1-Staff-4s

4. Please identify other factors that the Board should consider to justify assigning a distributor like API to an alternative stretch factor group than that resulting from the benchmarking analysis.

API has prepared this report in response to this question, and also to Staff IR #2. Because our response is somewhat longer that what would typically is included in an IR response, we have organized it for the convenience of the parties into a short summary, followed by a series of sections that explain our analysis, and that in our view, justify assigning a stretch factor to API other than the one resulting from the benchmarking analysis.

Summary

Distributors are given stretch factor assignments based on their actual cost relative to costs predicted by PEG's econometric model. The PEG model predicts a distributor's costs by combining values for each distributor's output and business conditions with the coefficients (or cost drivers) developed by PEG. These coefficients have been calculated by PEG using data for all distributors, and therefore represent an averaging of all distributors.

This process has produced a value for the predicted costs for each distributor when its exact business condition variables are applied to these "average" cost drivers.

API will clearly demonstrate in this response that API is an extreme outlier within the data set used by PEG to determine its coefficients. As such, PEG's coefficients are not representative of API's own cost drivers and will produce erroneous results for API. Therefore PEG's model will understate API's predicted costs. Because the cost drivers are not representative of API's unique attributes, it is impossible for API to be assigned to any stretch factor other than the highest stretch factor on the basis of the econometric model's outcome.

The benchmarking analysis is based on five cost drivers, which include

1) the number of customers served;
2) kWh deliveries;
3) system peak capacity;
4) the average km of distribution over the sample period; and
5) the percent of customers added in the last 10 years.

Variable 4, the average km of distribution line, is intended to reflect the "business conditions" of the LDC, with respect to circumstances of the LDC's service territory and the special distribution of customers, both of which, as acknowledged by PEG based on its research, have implications for network costs.

It is the essence of API's submission that while inclusion of this variable may adequately reflect its impact on LDCs within the most typical range of values, it is not adequate to reflect the situation under which API operates and incurs its costs. The result is that the benchmarking study establishes an inappropriate efficiency standard when applied to API. API does not believe that the econometric model is reflective of API's unique attributes.

Our reasons for this conclusion are as follows:

- API is an extreme outlier in terms of customer density, as measured by number of customers per circuit km and number of customers per square km of service territory, and therefore the output of a statistical analysis of a more homogeneous population of LDCs cannot be appropriately applied to API; and
- API faces atypical factors of geography, including location on the Canadian Shield and forestation on its circuit routes, that make the efficiently incurred cost of building and maintaining its system significantly higher than that for most other Ontario LDCs, and which are not reflected in the benchmarking model.

Table 1 summarizes API's customer density in comparison with the distribution of Ontario LDCs. To prepare this table, API has used statistics compiled by the OEB in its *2012 Yearbook of Electricity Distributors*, dated August 22, 2013.

Table 1: Comparison of API's Customer Density with Ontario LDCs

	Mean of LDCs	**Standard Deviation**	**API**
Customers per Square km of Service Territory	302.79	234.46	0.82
Customers per Circuit km of Line	46.49	18.66	6.28

The following sections of this brief report, elaborate our analysis demonstrating that API is an extreme outlier in terms of customer density, and explain some of the cost incurrence issues that this business condition imposes upon API.

Cost Drivers Significant to API, Addressed in the PEG Report

In the PEG Report titled "*Productivity and Benchmarking Research in Support of Incentive Rate Setting in Ontario: Final Report to the Ontario Energy Board"* dated November 2013 (Issued on November 21, 2013 and as corrected on December 19, 2013), (the "PEG Report") PEG makes several relevant observations. Beginning on page 54 of the report, PEG states, *"Distribution cost is therefore sensitive to the circumstances of the territories in which they provide service"*, and; *"The spatial distribution of customers will therefore have implications for network costs".* Both of these statements are significant when considering the stretch factor assignment for a distributor like API, for which the spatial distribution of customers is so significantly different than for other Ontario LDCs.

