

Appendix C – Board Staff Examples of Rate Design Proposals

The Board has asked staff to prepare examples of each of the rate design proposals described in chapter 4 of the report to illustrate the design's concept and facilitate stakeholder comments. The purpose of the examples is to show how the concept could be implemented and the possible impact on consumers.

To develop sample tariffs for residential and small general service classes, staff used the class revenue and class customer numbers from the 2012 Yearbook of Electricity Distributors¹ prepared by the Board.

To perform rate impact analyses, staff relied on the hourly data for 200 residential customers of one distributor in the greater Toronto area (LDC1). This is the same data used in the Time of Use study.² Where noted for some of the low-income and electrically-heated impact analysis, broader hourly data is used.

Staff did not have enough data on general service customers from any individual distributor to perform a statistically meaningful analysis of rate impacts from the tariffs presented.

While the random selection of customers provides representative data for illustration, the conclusions should not be taken as equivalent to studies that would support final rates for any particular distributor.

Proposal 1: Example for a Single Monthly Charge for All Consumers in a Rate Class

Under Proposal 1, all consumers in a class would receive a single monthly charge. The charge for each class is determined by taking the revenue requirement for each class and dividing it by the number of customers in the class.

¹

<http://www.ontarioenergyboard.ca/OEB/Industry/Rules+and+Requirements/Reporting+and+Record+Keeping+Requirements/Yearbook+of+Distributors>

² Navigant Consulting Inc., "Time of Use Rates in Ontario Part 1: Impact Analysis," December 20, 2013.

Residential

For one distributor in the greater Toronto area, the residential charge based on 2012 figures would be \$22.30/month. This charge would apply to all residential customers.

Table 1: Sample Single monthly fixed Residential Tariff

Single Fixed Monthly Charge for Residential consumers	
Customer class	Monthly Charge
Residential	\$22.30

As a point of reference, based on 2012 revenue requirements and customer numbers for all distributors, the minimum charge would be \$17.80 per month; the maximum charge would be \$60.19 per month; and the median charge would be \$25.96 per month. This contrasts with the current monthly service charge where the respective numbers are: \$5.95; \$55.69 and \$13.67.

LDC 1 Fixed Charge Analysis

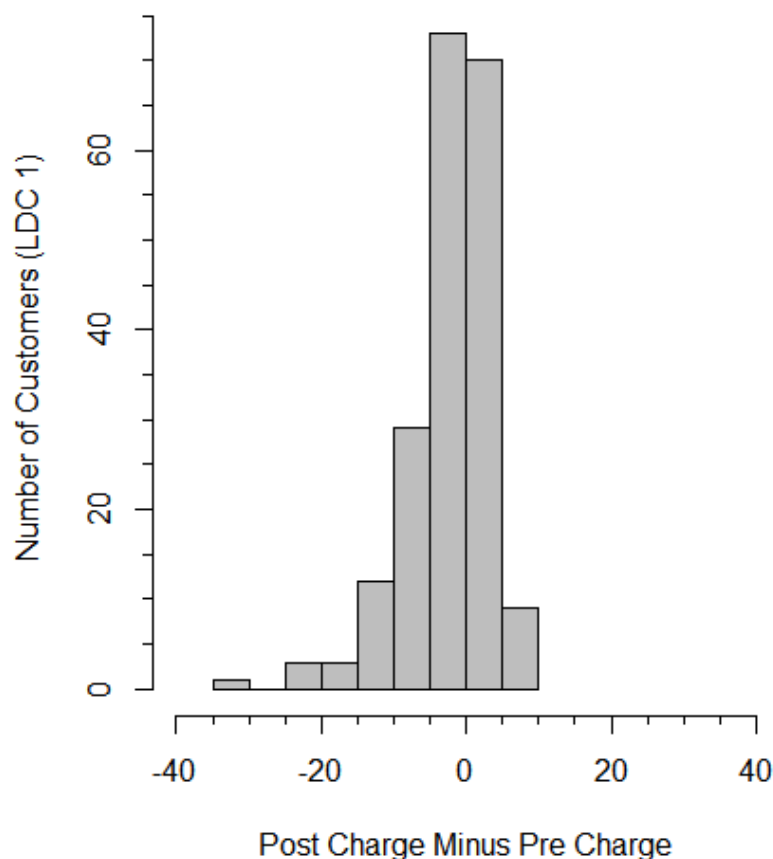


Figure 1: Example for LDC1 of Rate Impacts for a Typical Residential for a Single monthly fixed Charge

Figure 1 shows that just over 70% of the customers in the sample will have an impact within \$5 of the current bill (either an increase or decrease of less than \$5).

Board staff used the hourly data from the TOU study for customers of one distributor and the current tariff for that same distributor to calculate current distribution charges. Staff compared the example monthly fixed tariff shown in Table 1 to that calculated distribution charge. A negative number in Figure 1 indicates that a customer sees a reduction in their monthly bill under the proposed tariff. A positive number represents an increase in the monthly bill.

