream, Power Workers Union, Veridian Connections, and the Vulnerable Energy Consumers Coalition. Also present were HONI staff, and the LEI/PNXA presentation and facilitation team.

The full list of participants, together with the agenda, is provided in Attachment 1. Attachment 2 includes a copy of the presentation that was delivered by LEI/PNXA to stakeholders.

Ian Malpass (Director, Regulatory Support, HONI) welcomed participants and gave a quick overview of the status of the project. He encouraged participants to provide their ideas and perspectives on the proposed methodology that would be presented. He asked that participants identify themselves when making comments so this could be included in the notes of meeting. He then introduced Andy Poray (AP) of PNXA who would facilitate the proceedings.

2   Presentations and Discussion

2.1   Slide 2

AP provided an introduction to the presentation that would follow. He requested that questions be asked from the floor throughout the presentation.

These notes of the meeting make reference to the slides that were presented at the meeting and included in the package that was sent to stakeholders prior to the meeting.

AP noted that there were two general objectives for the stakeholder session:

- To reach a general agreement on the proposed methodology; and
- Receive specific feedback from stakeholders

He then introduced Benjamin Grunfeld (BG) of LEI and Mark Vainberg (MV) of PNXA to make the presentation.

2.2   Slide 4

BG reiterated that the objective of the session is to get general agreement from the stakeholders on the proposed methodology and to receive specific input from stakeholders. He reviewed the three objectives of the LEI/PNXA engagement and noted that these follow the OEB's direction to HONI for the density study. He addressed the confusion that sometimes exists related to characterising groups of customers specifically when using the word 'density'. Customer density is one specific characteristic of a group of customers (e.g. population density). This is

not to be confused with other characteristics of customers groups. For example, a rural or urban description tends to include multiple characteristics (e.g. distance from major load centre, levels of vegetation, network topology). However, there is typically overlap between the two classification methodologies e.g. low-density customers also tend to be rural customers, which contribute to 'misuse' of the low-density term.

2.3   Slide 5

The existing cost allocation methodology allocates approximately $110 million of costs to R2 and seasonal customers from UR and R1 customers, based on current density weighting factors. If the density weighting factors were removed (i.e. set to one), $110 million would shift back to UR and R1 customers, which would have a material impact on per customer cost in all of the residential sub-classes. The UR and R1 cost per customer would increase by 81% and 23% respectively, while the R2 and Seasonal cost per customer would decrease by 22% and 12% respectively. The impacts are similar for the General Service Customers, if existing density weighting factors are removed. John McGee asked if these costs represented only the distribution portion of costs. BG confirmed this to be correct.

Peter Thompson inquired as to what the basis is for the shift of costs from one group to another. BG and MV explained HONI's current cost allocation methodology and the way in which the density weighting factors are calculated. Density weighting factors are applied to a number of cost categories. HONI first assigns a portion of the total length of each distribution feeder to each of the individual customer sub-classes. Feeder length is allocated to sub-classes either on the basis of i) the number of customers in each sub-class on a feeder relative to the total number of customers on the feeder or ii) the volume of throughput (MWh) delivered to each sub-class on a feeder relative to the total volume delivered on the feeder. The calculation is performed on individual feeders and then aggregated up to the sub-class level. The customer density (customers per km of line) for each rate sub-class is determined as the ratio of the total number of customers in each sub-class to the total assigned feeder length. Likewise, the energy density (delivered kWh per km of line) for each rate sub-class is determined as the ratio of the total consumption for each sub-class to the total assigned feeder length for that class. The density weighting factors are calculated as the inverse of the ratio of the sub-class specific density to the average density across the class. Transformer cost density weighting factors are determined slightly differently. Instead of the density weighting factors being calculated on the basis of an allocation of a length of an individual distribution feeder to a sub-class, the density weighting factors are based on an allocation of the net book value of transformers on a feeder to a sub-class

John McGee asked about the sub-transmission costs and if they are included in the rate classes being considered. BG responded that no, sub-transmission costs are not included and only the eight rate classes illustrated in this slide are impacted by density weights in the cost allocation model.