At page 55 of the PEG Report, the authors elaborate on the issue:

"In addition to customer characteristics, cost can be sensitive to the physical environment of the service territory. The cost of constructing, operating and maintaining a network will depend on the terrain over which the network extends. These costs will also be influenced by weather and related factors. For example, costs will likely be higher in areas with a propensity for ice storms or other severe weather that can damage equipment and disrupt service. Operating costs will also be influenced by the type and density of vegetation in the territory, which will be at least partly correlated with precipitation and other weather variables."

In terms of the circumstances of API's service territory and the spatial distribution, API is unlike any other distributor in Ontario. This uniqueness from the perspective of spatial distribution will therefore have implications for network costs.

Table 16 of the PEG Report presents the econometric coefficients or cost drivers used for benchmarking which included the following narratives:

- Number of Customers: N = 0.4444

  A 1% increase in the number of customers raised the costs by 0.44%[1]

- Average Line Length (km): L = 0.283

  A 1% increase in the average circuit kilometers raised the costs by 0.29%[2]

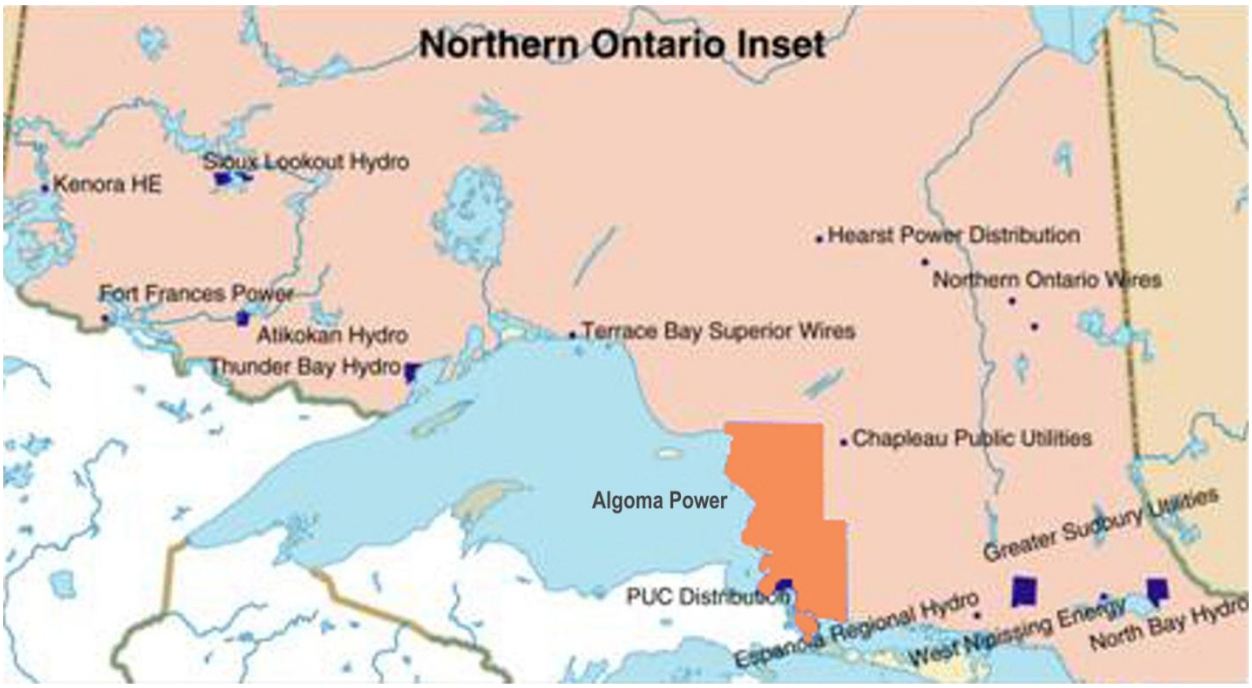
- Percent of 2012 customers added in the last 10 years: NG = 0.0165

  A 1% increase in this variable increased distributor costs by 0.017%[3]

Description of API's Service Territory

API's distribution system covers an area of more than 14,200 square kilometres in a remote area of Northern Ontario, north and east of the City of Sault Ste. Marie. API serves fewer than 11,800 customers on a distribution system consisting of 1,845 kilometres of distribution line; approximately 6.3 customers per kilometer of distribution line[4]. The distribution system extends 93 km east and approximately 255 km north of the City of Sault Ste. Marie. The following map illustrates the size of API's territory, shaded in orange, relative to neighbouring LDC's denoted in blue.