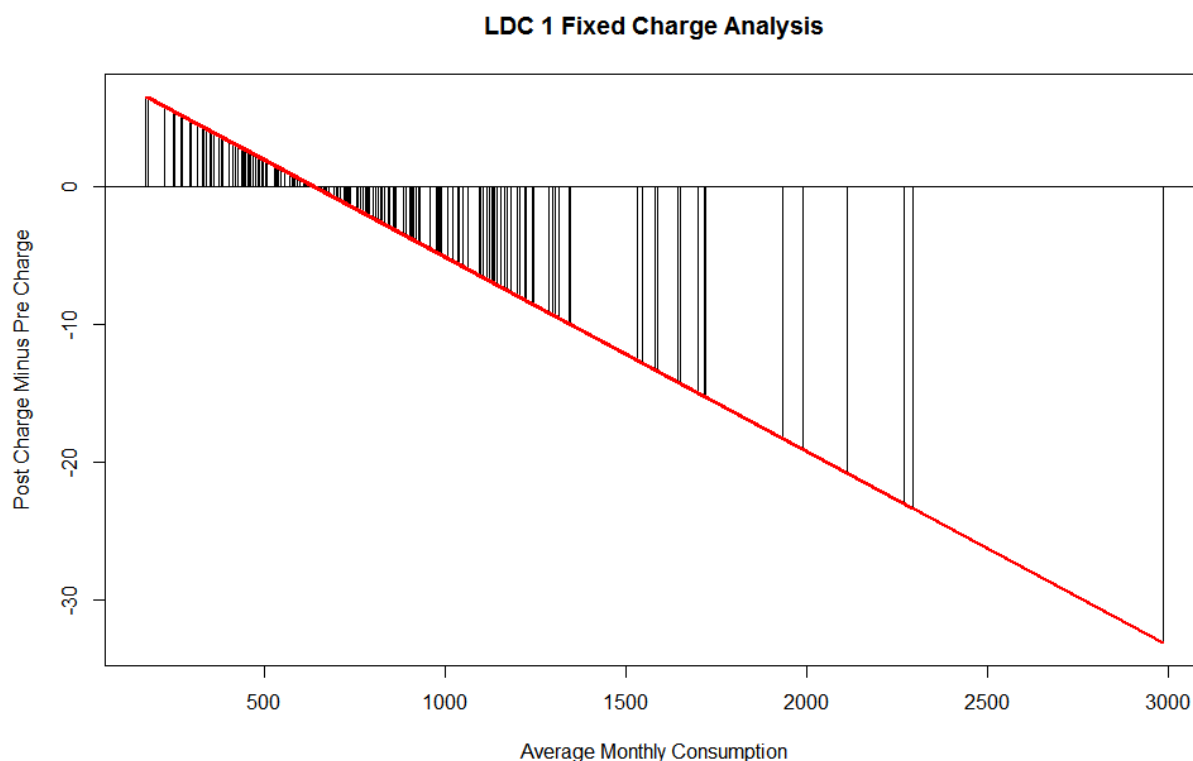


Figure 2: Analysis of Impacts by Use for a Single Monthly Residential Rate

Figure 2 shows the entire set of customers and the range of bill impacts for consumers. This figure shows that small users see increases and larger users see decreases under the fully fixed model.

Low-income consumers

The Board has hourly data for 774 customers who received assistance from the Low-Income Energy Assistance Program for the same GTA distributor used for the illustration. It is important to note that these customers are not necessarily entirely representative of low-income consumers, however they met the requirements for acceptance into the LEAP program and applied for assistance.

Their bill impacts were very similar to typical residential customers with approximately 60% of customers paying less and most increases being within \$5.

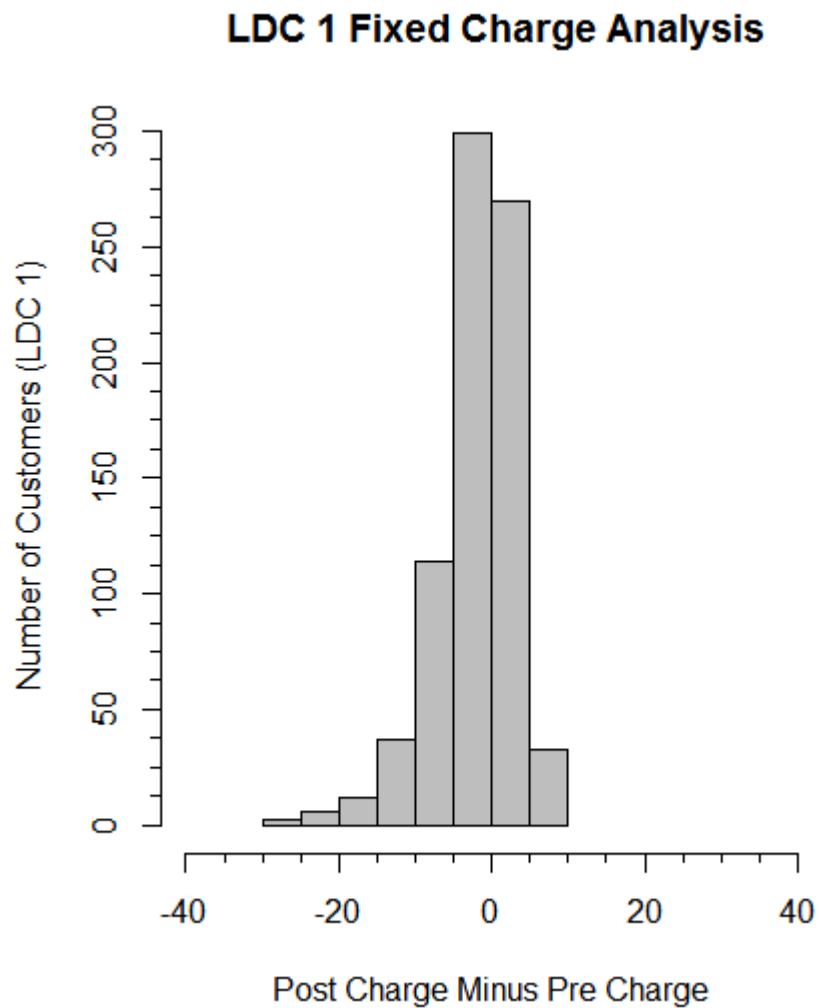


Figure 3: Example for LDC1 of Rate Impacts on LEAP customers for Single monthly fixed Rates