2.4   Slide 6

BG noted that HONI previously engaged Elenchus Research Associates to assess the impact of density on distribution rates.

In designing rate classes and cost allocation methodologies, one of principle objectives is to consider fairness. BG emphasized that one of the objectives of the study is to consider fairness in a number of dimensions such as:

- equal customers treated equally; and
- unequal customers treated unequally.

What is being proposed by LEI and PNXA is to differentiate customers based on the cost incurred by HONI in providing distribution services to different sub-classes through a comprehensive study providing evidence of a potential cost difference, thus providing justification for different distribution rates for different classes of customers.

The study will consider a number of specific questions and BG noted that this study will examine whether there is evidence of differences in cost to serve low and high density customers.

BG noted that there may not be a difference between the way rural and urban customers use electricity. Dana Silk disagreed noting that there are those who feel that there are differences in consumption of electricity between different customer classes. BG responded that that may be the case for Seasonal customers, but not in general for year-round customers. BG noted that the electricity volumes of rural customers may be less than for year-round customers, but that in terms of fixed costs, the cost to connect is higher for rural customers.

John McGee noted that there are seasonal customers that are adjacent to year-round customers and feels that there may no longer be a justification for having Seasonal classes.

Ted Cowan noted that given the significance of the $110 million cost shift due to density weights, it is important to consider an option of how much a utility would have to pay to low density customers to exit the grid (self-generate). He suggested a capital solution should be considered in dealing with the rate differential and that the Rural and Remote Rate Protection (RRRP) program is outdated and may need to be adjusted. MV noted that such considerations at this time are premature and not within the scope of the study since the cost/density relationship is not yet fully known, which is the focus of the study. Ray Gee (HONI) pointed out that differences in rate classes also provide a signal to future consumers. Ian Malpass noted that this study is not intended to address RRRP and only considers the cost to serve. Ted Cowan reiterated that this study is an opportunity to look at all available options, including the RRRP. AP summarized the focus of the project and noted that rate design is another topic for HONI and the OEB to consider following the results of this study.

Peter Thompson sought clarification on the Slide 6 statement, "after correcting for other exogenous factors". BG clarified that there are other factors that have an impact on cost to serve. For example, costs that may be correlated with density, but are not specifically density related.

BG noted that there may be some qualitative discussion based on the results of the study that may address other concerns not specified in the current scope.

2.5   Slide 8

This slide illustrates the proposed methodology, which relies on two separate but complementary analyses (econometric and engineering). The first entails an econometric analysis that will look at the OM&A and OM&A and capital costs that HONI incurs across its operating areas (approximately 50 in total), in which there is variability in customer density. BG noted that the analysis will look at 'OM&A only' and will also look at 'OM&A and capital'. BG noted that previous econometric studies, in support of utility cost benchmarking, performed on behalf of the Ontario Energy Board have relied only on OM&A costs, as obtaining and normalizing data on capital costs is problematic when looking across utilities. BG also noted that while the quality of the underlying data has been a concern in previous OEB proceedings, the use of econometric techniques has generally been accepted. By using HONI-specific data for each of the operating areas, information is consistent and in greater depth, therefore less contentious regarding its accuracy.

The second part entails an engineering analysis, or a direct cost assignment study. This study will identify sample areas across HONI's distribution network which will vary in terms of customer density. Sample areas will also vary in terms of geography, undergrounding, and other characteristics. The study will then assign operating area level costs to sample areas and assess how costs differ with respect to customer density.

Bill Harper asked what specifically is being achieved in the engineering analysis and the use of smaller sample areas. BG responded that looking at smaller sample areas provides a broader range of densities than the average densities across the operating areas. Bill Harper also noted that distance from service centres could be another consideration in defining of density. He also asked if the density defined in the econometric study is used in the engineering study. MV noted that the engineering study is designed to be blind to the results of the econometric study and to the definitions of density in the econometric study. The engineering study focuses on the cost to serve different groups of customers (in terms of density) and that individual results will allow for independent conclusions. Henry Andre (HONI) noted that part of the feedback received from the 1st density study stakeholder session was that it would be useful to have more than one approach for looking at the density issue.