[1] *The PEG Report, page 59, paragraph 2*
[2] *The PEG Report, page 59, paragraph 4*
[3] *The PEG Report, page 60, paragraph 2*
[4] *API 2011 Cost of Service Review, EB-2009-0278, Exhibit 1 Schedule 2 Tab1, page 3*



With the exception of Hydro One Networks Inc., no other LDC in the province has a service territory as large as API's.

The low number of customers relative to its vast distribution service area, results in a very low population density within API's distribution service area. Historically, much of API's distribution system was built to service the resource sector and the communities that developed around those enterprises. As a number of those industries declined, the result was a sparsely populated service territory with predominantly residential and seasonal customers. This explains why parts of API's system are characterized by long radial lines serving very few customers.

The comments in the PEG Report that are quoted above, referring to unusual situations of geography and customer density, are therefore clearly relevant to API.

Comparison of Spatial Distribution of Customers in API and other Ontario LDCs

Using the information provided in the OEB's *2012 Yearbook of Electricity Distributors*, dated August 22, 2013, the source of data used by PEG to produce its cost drivers (coefficients), API has produced the following four charts which illustrate the distinct difference between API's service attributes and those of the general population of distributors in Ontario.

API has developed these comparisons both from the perspective of total geographical area of its service territory and the total length of line required to service its customers. In the "*Unitized Statistics and Service Auditing Requirements"* for the year ended December 31, 2012, the

Yearbook provides information related to the number of customers per square kilometer of service area and the number of customers per kilometer of line.

Figure 1 illustrates the extreme variation between API and the population of distributors used by PEG for its analysis, in terms of customers per square km of the service territory.

