201~~8~~9 Bill Impacts

Summary

National Grid has performed an analysis of the electric and gas bill impacts resulting from the proposed 2019 Energy Efficiency Program Plan. Bill impacts are distinct from rate impacts because they model the long term effects of efficiency programs on customer bills by aggregating rate and consumption changes. In the electric bill impact analysis, rate impacts are modeled by mapping EE programs to rate classes and estimating changes in both delivery service rates and supply costs due to the energy efficiency (EE) program charge proposed in the Plan. Consumption impacts are predicted from proposed participation and energy efficiency savings. Where possible, other effects of energy efficiency beyond direct energy savings – such as price suppression and avoided infrastructure investments – are also included. In the gas bill impact analysis, rate impacts for different sectors account for the EE charge, while consumption impacts are modeled based on predicted participation and energy savings in the 2019 plan.

Changes from Last Year

National Grid made an important update to the methodology used in the Bill Impacts Analysis from last year. On the residential side there has been no change compared to previous years as there is only one rate for Non Income Eligible Residential Customers (A-16) and Income Eligible Residential customers (A-60). For 2018, the Bill Impact Analysis has been updated to provide a clearer picture of bill impacts for commercial customers. The Company has differentiated different types of commercial customers by adding a Medium Commercial bill impact analysis. Additionally, the Company has modeled by rate code the energy savings that come from participation in various programs and channels because it is more illustrative of the many different ways that Commercial customers access energy savings. For example, in the past, a franchise of restaurants was likely served through the Company's Small Business Direct Install Program. Today, in contrast, National Grid works with franchises through the food service initiative which is part of the Large Commercial Retrofit Program, even though each franchise is a small business and most use the small C&I (C-06) rate.

Key Findings

~~Despite changes to the methodology, the k~~Key findings did not change dramatically from last year to this year. The key findings of the bill analys~~i~~es are:

- Most customers are participating in EE programs.
- High participation means that, over the lifetimes of the programs proposed for 2019, the average Rhode Island customer's (participants and non-participants combined) bill will be less than if there were no programs. Overall, rates may increase, but energy savings from participation in EE programs results in bill savings that offset the costs of the EE program charge and revenue recovery.
- Higher values for electric energy and capacity DRIPE led to lower long term electric rate increases across all rate classes than in 2018, including long term rate decreases for medium (G-02) and large (G-32 ,G-62) C&I customers.

Electric Bill Impact Methodology

The electric bill impact models used to generate the electric results were adapted from models originally built by Synapse Energy Economics on behalf of the Division of Public Utilities and Carriers in 2013. These models are distinct from the traditional electric bill impacts models the Company presents in Rates proceedings before the PUC. The new models analyze two cases: the fulfillment of the 2019 Plan and the absence of an efficiency plan in 2019. This comparison isolates the effects of the proposed 2019 EE program charge and Fully Reconciling Funding Mechanism. It assumes energy efficiency plans have been implemented before 2019 but will not be offered starting in 2019. The analysis also incorporates how system-wide reduction in energy consumption affects the different elements of rates such as transmission, distribution, and commodity charges.

Five separate electric models were developed, one for each of the main customer segments: Residential, Income Eligible, Small Commercial, Medium Commercial, and Large Commercial and Industrial. For all of the electric models, the key inputs are the net planned participation and savings numbers from Table E-7 in Attachment 5.[1] The models combine these data with rate class information to determine the benefits to customer bills from program participation.

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[1] In 2017, there were four Bill Impact models in total. In 2018, there ~~are~~ were five models – the addition ~~is~~ was the C&I Medium Commercial (G02) model. In 2017, medium commercial customers were split between the small and large commercial models, now they are differentiated. This change allows for a more realistic depiction of bill impacts because there is a wide array of usage among commercial customers and having more groupings helps illustrate typical impacts.

Table 1 below shows the mapping of efficiency programs to rate classes for the five models.[2] The diversity of the commercial customer profile means that customers from multiple rate classes can participate in any commercial program. Assumptions for these rate classes were made based on historical program participation data[3].