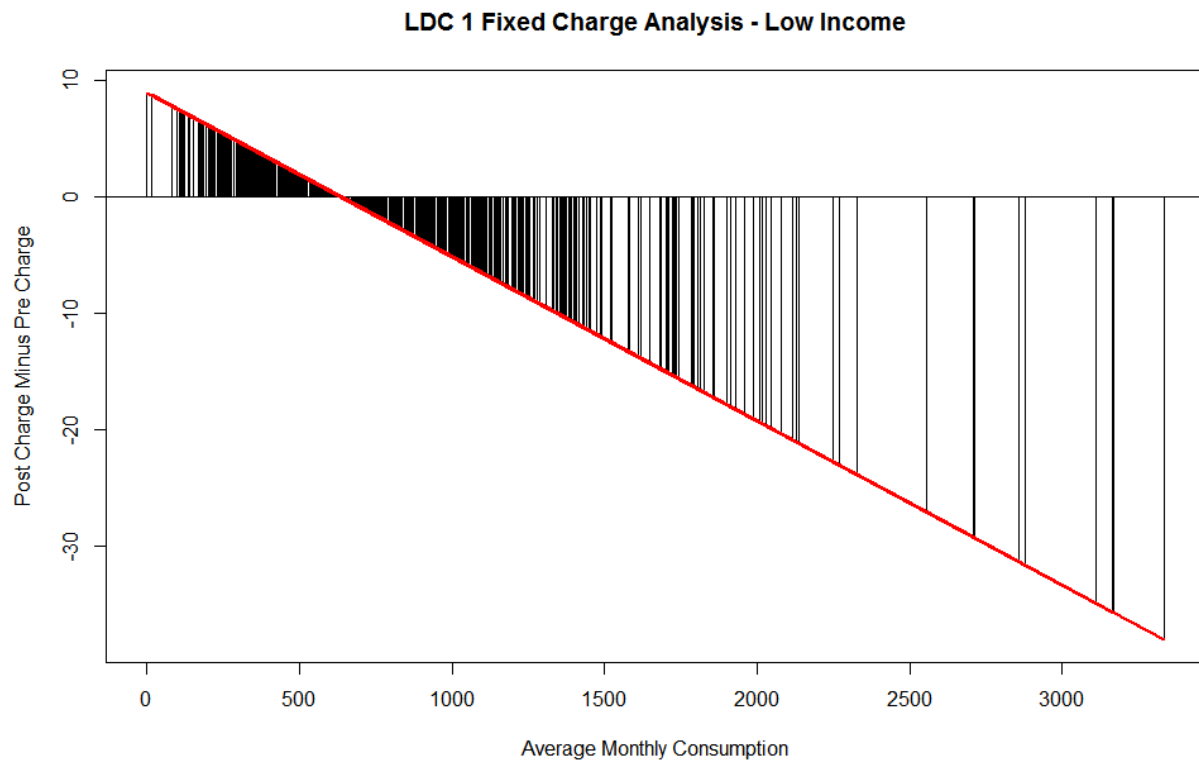


Figure 4: Analysis of Impact by Use on LEAP customers for a Single monthly fixed Rate

Similar to the general residential analysis, small LEAP users see the biggest bill increases and large LEAP users see very large decreases.

Electrically-heated consumers

Staff undertook an analysis of potential bill impacts for consumers with electric space heating. Hydro One Networks Inc. was able to provide hourly data for 49 electric baseboard customers and 49 electric furnace customers. To make the analyses comparable, staff used the tariffs for LDC1 for both pre and post charges.