Figure 1

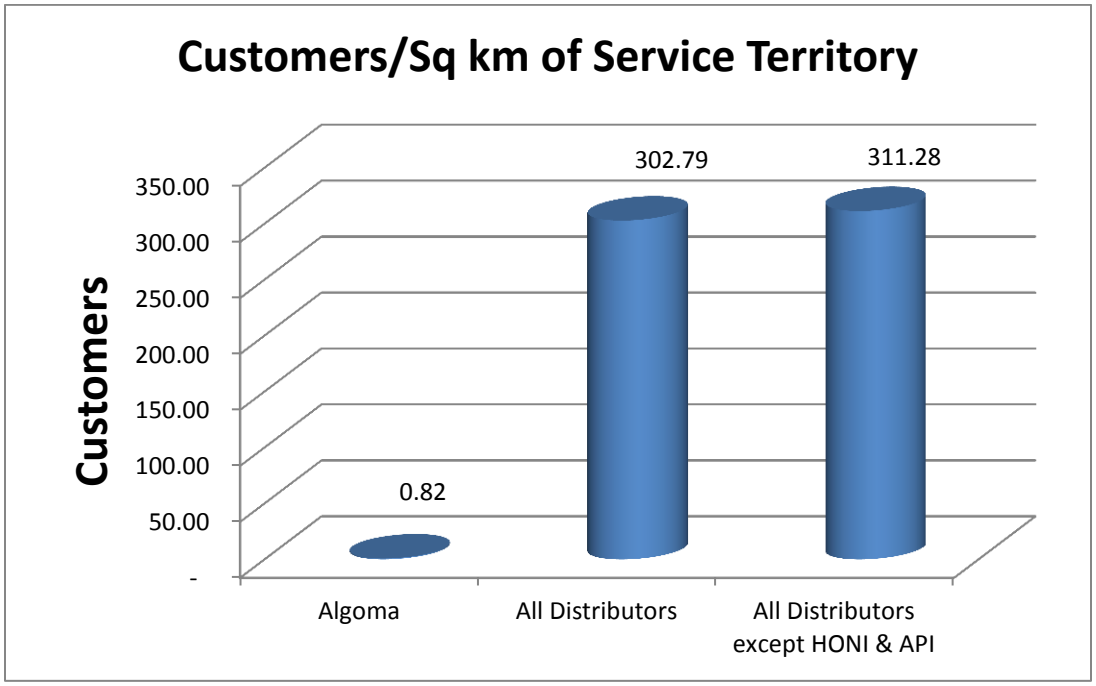
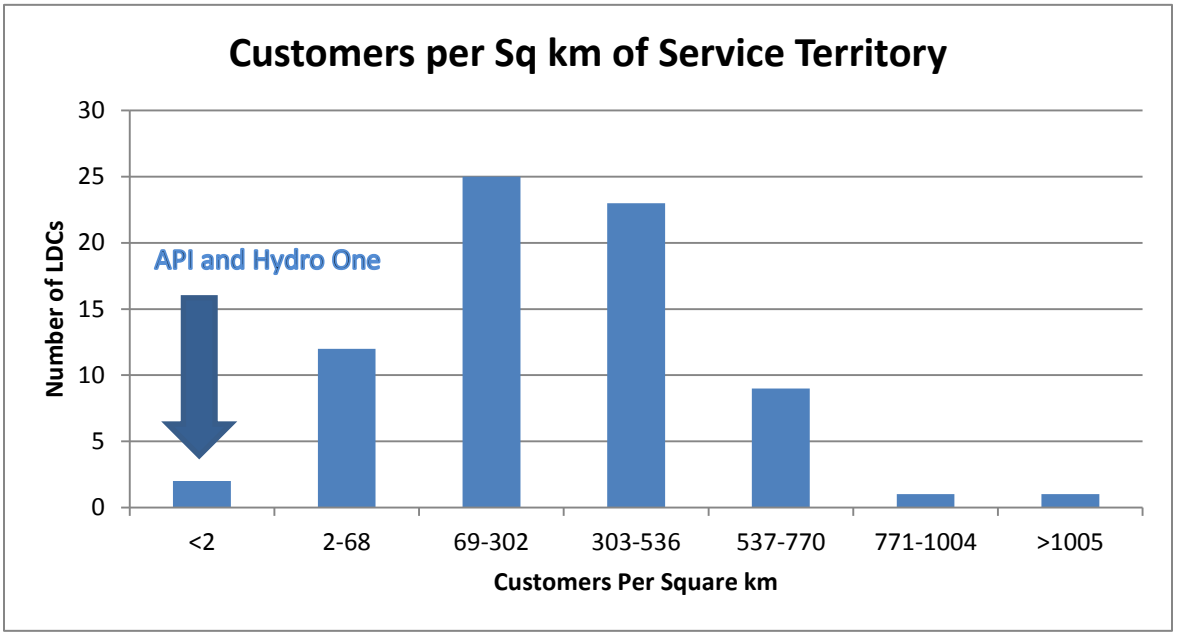


Figure 2 shows the entire population of LDCs in terms of density of customers per square km of service territory. As shown above, the mean of the distribution of 302.79, and the standard deviation is 234.46. Statistically, this indicates that approximately 68% of LDCs are expected to fall between 69 and 536 customers per square km, and in fact, 48 of the 73 LDCs are within these values. 95% of LDCs have densities between 2 and 770 customers per square km. Only Hydro One and API have densities of fewer than 2 customers per square km, and only API has a density of less than 1 customer per square km of service territory.

Figure 2



Of the twelve LDCs shown with customer densities between 2 and 68 customers per square kilometer of service territory, only two approach API and HONI with densities of approximately 5 customers per square kilometer of service territory.