Bayu Kidane noted that relying on one analysis is not as reliable as two. He asked what happens if the two studies do not support each other? BG remarked that the econometric study can isolate specific impacts of customer density on cost. Engineering analysis, while it can normalize for other factors, is more aptly designed to determine the total cost difference in serving one group versus another (where density is a factor). They may not necessarily come to same conclusions; however they may provide different views or interpretations.

John McGee asked about the use of CAPEX in the studies. BG noted that CAPEX represents a plan on how the rate base will grow in subsequent years. BG also discussed asset intensity and the fact that you cannot simply add OM&A (OPEX) and CAPEX to derive total costs. Laurie McLorg also raised a similar question on this point. MV added that capital expenditure (CAPEX) is used and partially proportioned to deal with annual costs, because approximately 10% of CAPEX is depreciated annually.

Marion Fraser asked which study will isolate CAPEX already incurred. BG clarified that both studies will isolate these costs. Econometric analysis will look at O&M and the substitution effect of CAPEX (CAPEX today will reduce O&M tomorrow). In engineering analysis, there is less of a substitution effect; however asset intensity will be examined for costs already incurred.

2.6   Slide 9

This slide illustrates the major steps that will be followed in the econometric analysis. BG explained the four major steps involved in an econometric analysis.

- Identify a utility cost function that includes inputs, outputs, and operating characteristics;
- Compile a data set that incorporates the necessary input, output, and operating characteristics;
- Solve the model to minimize the error term in the cost function; and
- Interpret the estimated coefficients to reveal the sensitivity of costs to changes in the independent variables.

BG noted that operating areas within HONI's service territory provide a natural break in terms of how costs, customers, and assets are tracked. The goal is to minimize bias in the results by using these natural breaks and delineation points. The advantage in looking at intra-HONI costs versus inter-LDC costs is that no assumptions are needed on cost allocation since there are no differences in capitalization rules. Marion Fraser noted that the flip side is also true in that what is representative of averages does not necessarily reflect the extremes. BG agreed.

Peter Thompson referred to Jay Shepherd's email comment regarding the proposal not to use other Ontario LDCs cost data in the study. BG responded that the granularity in LDC cost data is insufficient for the purposes of the study and that differences in capitalization policies and treatment of shared services make a direct comparison difficult. Ted Cowan noted that for an LDC study the boundary problems are vastly more difficult and have great effects and agreed that the approach of the study will provide a more accurate picture. MV further elaborated on the fact that cross-subsidization within municipalities influences LDC cost data and makes its use problematic. Bill Harper noted that if you were to compare LDCs and HONI, you would not be able to determine if cost differences were due to density or differences in company efficiency. BG noted that the report will document the reasons why the use of cost and customer data from other Ontario LDCs is problematic when considering the impact of density on HONI's cost to serve.

Ted Cowan noted that it may be useful to take a look at data from other LDCs with different densities (if data is available). BG pointed out that the level of detail with HONI data is much greater than with the other LDCs data. For example HONI knows exactly the number of poles in each operating region. Peter Thompson asked if similar data from Slide 23 were available for the Kingston LDC. BG and Ray Gee noted that there will be differences in data and its availability.

Henry Andre suggested that comparing operating areas within HONI to other LDCs is more of benchmarking exercise than a study looking at density as sought by the Board.

2.7   Slide 10

This slide illustrates the major steps that will be taken in the engineering analysis. The steps include:

- Select operating areas and sample areas within them;
- Compile data on operating areas and sample areas ;
- Calculate assignment factors;
- Assign operating area and provincial level costs to sample areas;
- Calculate asset intensity for each sample area; and
- Evaluate the distribution of costs across the sample areas to indicate costs to serve different groups of customers.

There was no discussion on the content of this slide.