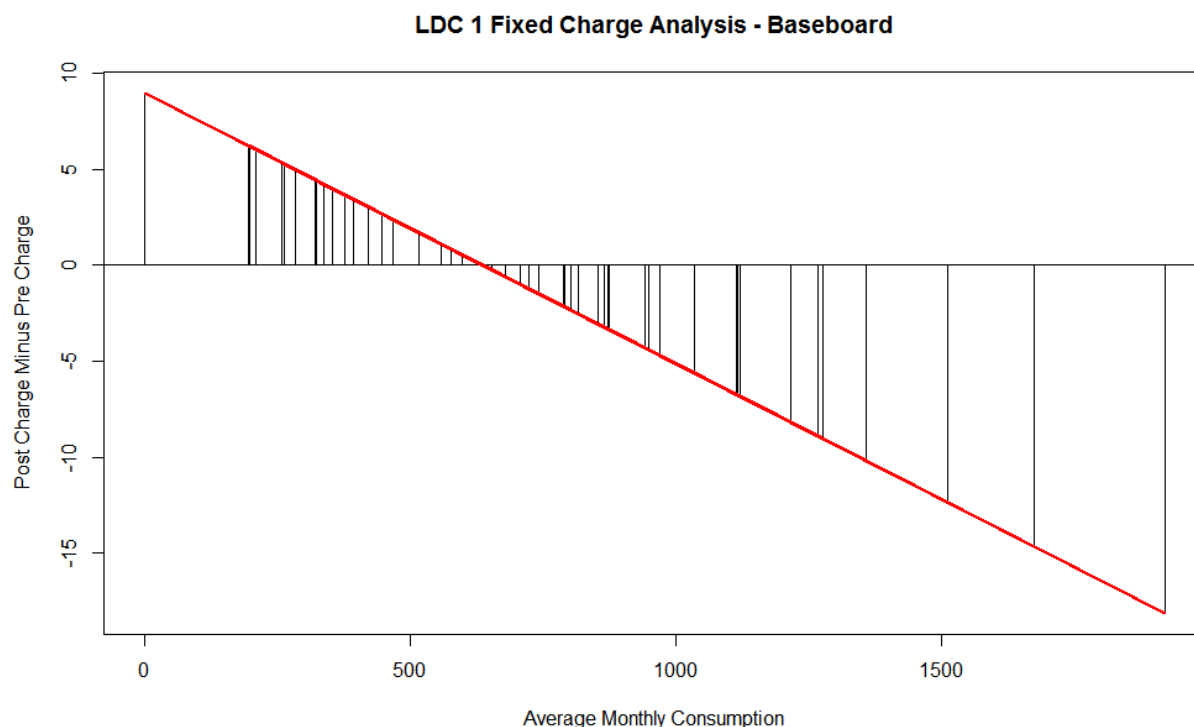


Figure 5: Analysis of Single monthly fixed rate on Electric Baseboard Customers (Summer Peak)

Figure 5 shows that electrically heated consumers which are typically large users, tend to see large decreases under a single monthly fixed charge design.

General Service Under 50 kW

The calculation of the revenue requirement for the General Service under 50 kW class by the number of customers in the class yields a fixed charge of \$60.58 per month for LDC1.

Table 2: Sample Tariff for Single monthly fixed charge General Service under 50kW

Single Fixed Monthly Charge for General Service under 50 kW consumers	
Customer Class	Monthly Charge
General Service under 50kW	\$60.58

Proposal 2: Example for Fixed Monthly Charge Based on the Size of the Connection Current

Under Proposal 2, all consumers in a rate class would have a fixed monthly charge based on the size of the connection current. Since virtually all residential low-volume consumers will be connected at 120V, connection capacity can be simplified to connection current.

Typical connection currents for residential consumers at present are 100 amps, 200 amps and 400 amps. There are still some residential premises that have service at less than 100 amps but these are primarily older homes.

Based on information that Staff has from prior consultations we are aware that distributors do not track the connection current of consumers. Thus we do not have data on the potential numbers of accounts in each group, current usage for these customers or a cost-based estimate of what the charges might be for a sample tariff.

The sample tariff could be based on a relatively administrative decision for the charge. Staff suggests that the charge for the middle group could be based on the average cost for the rate class: revenue for class divided by the number of customers in the class. The charges for the lower and upper groups would then be some relatively arbitrary amount below and above that figure based on acceptable levels of differentiation and rate impacts. Staff have built in an arbitrary factor to encourage capacity management. In order to keep the new tariff revenue neutral, the actual amount above below the average would depend on the number of customers in each group.

Fixed charge for connection current groups for Residential consumers	
Connection current (amps)	Charge (\$)
Under and equal to 150 amps	\$20
Over 150 amps and below 300 amps	\$30
Over and equal to 300 amps	\$50

Staff is unable to estimate what the bill impacts would be for typical or low income residential consumers since we do not have the connection capacity information for the customer data that we have.

General Service Consumers

Similarly there is no data available regarding general service customers connection current that would provide the basis for an example. However, staff notes that some low-volume general service consumers may have 3-phase service in which case their connection capacity will be higher than a consumer with single phase service even though the current is the same.

Fixed charge for connection capacity groups for General Service under 50 kW consumers		
Service	Connection current (amps)	Charge (\$)
Single phase	Under and equal to 150 amps	\$20
	Over 150 amps and below 300 amps	\$50
	Over and equal to 300 amps	\$80
Three phase	Under and equal to 150 amps	\$40
	Over 150 amps and below 300 amps	\$100
	Over and equal to 300 amps	\$160

Proposal 3: Example for Fixed Charges for Groups based on peak use

Under Proposal 3, all consumers in a rate class would have a fixed monthly charge based on their use during peak hours.

The proposal for charges based on peak use has many implementation options that will affect consumer outcomes. This example is intended to show the key factors that are necessary to implement the concept and how it may impact consumers. The intent is to provide a relatively simple example without bogging down the general concept with too much detail. To be clear this is just a single example of how Proposal 3 could be implemented.

Residential

Group classification

Distributors in southern Ontario typically have their system maximum demand in the summer (June, July or August depending on weather) driven by air conditioning load. Distributors in the north typically have their system maximum demand in the winter (December, January or February) driven by electric heating. This is driven by the colder weather and also the lower availability of natural gas as a space heating choice.