Table 1: Electric Rate and Program Mapping

Bill Impact Model	Rate Class(es)	Efficiency Programs
Residential Electric	A-16	Home Energy Reports
		EnergyStar HVAC
		EnergyWise Multifamily
		EnergyStar Lighting
		Residential Consumer Products
Income Eligible Electric	A-60	Inocme Eligible Single Family
		Income Eligible Multifamily
		Home Energy Reports
		EnergyStar Lighting
Small Commerical	C-06	Small Business Direct Install
		Large Commercial New Construction
		Large Commercial Retrofit
Medium Commercial	G-02	Small Business Direct Install
		Large Commercial New Construction
		Large Commercial Retrofit
Large Commercial	G-32, G-62	Small Business Direct Install
		Large Commercial New Construction
		Large Commercial Retrofit

Explanation of Electric Bill Impact Results

The results of the models are shown in Tables 2 through 6, and some highlights of the results are presented after the Tables. The columns in the Tables are as follows:

- Long-term rate impacts are defined as the average rate increase percentage from 2019 to 2039 (positive numbers indicate rate increase).
- Typical energy savings refer to the average percentage of energy savings to total annual consumption from 2019 to 2039 (positive numbers indicate electricity consumption reduction).
- Typical bill savings are defined as average percentage of bill decrease to total customer bill from 2019 to 2039 (positive numbers indicate electricity bill reduction).

The long-term rate impacts, typical energy savings, and typical bill savings are shown for average participants in energy efficiency programs, non-participants, and average customers within each of the five main customer segments. Average customers combine the bill impacts of EE participants and non EE participants to show the impacts of all customers combined. For the 2019 Bill Impact analysis the key finding is that, over the lifetimes of the programs proposed for 2019, the average Rhode Island customer's (participants and non-participants combined) bill will be less than if there were no programs.

Table 2: Residential Bill Impact Analysis – A16 (2019 EE Plan vs. No EE)

Residential	Long-Term Rate Impacts	Typical Energy Savings	Typical Bill Savings
	(% of Total Rate)	(% per Participant)	(% of Total Bill)
Average Participant	0.13%	2.30%	1.67%
Non-Participant	0.13%	0.00%	-0.13%
Average Customer	0.13%	2.18%	1.57%

Table 3: Income-eligible Bill Impact Analysis – A60 (2019 EE Plan vs. No EE)[4]

Income-Eligible	Long-Term Rate Impacts	Typical Energy Savings	Typical Bill Savings
	(% of Total Rate)	(% per Participant)	(% of Total Bill)
Average Participant	0.97%	5.01%	3.54%
Non-Participant	0.97%	0.00%	-0.97%
Average Customer	0.97%	4.70%	3.26%

Table 4: Small Commercial Bill Impact Analysis – C06 (2019 EE Plan vs. No EE)[5]

Small Business	Long-Term Rate Impacts	Typical Energy Savings	Typical Bill Savings
	(% of Total Rate)	(% per Participant)	(% of Total Bill)
Small C&I Participant	0.23%	20.92%	22.83%
Non-Participant	0.23%	0.00%	-0.23%
Average Customer	0.23%	1.90%	1.67%

Table 5: Medium Commercial Bill Impact Analysis – G02 (2019 EE Plan vs. No EE)

	Long-Term Rate Impacts	Typical Energy Savings	Typical Bill Savings
	(% of Total Rate)	(% per Participant)	(% of Total Bill)
Medium C&I Participant	-0.38%	11.14%	11.48%
Non-Participant	-0.38%	0.00%	0.38%
Average Customer	-0.38%	1.88%	2.21%

Table 6: Large Commercial & Industrial Bill Impact Analysis – G32, G62 (2019 EE Plan vs. No EE)

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[4] Home Energy Reports and Energy Star Lighting participation and savings are split between standard residential and income-eligible customers, since these measures reach all residential customers. For analysis purposes, it is assumed that income-eligible customers account for 10% of participation and 10% of savings in the two programs.