2.8   Slide 11

BG invited participants to offer comments or suggestions concerning the two methods being proposed. John McGee noted that operating areas are not set up as utilities. For example, feeders are intertwined. If a transformer station is within an operating area, this would cause problems. MV explained that there is good data granularity and connectivity data. It can be determined which feeders and portions of feeders go through which operating areas and sample areas. There is also connectivity of every feeder with every transformer station. Bill Harper asked if every operating area has its own service centre. BG responded yes, and noted that in some cases there are two service centers per operating area. MV also emphasized the power of GIS and that the physical location of all assets in system can be determined.

Peter Thompson suggested that in the final report, it would be helpful to note other potential methodologies that were considered and why there were rejected (e.g. using LDCs in comparing costs). MV agreed to consider this.

2.9   Slide 13

BG provided an overview of the econometric methodology. BG reiterated that the analysis will look at two separate cost functions (OM&A only and OM&A and capital). BG noted that scale (magnitude) is a major cost driver for HONI. Density is a measure of customer intensity. BG also went through a number of other factors that could be considered. BG noted that while increasing the number of data points (observations) will improve accuracy, as the number of characteristic variables increases, the accuracy of the function decreases. An appropriate balance needs to be established. John McGee suggested dropping the use of aerial customer density (customers per km^2). BG stated that the study will look at both aerial and linear density, while recognizing that the denominator used to determine aerial density will be an issue. MV remarked that it is important not to miss areas where there are physical assets, but there are no customers. Laurie McLorg inquired about data time series (use of multiple years of data). BG indicated that 3-5 years of data would be used and, if available and usable, more years of data will be utilized.

Bill Harper asked if there were any other measures of customer density that could be used (e.g. average distance from service center). BG and MV noted that the engineering analysis will look at these factors.

Bill Harper also noted that vegetation management is on a seven-year cycle and should be taken into account. BG responded that multiple years of vegetation data is available and will be properly accounted for and that it is recognized that vegetation management is a major cost driver.

Marion Fraser asked if distributed generation is being considered. BG indicated that this will not be considered as the window of data available is too small.

Neil Mather noted that cluster size is part of the existing definition and that boundary issues warrant particular attention. Ted Cowan noted that the econometric study will eliminate border issues with regards to clustering. MV agreed and indicated that the sample areas will not take into account cluster sizes, but rather representative densities. Bill Harper suggested using (binary) flags to represent certain break points in cluster size. He also remarked that this study may not determine if current rate class definitions are appropriate and suggested there may be a continuum of cluster sizes and questioned if there are any reasonable break points. On the issue of the appropriateness or otherwise of the current rate differential, BG described that what is intended is to compare current ratio of costs allocated to different customer classes against comparisons of the cost ratios between high-, medium-, and low-density sample areas. Bill Harper noted that the results may be difficult to interpret because any differences may be the result of density differences or may be simply the way density is defined.

Ted Cowan asked about the number of samples being considered. BG indicated that the econometric study will use all 50 operating areas and that the engineering analysis will select a number of sample areas from operating areas. MV remarked that based on some preliminary analysis, to acquire statistically meaningful results would require about 15 samples for each of high-, medium-, and low-density categories.

Ted asked if both planned and unplanned outages are addressed. BG confirmed that will be the case.

Elena Yampolsky asked if the econometric analysis will be able to use different definitions of density. BG responded yes, and that the study will present the best model (highest statistical significance or minimization of error term) but that the final report will document the other potential cost functions.

2.10   Slide 15

BG reviewed briefly this slide which illustrates HONI operating areas within the province. There were no comments on this slide.

2.11   Slide 16

BG reviewed briefly this slide which illustrates the density (both linear and aerial) diversity of operating areas. Ted Cowan asked if the HONI median value was known, but BG indicated that the median was not illustrated in the chart.