Therefore, staff has adopted the peak hours in peak season for this example. The data available for the purpose of developing this example is the Time of Use study data from southern distributors. Unless otherwise specified, the examples in this analysis used summer peak hours in June, July and August (“Summer”).

Boundaries

After picking an example measure for classification, staff had to determine a boundary between the groups. The distribution of typical customers and LEAP customers in the ToU data is consistent regardless of measure. There is a steep increase from almost zero use to a broad, flat middle group of customers and then another steep increase for large users leading to levels up to 15 times the smaller users.

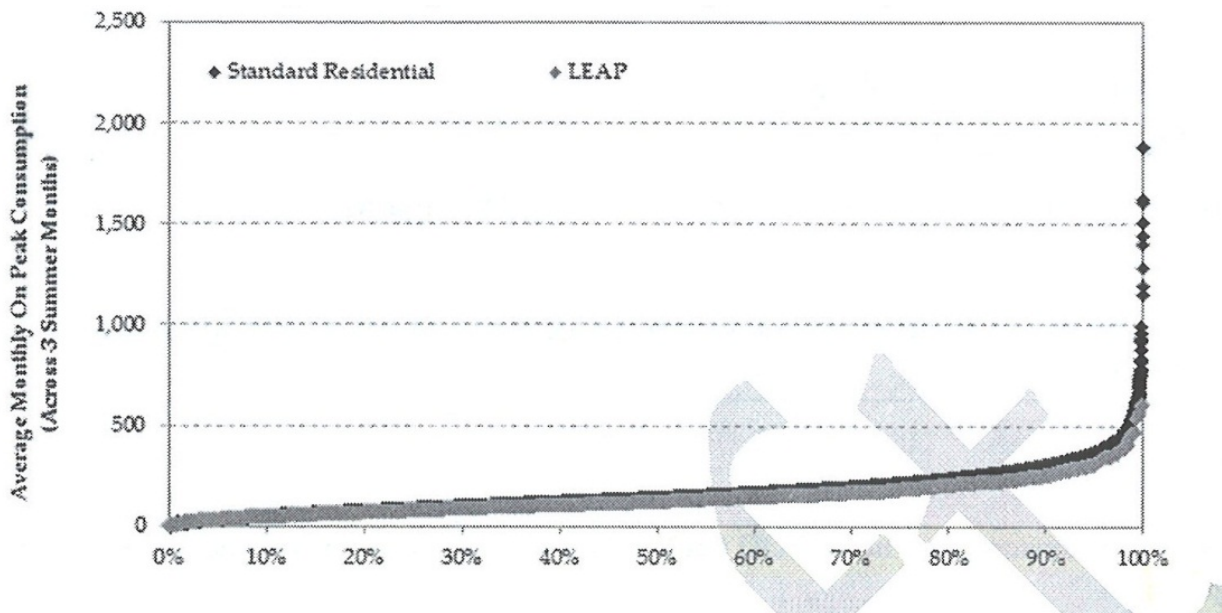


Figure 6: Graph of customer distribution by Summer peak consumption

Staff chose boundaries to put 20% of customers in the lowest user group; 70% of customers in the middle group (the 20th to 90th percentiles) and 10% of customers in the highest user group (above the 90th percentile). These boundaries roughly represent the points at which the graph flattens for the middle group.

While the analysis calculates a defined level of consumption as the boundary between groups, staff has assumed that consumers will be consistently grouped according to the selected stratum. That is, the ratio of consumers in the groups remains 20/70/10. In doing so, the consumer's use will only be compared to others and not the hard boundary. This would allow the group size and charges to remain consistent. If hard boundaries are enforced and customers follow the incentive to move into lower groups, either revenue will fall or the charge for each tier will have to rise. The first outcome does not fulfill the Board's objective of revenue stability for the distributor. Under the second outcome, consumers who thought that they were going to get a bill reduction might find that the charge had increased. In preparing this example, staff held discussions with various distributor groups to discover specific implementation considerations for the group mechanism. The distributors pointed out the benefits of minimizing changes to customer information systems ("CIS"). It may be further complicated by the way that distributors store the information for billing purposes. Few distributors bill on the calendar months. For most distributors, the information in the billing system is not a number that corresponds directly to the 3 Summer or Winter calendar months. For the example, staff used the data in the TOU study for peak hours in the Summer.

Charge

For the purposes of the example, staff has developed a cost-based charge. Other methods could be used including a simple administrative approach based on the average cost per customer with appropriate adjustments for the upper and lower tiers. Staff has used the \$5.40 microFIT generator monthly service charge³ as the minimum customer charge. This charge was developed to represent a minimum charge for metering and account services such as billing. The remainder of the revenue requirement was divided by the total customer consumption for the GTA distributor over the peak hours to determine a cost basis for the measure. Then the group charges were set by using that measured cost and the mean value for the group.⁴ Thus the charge for the lowest group was set at \$5.40 + the calculated demand charge x the average demand for the customers in the lowest group.

Using the sample measure, boundary and charge are results in the following example tariff.

Table 3: Sample tariff for residential customers

Fixed charge for Peak Use for Residential consumers		
	Boundary between groups (kWh)	Monthly Fixed Charge (\$)
Lowest 20%	≤106.8 kWh	11.72
Middle 70%	>106.8 and <336.5	22.48
Highest 10%	≥336.5 kWh	42.22

³ Established by the Board in EB-2010-0219 and updated on September 20, 2012.