Figure 3 presents a summary comparison of the density of customers per length of line of API and other LDCs. API has 6.28 customers per kilometer of distribution line while the average of all distributors, including API, is 46.49 customers per kilometer of distribution line. As shown, the variation between API and the other distributors used by PEG for its analysis is extreme.

Figure 3

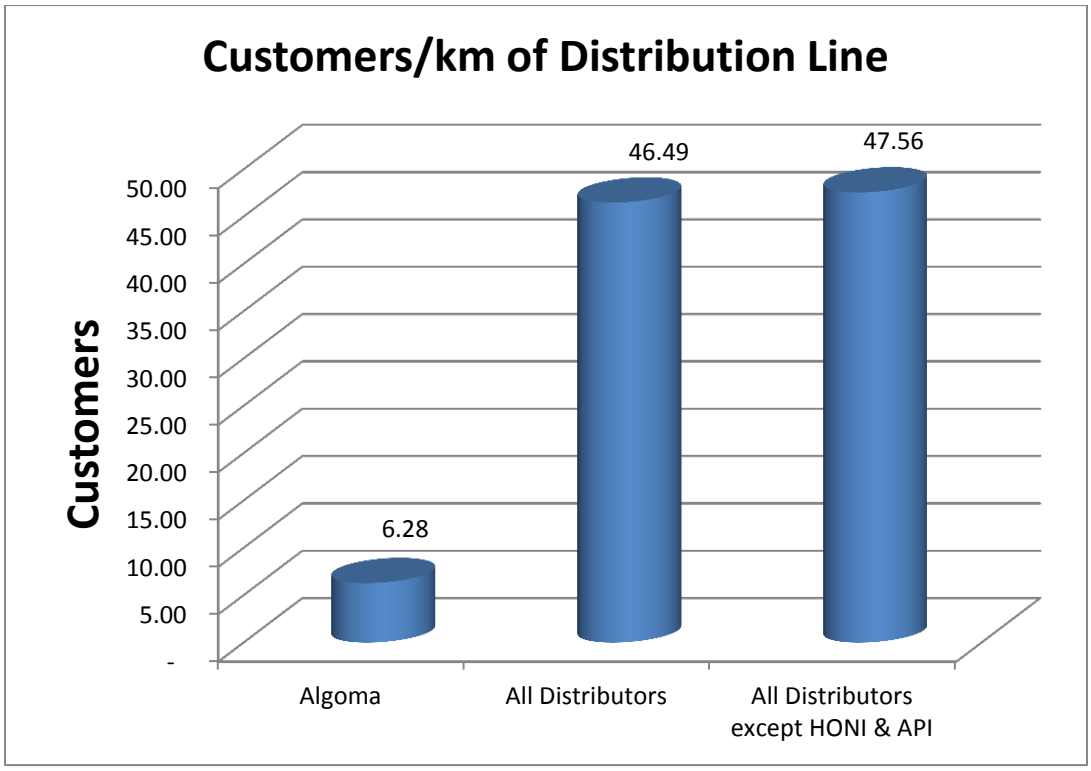
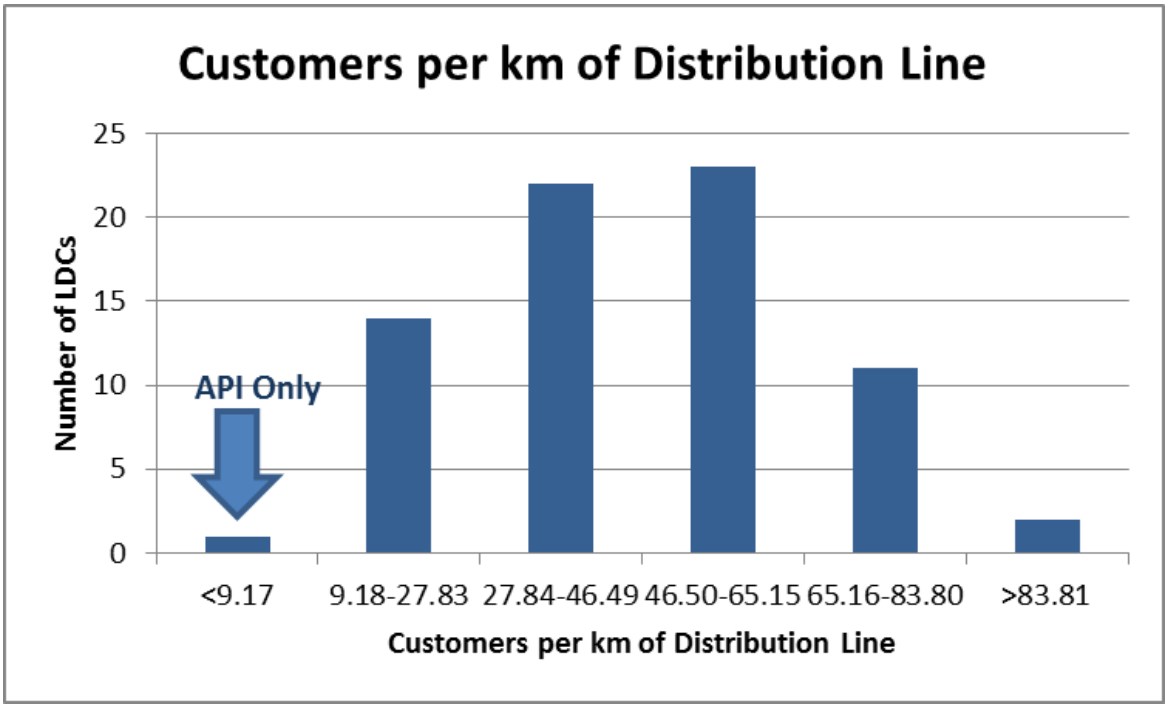