2.12   Slide 17

MV discussed the "bottom-up" approach (the use of unit costs and number of units to build up to a total cost) that was considered, but ultimately excluded from the proposed methodology. MV discussed the "top-down" approach which uses cost categories and assigns these costs to customer groups. To choose customer groups, sample areas will be selected which are representative of high-, medium-, and low-density customers, not necessarily customer groups based on the current rate classifications. Selection of sample areas is facilitated with GIS data. Both OM&A costs and CAPEX will be used in the study. Fixed asset related costs are apportioned based on an asset intensity analysis.

Approximately 80% of HONI's costs will be assigned using a specific factor in the engineering analysis. The remaining 20% of costs are assigned based on ratio of the number of customers.

2.13   Slide 18

MV reviewed the definition of the various assignment factors. Several questions were asked on this slide, primarily to clarify the understanding of the various assignment factors. Laurie McLorg asked for additional detail on how the Asset Intensity Ratio (AIR) is calculated, the use of replacement costs, and the variability of installed costs throughout the province. MV clarified that installed costs do vary geographically and that this data is available and will be taken into account. Bill Harper requested further detail on what the AIR assignment factor is applied to. MV responded that it is used to assign certain CAPEX costs tracked at the operating area level to the sample areas (as is the case with the other assignment factors).

Neil Mather asked for additional detail on the characteristics of sample areas. MV provided a general description of the sample areas (e.g. range of 20-30 square kilometres with consistent density in each sample). MV also indicated that in order to achieve a reasonable confidence, 15 samples in each of the high-, medium-, and low-density categories (45 in total) would be required.

Ted Cowan asked if regression analysis would be used for the engineering analysis. MV clarified that regression will only be used in the econometric study. BG added that the econometric analysis does not incorporate cost data at a level lower than the operating area since a number of assumptions would have to be made to derive much of the data points. BG also noted that the engineering study will go into greater detail than the econometric study by looking at the sample areas within the operating areas. Ted Cowan indicated that he would provide written comments on his thoughts regarding statistical analysis.

2.14 Slide 19

MV discussed the next slide which looks at cost groupings at the provincial and operating area level, and the proposed assignment factors to be used in the engineering analysis. Laurie McLorg noted that PDR and CKM factors take into account distance, but not explicitly travel time. MV noted that travel time is a difficult item to deal with. For example, it is not known if each trouble call requires its own trip from the service center. MV also noted that delays occur even on high speed roads and that weather can reduce the speed of travel. In general, MV indicated that these travel time related factors are likely of second order magnitude relative to distance. Ray Gee expanded on the point and BG said that looking at distance traveled led to non-material changes from the use of "as the crow flies" distance.

Ted Cowan used an analogy of a horse and jockey to explain his thoughts on the importance of management experience at the operating area level and that management experience at the operating areas should be a factor to consider in the econometric analysis. BG indicated that this factor could potentially balance out when looking across all operating areas.

2.15 Slide 20

Elena Yampolsky asked how provincial level costs are apportioned to operating areas. BG noted that these costs are small ($23 million of provincial costs compared to $129 million directly assigned at the operating area level) and will be assigned to operating areas based on customer numbers, area, line km or "expanded" assignment factors. The costs are then allocated to the sample areas based on specific assignment factors.

Ted Cowan asked if line losses should be considered and density weighted. Henry Andre noted that delivery costs and rates are not impacted by losses and as such they are not density weighted. Losses apply to the commodity portion of the bill.

2.16 Slide 21

MV discussed the HONI databases described in this slide. There were no comments on this slide.

2.17 Slide 22

MV discussed the necessary characteristics of selected sample areas. There were no comments on this slide.

2.18 Slide 23

MV and BG elaborated on the abilities of the GIS. There were no comments on this slide.

2.19 Slide 24

MV summarized the two approaches (econometric and engineering) of the engagement. Qualitatively, costs incurred by high-, medium-, and low-density customers will be compared with tariffs based on the current rate classification.