[5] For 2019, the small business (C-06 rate) customer count has been refined to better estimate customers. The number of accounts on the C06 rate is greater than the number of customers, for example there are many accounts for cell towers, pumps, etc. that belong to one customer. This is an estimate based on the best data currently available to the Company.

Commercial & Industrial	Long-Term Rate Impacts	Typical Energy Savings	Typical Bill Savings
	(% of Total Rate)	(% per Participant)	(% of Total Bill)
Large C&I Participant	-0.96%	4.45%	5.36%
Non-Participant	-0.96%	0.00%	0.96%
Average Customer	-0.96%	2.47%	3.40%

On the residential side, rates increase for all rate classes. For all rate classes non-participant bills increase slightly, while participant and average customer bills go down. The decreased average customer bills demonstrate that the scale of the energy savings due to program participation outweighs the incremental costs to implement the program. On the commercial side, long-term rates increase slightly for small C&I customers, and decreased for medium, and large C&I customers. Overall, long term rate impacts decreased across all rate classes from 2018 to 2019. A key driver in this decrease is the application of updated avoided energy supply component values from the "Avoided Energy Supply Components in New England: 2018 Report" (2018 AESC Study) see EM&V attachment 3 for more details. The study found higher values for energy and capacity DRIPE. For Small, Medium, and Large Commercial customers, non-participant bills decreased for all customers (participants and non-participants), with the exception of a 0.23% rate increase for non-participant small business customers increase slightly, while bills decrease for participants and average customers.
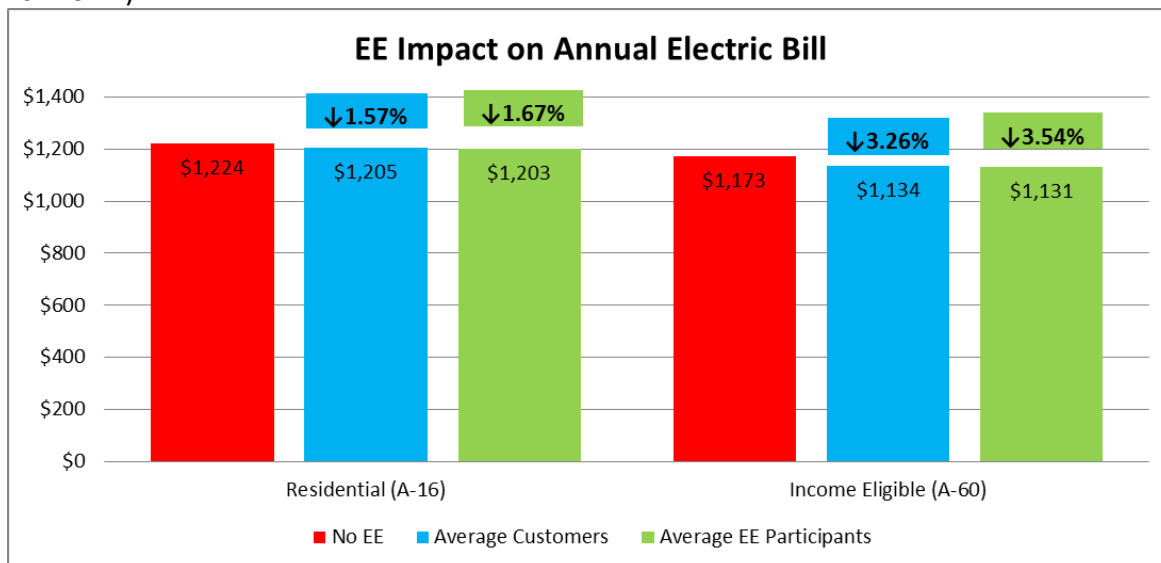
- *Residential long-term rate impacts*: EE programs bring system benefits in terms of avoided infrastructure investment in generation, transmission, and distribution in the long-run. These avoided investments will ultimately flow through rates and offset the short-term contribution of the EE program charge to 2019 rate (from 5-9%, depending on rate class) and bring the long-term rate increase down to 1.31%0.13% for standard residential customers and 0.97%1.82% for income-eligible residential customers.