⁴ For a more detailed analysis of tariff calculations, see Navigant, "Analysis Investigating Revenue Decoupling for Electric and Natural Gas Distributors in Ontario" December 2013, p.

Rate Impacts

Effects on typical Residential consumers

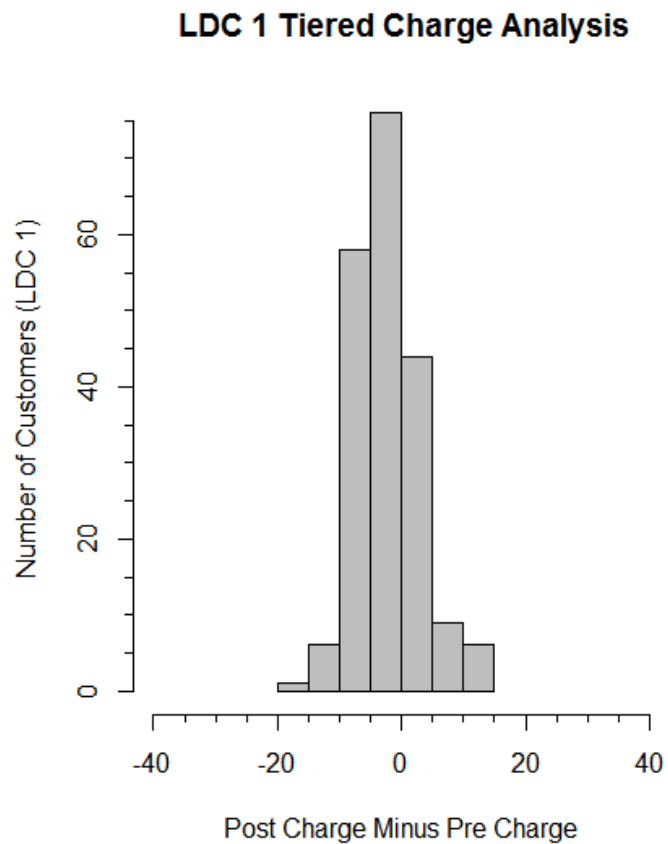


Figure 7: Example for LDC1 of Rate Impacts for Typical Residential Customers from a Group Charge

Figure 7 shows the distribution of rate impacts by the customer's group compared to the anticipated bill for the consumer under existing rates. Sixty percent of customers are within \$5 of their current distribution charge. Over 70% of customers will pay less than under the current tariff and none of those studied with pay more than \$20 difference than their current bill.

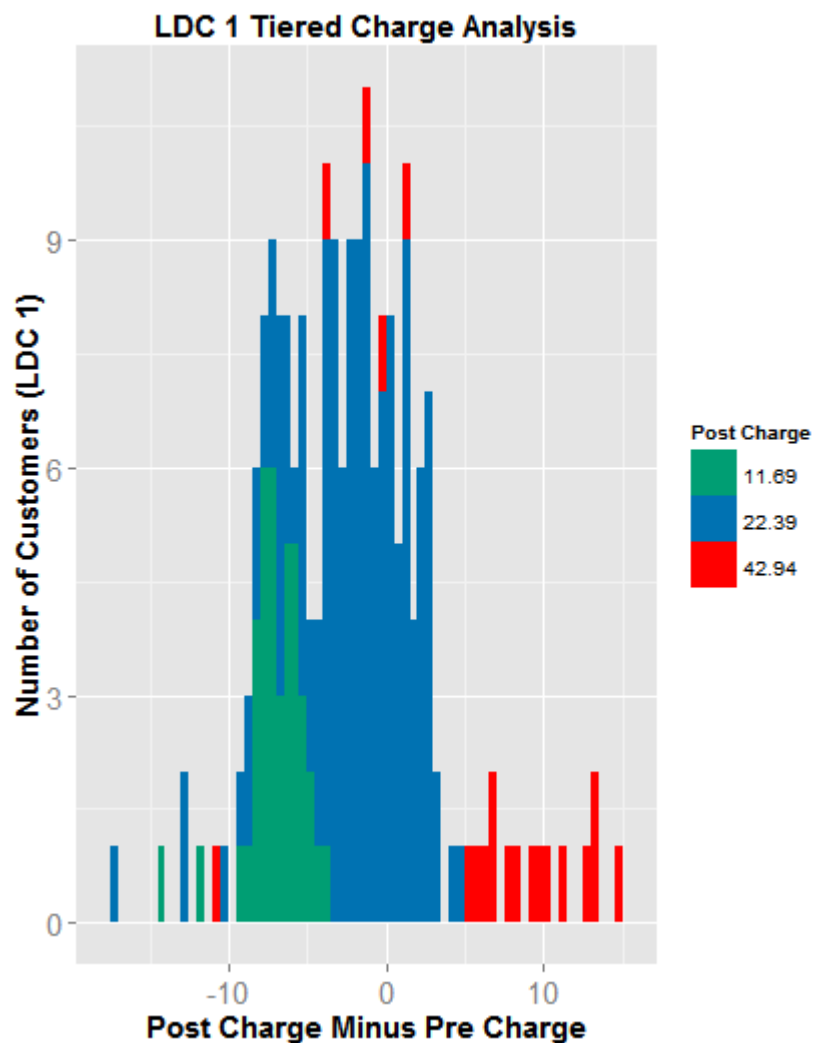


Figure 8: Analysis of Rate Impacts by Group

Figure 8 shows bill impacts by where customers are slotted into the groups. As expected, those with the most on-peak use (represented by the highest tier in red) are generally showing the largest rate increases. Those with the lowest on-peak use (the lowest tier in green) are showing bill decreases. The one high tier customer who shows a bill decrease would be a customer with a flat profile: high consumption but not in peak hours.