Figure 4 is a more detailed representation of the distribution of values for the variable customers per km of distribution line. The mean of the distribution is 46.49, and the standard deviation is 18.66. This means that about 68% of LDCs will fall between 27.84 and 65.15, and that 95% of LDCs will have values greater than 9.17 and less than 83.80. API is the only Ontario LDC with a number of customers per km of distribution line that is more than two standard deviations below the LDC mean.

Figure 4



Effect of Extreme Conditions of Density and Geography on Cost Incurrence in an LDC

The PEG econometric model quantifies the average expected change in cost resulting from an increase in the number of customers, an increase in the average circuit kilometers, and the percentage of customers added in the last ten years. The PEG report acknowledges that geographic conditions and distribution customer density will impact cost incurrence. The actual cost of connecting a new customer and extending the overall length of the distribution system in API's low density service territory is sensitive to these density dependant measures. Direct examples of these cost sensitivities are the extended labour costs associated with the driving time, additional fuel costs to travel longer distances and the accumulating driving distances contributing to increase vehicle maintenance cost and vehicle replacement costs.

Possibly the most evident cost associated with an increase in customers is the cost associated with distribution transformers. Distribution transformers are a prevalent and material cost for all distributors and even more so for distributors with widely dispersed low density customers as is the case with API; as shown in the Figures above, API has the lowest measure of customers per kilometer of distribution line of all distributors reported in the OEB's yearbook, and a very significantly lower measure than the average or typical LDC. With the exception of certain larger commercial and industrial customers, all customers have to be connected to a distribution

transformer; the distribution transformer transforms the system voltage to the utilization voltage required by the customer.

Typically, a residential customer requires 2.5 to 5 kVA of distribution transformation capacity. Therefore, a distributor has the potential to connect 5 to 7 residential customers to a centrally located 25 kVA distribution transformer (a 25 kVA distribution transformer is the standard minimum commercially available size available).

It is common for API to have one residential customer connected to one distribution transformer; a 1:1 ratio. This means API will purchase and install a 25 kVA distribution transformer and will make all necessary line modifications associated with the transformer installation to connect one residential customer.