- *Small, Medium, and Large C&I long-term rate impact*: avoided infrastructure costs flow through rates and partially offset the EE program charge for 2019 and beyond, leading to only a 0.54%0.23% increase in rates for small C&I customers, a 0.30%0.38% rate decrease for medium C&I customers, and a 0.25%0.96% rate decrease for large C&I customers in the long runthrough 2039.

- *Average participant bill savings*: the proposed EE programs will bring bill savings to participants in all rate groups. Specifically, typical bill savings are 1.56%1.67% for standard residential participants, 3.69%3.45% for income-eligible residential
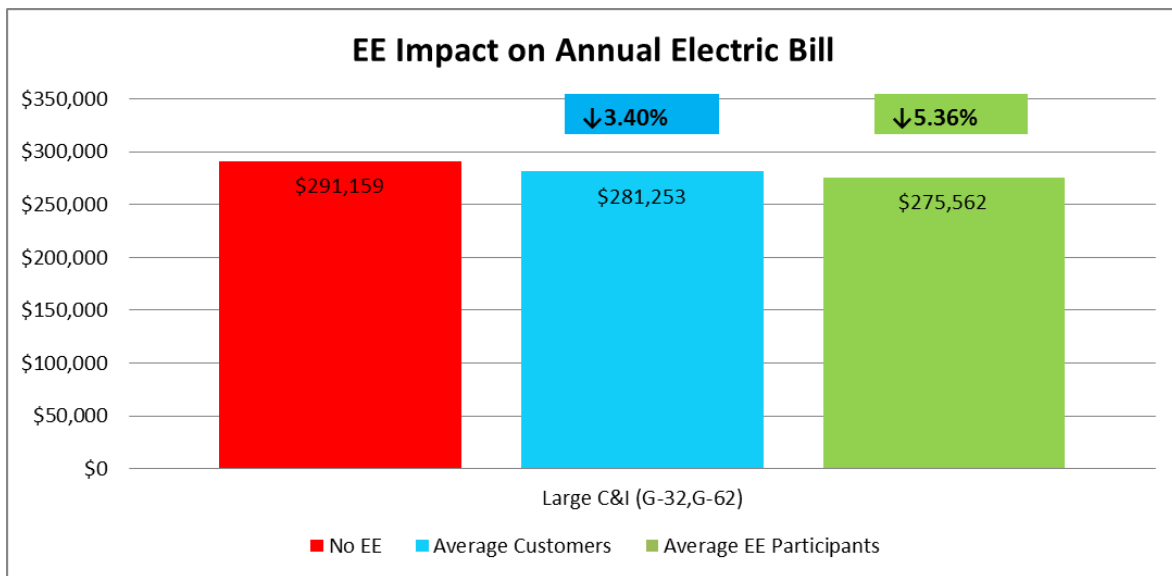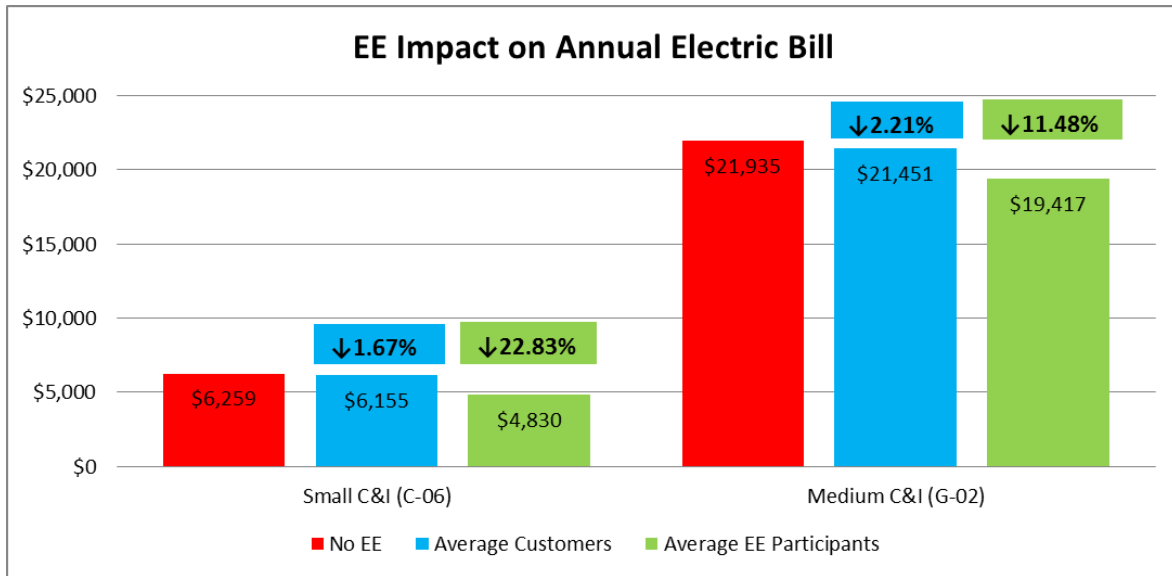
participants, 15.80%22.83% for small C&I participants, 11.58%11.48% for medium C&I participants, and 5.35%5.36% for large C&I participants (Tables 2-6).