3   Closing Remarks

AP remarked that there was good discussion regarding the study methodology and thanked participants for being engaged and that several good suggestions were heard. He asked all stakeholders if there were any further suggestions and whether the consultants could conclude that stakeholders were comfortable with the proposed methodology. Generally, there were no further comments, except for the following:

Bill Harper confirmed that the methodology is appropriate, but the team needs to be careful in defining the sample areas and work to get the analysis right in order to answer the following questions related to the last two questions on slide 4, namely:

- Whether the existing density-based rate classes and density weighting factor appropriately reflect costs incurred
- The appropriateness and feasibility of establishing alternate customer class definitions or delineation points

Ted Cowan reiterated his view that line losses should be density-weighted. AP remarked that the study needs to deliver on the scope defined by HONI which is based on satisfying the Board direction.

Susan Frank thanked participants for attending the session by taking time from their busy schedule and recognizing the importance of the subject matter discussed today. She commented on the wide ranging discussion but reminded participants that in as much as the comments received are valuable and appreciated, it is not possible to include them all as the scope of the study is limited and that the budget for the study has been set. She indicated that the consultants will weigh the input provided in today's discussion and what can be incorporated within the scope of their engagement.

Stakeholder Consultation

Rate Applications

CDM and Density Cost Allocation Studies in Support of Hydro One Rate Applications

AGENDA
March 22, 2011
Hydro One Networks
Special Event Room, Ground Floor
483 Bay Street, North Tower
8:30 a.m. – 12:30 p.m.

8:15 am Registration and Refreshments		
8:30 am	Introductions and Review Agenda	Enza Cancilla, Manager, Public Affairs, Hydro One Networks
8:35 am	Welcome	Ian Malpass, Director, Regulatory Support, Hydro One Networks
8:40 am	Update on CDM Forecasting and OEB Directive	Stan But, Manager, Economics and Load Forecasting, Hydro One Networks
9:45 am	**BREAK**	
10:00 am	Overview and Update of Density Cost Allocation Study	Andy Poray, Facilitator, PowerNex, Ben Grunfeld, Presenter, London Economics
11:00 am	**BREAK**	
11:05 am	Overview and Update of Density Cost Allocation Study Cont'd	Andy Poray, Facilitator, PowerNex, Ben Grunfeld, Presenter, London Economics and Mark Vainberg, Presenter, PowerNex
12:25 pm	Next Steps and Closing Remarks	Ian Malpass
12:30 pm	**Adjourn**	

Attachment 1 – Participant List

Name	Affiliation
Bond, Reagan	Ontario Power Authority
Butany-DeSouza, Indy	Horizon Utilities
Cowan, Ted	Ontario Federation of Agriculture
Fraser, Marion	Canadian Energy Efficiency Alliance
Grice, Shelley	Association of Major Power Consumers in Ontario
Harper, Bill	Vulnerable Energy Consumers Coalition
Kidane, Bayu	Power Workers' Union
MacIntosh, David	Energy Probe
Mather, Neil	Ontario Energy Board
McGee John	Federation of Ontario Cottagers
McLorg, Laurie	Veridian Connections Inc.
Pasumaty, Dev	Electricity Distributors Association
Silk, Dana	Enviro Centre
Thompson, Peter	Canadian Manufacturers and Exporters
Yampolsky, Elena	Powerstream Inc.
Zajdeman, Marcie	Brookfield Asset Management
Zebrowski, Steve	Veridian Connections Inc.

HYDRO ONE

Andre, Henry	Hydro One Networks, Inc.
But, Stanley	Hydro One Networks, Inc.
Cancilla, Enza	Hydro One Networks, Inc.
Frank, Susan	Hydro One Networks, Inc.
Gee, Raymond	Hydro One Networks, Inc.
Innis, Ian	Hydro One Networks, Inc.
Li, Clement	Hydro One Networks, Inc.
Malpass, Ian	Hydro One Networks, Inc.
Stadnyk, Alexandra	Hydro One Networks, Inc.

PRESENTERS

Carew, Steven	London Economics International
Ford, Gary	PowerNex Associates, Inc.
Grunfeld, Ben	London Economics International
Vainberg, Mark	PowerNex Associates, Inc.
Poray, Andy	PowerNex Associates, Inc.

Attachment 2 – LEI/PNXA Presentation

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