The OEB Yearbook does not report the information necessary to compare API's ratio of customers to installed distribution transformers. API was able to extract distribution asset information from cost of service applications filed with the Board and together with customer data from the OEB 2012 Yearbook to construct ratios for a sample of other distributors; this information is shown in Table 2. The selection of these LDCs for inclusion was strictly on the basis of availability of the data within the time permitted for response to these Interrogatories.

Table 2: Comparison of API's Customer to Distribution Transformer Ratio to other Distributors

Distributor	Customer to Distribution Transformer Ratio
Algoma Power Inc.	2.3
Canadian Niagara Power	6.2
Cornwall Electric	5.4
Burlington Hydro Inc.	8.1
Cambridge and North Dumfries Hydro Inc.	14.6
Cooperative Hydro Embrun Inc.	5.9
Hydro Hawkesbury Inc.	6.7
Oakville Hydro Electricity Distribution Inc.	9.6
Orangeville Hydro Inc.	9.2
Veridian Connections Inc.	7.0
Average Excluding API	**8.1**

This information demonstrates that the average distributor will be required to purchase, install and maintain an additional distribution transformer to support connection of eight customers;

API will have to purchase, install and maintain an additional distribution transformer to support connection of only two customers, a multiple of four. For example, if the average cost to purchase, install and maintain an additional distribution transformer is $10,000 then the average distributor will incur a marginal cost of $1,250 per customer; API's marginal cost per customer will be $5,000. This is further evidence that the PEG estimation of a 1% increase in the number of customers raising the costs by 0.44% and a 1% increase in the percent of 2012 customers added in the last 10 years increasing distributor costs by 0.017% are not valid measures on which to assess the ability of API to achieve cost efficiencies. Due to API's extremely low customer density, its cost to add additional customers will include very expensive transformer costs, costs not experienced by the general population of distributors in Ontario. These same cost drivers will be higher for API; the result of using PEG's estimated cost drivers is understating API's predicted costs.

It is therefore reasonable to extrapolate with a great degree of confidence that the coefficients presented in Table 16 of the PEG report and set out earlier in this response are not valid in API's circumstance and therefore unreliable as cost drivers to predict costs for API, and therefore also inappropriate to use as a standard to measure the level of cost efficiency that API should be able to achieve.

Geography and Low Density Drive High Investment in Property, Plant and Equipment per Customer

A further clear indicator of API being an extreme outlier is the measure of property plant and equipment that must be supported and maintained in order to provide service in its vast service territory. The OEB's *2012 Yearbook of Electricity Distributors*, dated August 22, 2013, indicates that the total gross property plant and equipment for API was $137 million or $11,285 per customer. Figure 5 below compares total property plant and equipment per customer for API to the average for Ontario distributors.

The reason for the high amount of plant investment per customer in API is the length of distribution line that is installed, on average, per customer, as well, as discussed previously, as a correspondingly high base of assets such as transformers. The longer distances create a requirement for more vehicles and equipment per customer in order to build, operate and maintain the system.