- For the 2019 Bill Impact Analysis, Commercial participation by rate class is assumed to be similar to 2016 data.

- *Average customer typical bill savings*: among all participants and non-participants, typical bill savings is 1.35%1.57% for standard residential customers, 3.47%3.26% for income-eligible residential customers, 0.81%1.67% for small C&I customers, 1.42%2.21% for medium C&I customers, and 2.42%3.40% for large C&I customers, indicating that the proposed EE programs will bring net benefits to all types of electric customers in Rhode Island (Tables 2-6).

Figure 1 shows an example of electric bill reduction for average residential, income-eligible, small C&I, medium C&I and large C&I customers and participants. Bills are calculated based on average annual consumption of a typical customer in Rhode Island (residential and low-income: 6000 kWh; small C&I in C-06 rate group: 33,000 kWh, medium C&I in G-02 rate group: 158,400 kwh, large C&I in G32 and G62 rate groups: 2.34 million kWh). In the figures below, the rates are the same as rates used in the bill impact analysis above. This illustration is different from traditional incremental bill impacts because it shows the long-term bill impact of the proposed EE programs and accounts for the measure life of the energy efficiency measures.

Figure 1: Example of Typical Participant and Customer Annual Electric Bill Impact (2019 EE Plan vs. No EE)

EE Impact on Annual Electric Bill

Small C&I (C-06): No EE $6,259; Average Customers $6,155 (↓1.67%); Average EE Participants $4,830 (↓22.83%)

Medium C&I (G-02): No EE $21,935; Average Customers $21,451 (↓2.21%); Average EE Participants $19,417 (↓11.48%)

Legend: ■ No EE ■ Average Customers ■ Average EE Participants

EE Impact on Annual Electric Bill

Large C&I (G-32,G-62): No EE $291,159; Average Customers $281,253 (↓3.40%); Average EE Participants $275,562 (↓5.36%)

Legend: ■ No EE ■ Average Customers ■ Average EE Participants

Gas Bill Impact Methodology

The natural gas bill impacts were analyzed by adapting an existing gas bill impact model used by the Company in dockets 47084846 and 47194872.[6] The updated model analyzes the effects of the 2019 Plan by looking at a change in average consumption due to energy efficiency. The adapted gas models do not account for efficiency's effects on future gas rates. They only look at direct energy savings for the rate classes that best map to the four efficiency customer segments: Residential, Income Eligible, Small Business, and Large Commercial and Industrial. The table below shows the mapping of rates to customer segments.[7]