Low-income consumers

Staff has developed the following analysis to assess the possible impacts from the sample tariff using the same data as it considered in Proposal 1.

Two of the GTA distributors who provided data for the ToU study were able to provide hourly data for all of their customers who received any form of assistance from the Low-

income Energy Assistance Program for 2012. The following chart shows that for the measure used by staff, more LEAP consumers fall into the lowest group than the typical consumers. Therefore it appears more of the LEAP customers would have lower distribution charges than typical customers under the proposal. According to the Navigant study, when comparing LEAP data from two LDCs to all the distributors in the TOU study, fewer LEAP customers were in the highest category of usage than typical residential customers.

Typical Residential Customer	Threshold of average monthly Summer Peak hours	LEAP Customers within the Thresholds
Lowest 20%	≤ 106.8	24 %
Middle 70%	$> 106.8 < 336.5$	66 %
Highest 10%	$\geq 336 \text{ kWh}$	11 %

Figure 9: Comparison of Typical Residential and LEAP customers

LDC 1 Tiered Charge Analysis-Low Income

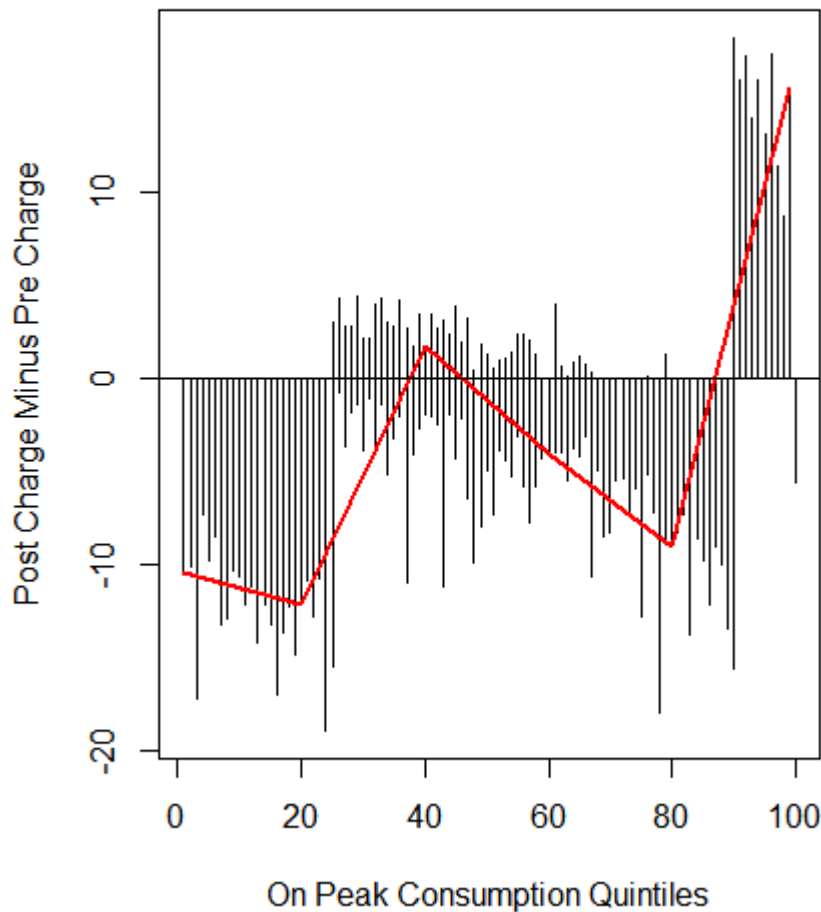


Figure 10: Analysis of Rate Impact by Use for a Tiered Charge for LEAP Customers

Electrically heated consumers

As with the single monthly fixed charge model, staff has analyzed impacts on electrically heated customers. Hydro One Networks Inc. (“Hydro One”) was able to provide the Board with hourly data for representative customers with both baseboard heating and electric furnaces. Staff analyzed these two groups separately to determine bill impacts. The analysis was made using only Hydro One data to try to ensure comparability. These customers were not necessarily low-income.

These customers currently would have high winter consumption and therefore high winter bills. It could also be expected that their winter use would be less peaky compared to other customers with the same consumption since space heating operates on a more consistent basis and customers will likely have a much flatter load. Since the

Hydro One service area has many northern and rural customers without access to natural gas, we would expect a higher percentage to be electrically heated than would be typical of urban distributors.

Table 4: Comparison of customer distribution for winter months

Boundaries for All Data based on Average Winter Peak hours	HONI customers in each group (%)	Baseboard customers in each group (%)	Furnace customers in each group (%)	Charge based on HONI revenue (\$)
20	16.2	8.16	10.2	\$22.34
70	73.7	71.4	65.3	59.67
10	10.1	20.4	24.5	188.18

When the same analysis was made using only summer peak hours, the electrically heated consumers fell into the lower groups. If the difference were only as a result of the heat not being on, we would expect that the two groups would have the same use in summer. Therefore, perhaps this shows that overall high bills have driven customers to maximize efficiency in other ways.