Figure 5

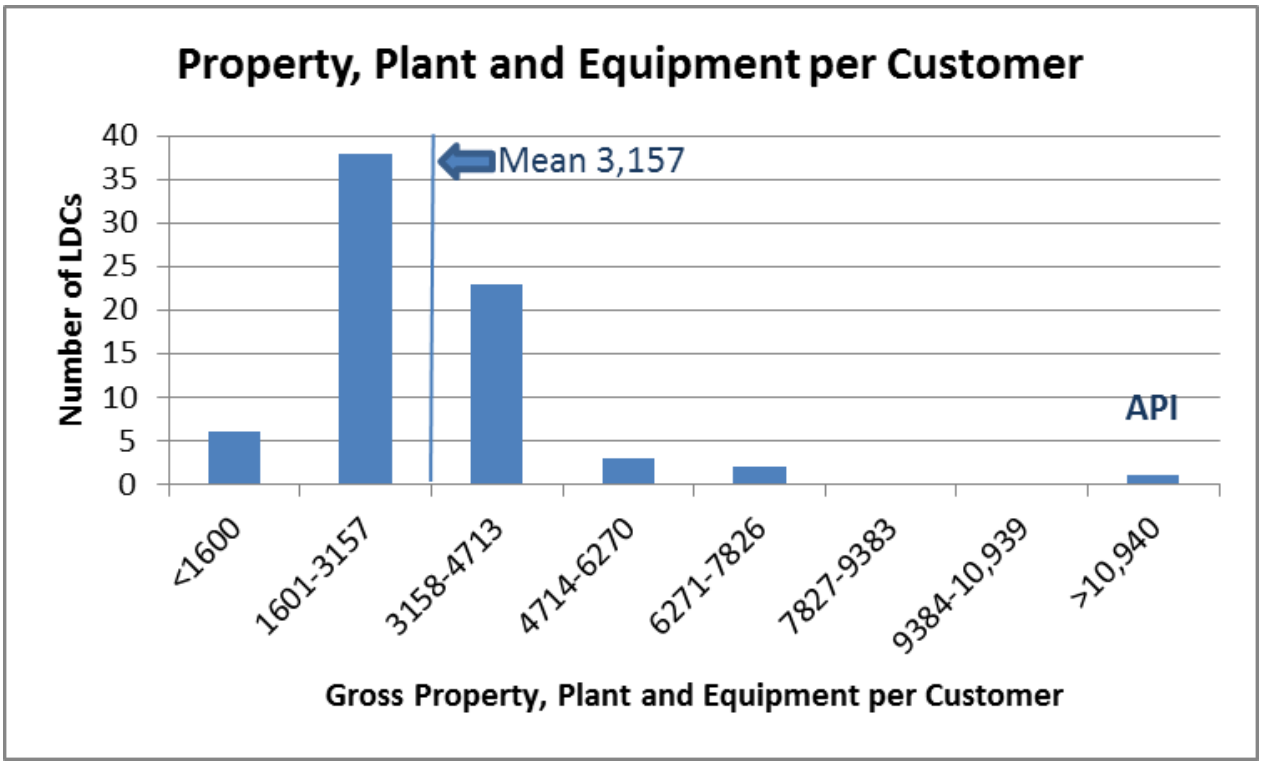


Figure 5 reflects the distribution of gross property, plant and equipment per customer in the population of Ontario LDCs, Frequency distribution "bins" shown in the graph are defined by the mean of the population, which is $3,157 per customer, and the standard deviation of the distribution, which is $1,557. With $11,285 in gross property, plant and equipment per customer to operate and maintain, API is more than five standard deviations from the average of Ontario LDCs. On the basis of property, plant and equipment per customer, Ontario LDCs are relatively homogeneous, with 83% (61 of 73) falling within one standard deviation of the mean.

It is relevant to note that if API is excluded from the population, the mean property, plant and equipment per customer for Ontario LDCs is reduced to $3,036, and the standard deviation is greatly reduced (from $1,557 to $1,182).

Effect of Forestry on Costs

While Ontario's beautiful trees present a challenge and a cost even in the densely populated areas of the GTA, nowhere are the challenges and the costs as significant as in rural northern

Ontario, and most specifically for API, where the length of distribution line per customer is so high.

Vegetation management costs are a significant cost driver for API. In its last cost of service review, API presented a test year budget of $2.5 million for vegetation management; approximately $2,100 per customer. API's service territory is geographically vast and heavily forested; other than Hydro One, it has no comparator in Ontario. API's distribution facilities are primarily located on crown land and/or corporately controlled land tracks. These land control authorities, including the MNR, are introducing new fees to API making its vegetation management cost more than otherwise forecasted. These fees include both stumpage fees and licence/permitting fees; all of which are volumetric based.

The photograph shown below is indicative of the terrain that API's distribution lines traverse and the vegetation management required to maintain a safe and reliable distribution system.

These increasing costs of establishing and maintaining this type of right-of-way, embedded within the API OM&A accounts, are not commonly associated with other distributors in the PEG sample group and therefore not adequately weighted in PEG's cost drivers.