Table 6: Gas Rate Mapping

Bill Impact Model	Rate Class(es)
Residential Gas	Residential Heating
Income Eligible Gas	Residential Heating – Low Income
Small Commercial Gas	C&I Small
Large Commercial Gas	C&I Medium, Large Low Load, Large High Load, Extra Large Low Load, Extra Large High Load

Explanation of Gas Bill Impact Results

The proposed EE programs lead to reduction in participant bills. Moreover, the annual bills for average customers (participants and non-participants combined) are also projected to decrease for all four rate groups (residential heating, low-income heating, small commercial and large commercial). The detailed bill reduction percentages are shown in Table 7. The columns in the Tables are as follows:

- The rate impact is calculated as percent increase in rates due to EE (positive numbers indicate rate increase).
- The participant bill savings is defined as percent change in participant bill over the lifetime of the EE programs (positive numbers indicate participant bill decrease).

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[6] Proposed DAC rates are in Docket 47084846 and proposed GCR rate are in Docket 47194872.

[7] The analysis uses residential and income eligible heating to represent the two groups. As of August 20168, residential heating represents 912% of standard residential customers and income eligible heating represents 98% of income eligible customers.

- The average customer bill savings is expressed as the percent change in total bill for average customers (participants and non-participants combined and positive numbers indicate average customer bill decrease).

Table 7: RI Gas Bill Impact Analysis

Rate Group	Rate Impact (% of 2019 Total Rate)	Average Participant Bill Savings (as a % Change in 2019 Bills)	Average Customer Bill Savings (as a % Change in 2019 Bill)
Residential Heating	4.68%	1.50%	0.85%
Low Income Heating	4.68%	21.81%	4.73%
Small Commercial	3.18%	5.85%	0.02%
Large Commercial	3.43%	5.61%	0.33%

- The total EE contribution to the 2019 gas rate is 5.655.14% for residential rates and, 4.60%3.93 for small C&I rates, and 4.964.24% for large C&I rates.
- Typical bill savings is 0.93%1.03% for standard residential participants, 8.28%21.32% for income-eligible residential participants, 3.22%5.11% for small C&I participants, and 2.23%4.27% for large C&I participants (Table 7). [8]
- The average customers in all rate groups will experience bill decrease (0.51%0.59% for standard residential customers, 1.75%4.62% for income-eligible residential customers, 0.01%0.65%[9] for small C&I customers, and 0.75%0.18% for large C&I customers), indicating that the proposed EE programs will bring net benefits to all types of gas customers in Rhode Island (Table 7).

Figure 2 shows an example of gas bill reduction for average residential heating, income-eligible heating, small C&I, and large C&I customers and participants. Bills are calculated based on average annual consumption of a typical customer in Rhode Island (standard residential: 8465 therms, low-income residential: 8465 therms, small C&I: 1,325277 therms, large C&I: 269,689359,745 therms).

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[8] The difference in bill reduction percentage between standard residential and income-eligible participants is mainly driven by Home Energy Reports for standard residential customers. Home Energy Report brings less direct energy savings to participants. This analysis assumes Home Energy Reports are offered to standard residential customers.

[9] In 2019 participants in the C&I Multifamily program began to be counted on the account level for the Bill Impacts Analysis instead of individual level. This more accurately represents the number of large commercial customers participating in the program.

Figure 2. Example of Annual Gas Bill Impact on Typical Participant and Customer (~~2018~~2019 EE Plan vs. No EE)

EE Impact on Annual Gas Bill

Residential Heating: No EE $1,314; Average EE Participants ↓0.50% $1,307; Average EE Participants ↓1.03% $1,301

Income Eligible Heating: No EE $1,256; Average EE Participants ↓4.62% $1,198; Average EE Participants ↓21.32% $988

Small C&I: No EE $1,983; Average EE Participants ↓0.02% $1,983; Average EE Participants ↓5.11% $1,882

Legend: No EE | Average EE Participants | Average EE Participants

EE Impact on Annual Gas Bill

Large C&I: No EE $272,799; Average Customers ↓0.25% $272,110; No EE ↓4.27% $261,151

Legend: No EE | Average Customers | No EE