Table 5: Comparison of customer distribution based on summer peak

Boundaries for All Data based on Average Summer Peak hours	HONI customers in each group (%)	Baseboard customers in each group (%)	Furnace customers in each group (%)	Charge based on Hydro One revenue (\$)
20	16.2	28.57	10.2	\$21.26
70	73.7	69.38	83.6	63.13
10	10.1	2.04	6.1	166.09

When the analysis was made on winter peak hours, the electrically heated consumers still skewed into the higher groups but not as much as might have been expected. Most were still in the middle group.

Staff then further analyzed the consumer data to see what a bill impact might be. It is expected that they currently have a high bill because of high consumption. For bill impact calculations, Staff assumed that the consumption pattern would have been the

same had they been customers of LDC1. Thus current and sample tariffs for LDC1 were applied to consumption data for customers of Hydro One for the sole purpose of a rate impact example. It is important to note that these are not the charges that would actually be billed to Hydro One customers.

Most of these electrically heated consumers showed a decrease in bills reflecting the lower load profile. Some show significant bill reductions. A small number of customers showed a large increase in bills of \$50 to \$100 per month. In looking at individual customer profiles for these customers, staff was unable to explain the source of the impact. These anomalous customers with large impacts could be the target of a CDM program.

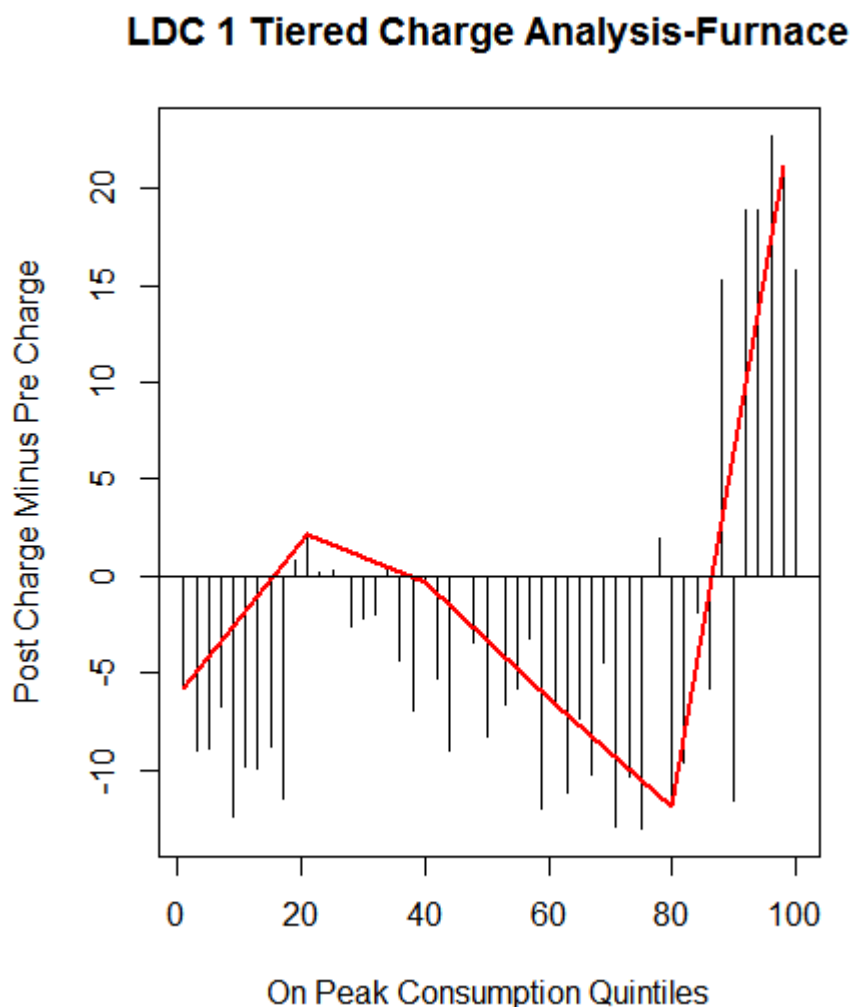


Figure 11: Analysis of Impact by Use for a Tiered Rate on Electric Furnace customers (Summer Peak)

General Service under 50 kW

Staff went through a similar analysis of general service under 50 kW customers from the Time of Use study. The measure was still peak demand in the peak hours for the peak season. Given the wider range and greater slope of the general service customers, staff suggests 5 groups at 30, 60, 80 and 90% of customers. Using the revenue requirement for a typical Ontario distributor and a cost-based charge this would result in the following tariff.

Fixed Charges for Peak Use Groups for General Service Under 50 kW		
	Boundaries (kW)	Monthly Fixed Charge (\$)
Under 30%	< 3.1	\$15.26
30 to 60%	3.1 to 7.04	42.45
60 to 80%	7.04 to 11.78	71.60
80 to 90%	11.78 to 17.06	107.55
Over 90%	> 17.06 (to 70.61)	190.12

The top group fixed monthly charge of \$190 compares to the monthly service charge for the next class of customer (General Service over 50 kW) such as \$134.91 for PowerStream or \$253.92 for Hydro Ottawa.