RICARDO
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Rate Restructuring

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1	2/06/26	Version 1	**Maria Nieto**

Contents

1. Executive Summary

1.1 Introduction

Section 35(1) of the Electricity Act 2016 (the "EA") requires the Regulatory Authority of Bermuda (the "RA") to determine the Retail Tariff in accordance with the methodology that was set by the RA in the Regulatory Authority (Retail Tariff Methodology) General Determination 2025 dated 22 January 2025 (the "GD") and the principles set out in part 6 of the EA.

To ensure that the way rates are calculated are aligned with these mandates, are transparent, cost-reflective, and fair, the RA contracted Ricardo to provide support in carrying out a comprehensive review of the island's rate structure. The study covers the following:

1) Review of Bermuda's current rate structure and its cost-reflectivity, fairness and transparency
2) Assess rate design options to improve cost-reflectivity, fairness and transparency
3) Provide a recommendation of a scenario and pathway forward

However, we acknowledge that the RA may have additional principles to consider, which may differ from our own.

1.2 Scenarios Considered

Ricardo acknowledges that the current electricity rate structure is relatively easy for BELCO to implement, however, there is room for improvement to improve cost-reflectivity and cost-causation. Currently, rates are bundled, which limit the transparency in the current structure. Unbundling the rates to try and reflect the type of costs incurred can help customers understand their bills and what they are paying for. Furthermore, the majority of revenue is recovered through variable rates (i.e. $/kWh) rather than fixed rates ($/month or $/kW), while studies submitted by BELCO have shown that costs incurred are not directly proportional to energy and instead are predominantly fixed. Therefore, to improve cost reflectivity, electricity bills would ideally recover a larger proportion of revenue through fixed rates instead of variable rates.

To address the concerns, the RA contracted Ricardo to support with the review and assessment of the current rate structure with the objective of improving transparency and cost-reflectivity. In the exercise, we considered various alternatives for implementation in Bermuda with varying degrees of unbundling to help transparency and rate restructuring to better reflect the types of costs incurred.

After analysis and discussions with the RA, the RA decided to proceed with one option, Option A, which involves the structure detailed in the table below. Option A was selected as it was observed to be a good first step towards improving cost reflectivity and transparency whilst limiting the disruption to the customer base.

Table 1. Comparison of Current Bill Structure and Option A

	Current Approach	Option A
Residential		

	Current Approach	Option A
Fixed charge ($/month)	Consumption-driven GFC tiers with DG customers paying the average GFC rate	Consumption-driven GFC tiers with DG customers in GFC tier 5
Variable Charges ($/kWh)	1 Inclining Block Tariff (IBT) rate	2 IBT rates: Generation and TD&R/Residual
Demand Charges ($/kW)	None	None
Fixed Cost in Variable Charges	Status quo	Incrementally lower than the status quo
Commercial		
Fixed charge ($/month)	1 fixed charge	2 fixed charges: 1 for non-DG customers and 1 for DG-customers
Variable Charges ($/kWh)	1 IBT rate	2 IBT rates: Generation and TD&R/Residual
Demand Charges ($/kW)	None	None
Fixed Cost in Variable Charges	Status quo	Incrementally lower than status quo
Demand		
Fixed charge ($/month)	1 fixed charge	2 fixed charges: 1 for non-DG customers and 1 for DG-customers
Variable Charges ($/kWh)	1 Declining Block Tariff (DBT) rate	2 DBT rates: Generation and TD&R/Residual
Demand Charges ($/kW)	Three types of demand charges	Generation demand charges with three types (A, B, C), and TD&R/Residual demand charges with three types (A,B,C)
Fixed Cost in Variable Charges	Status quo	Incrementally lower than status quo

After selecting Option A, it was important to then assess the desired shift of revenue recovery from variable rates to fixed rates. Several scenarios were considered with increasing degrees of recovery from fixed rates and all the way to cost-reflective recovery from fixed rates. However, to limit the disruption to the customer base as a first step, the more conservative scenario was selected. These factors are shown in the table below, next to the current allocation present in electricity rates.

Table 2. Preferred rate design allocation factors relative to current allocation factors

	Current Factors			Preferred Factors		
	RES	COMM	DMND	RES	COMM	DMND
Facilities Charge (%)	24.4%	6.7%	0.6%	30.0% ↑	10.0% ↑	0.6% ↑

	Current Factors			Preferred Factors		
Energy Charge Block One (%)	15.9%	21.0%	58.4%	14.7%	20.2%	54.8%
Energy Charge Block Two (%)	28.8%	33.4%	24.0%	26.7%	32.3%	22.5%
Energy Charge Block Three (%)	30.9%	38.9%	2.9%	28.6%	37.5%	2.7%
Class A Demand Charge (%)	0.0%	0.0%	13.5%	0.0%	0.0%	18.2% ↑
Class B Demand Charge (%)	0.0%	0.0%	0.5%	0.0%	0.0%	1.0% ↑
Class C Demand Charge (%)	0.0%	0.0%	0.2%	0.0%	0.0%	0.2% ↑

BELCO was then asked to model and submit analysis considering Option A rate structure with the preferred allocation factors. Overall, the average rate will stay the same across customer classes and those who will be more unlikely to see a noticeable increase will be those customers with higher load factors and no distributed generation. On the other hand, customers with lower load factors or who have distributed generation, are more likely to see noticeable increases. The following table summarises the estimated rate impacts by customer class as calculated by BELCO.

Table 3. Rate impact assessment

	% that will see a decrease or no change	% that will see an increase	Max increase
Residential – non DG	25%	75%	$10/month
Residential - DG	10%	90%	$100/month
Commercial – non DG	30%	70%	$25/month
Commercial - DG	20%	80%	$150/month
Demand – non DG	60%	40%	13%*
Demand - DG	10%	90%	7%*

* the vast majority would see an increase that is <3%

1.3 Summary of recommendations and impact assessment

After considering BELCO's analysis, the objectives of the exercise, and the public, we recommend proceeding with Option A rate structure with the preferred allocation factors across the rate design shown in Table 2. Ricardo recommends this combination as it could be a good step in the right direction, whilst providing a level of continuity and transition to help with customer understanding while limiting the disruption to customers from a more aggressive scenario. Whilst other less progressive scenarios could have been considered as well, for example, purely unbundling volumetric rates instead of also shifting recovery slightly away from volumetric rates, Ricardo recommends that a shift is introduced. While it will provide a larger impact than purely unbundling the rates, Ricardo thinks it is appropriate to slowly start shifting the cost recovery and taking advantage that the rate restructuring update is not at the same time as a larger tariff update, which can help with customer understanding and isolating impacts.

We recommend that a staggered approach towards fairer, more transparent and cost-reflective rates is taken to help minimise confusion and price spikes. Even with this recommended option, the RA needs to design and implement a thoughtful and clear communication strategy to ensure that customers understand not only the changes but the reason for the changes. It is important to ensure that customers are onboard and are taken along the journey as this is only the first step into improving transparency and cost-reflectivity across electricity bills in Bermuda.

2. Introduction

2.1 Objectives for this study

Section 35(1) of the Electricity Act 2016 (the "EA") requires the Regulatory Authority of Bermuda (the "RA") to determine the Retail Tariff in accordance with the methodology that was set by the RA in the Regulatory Authority (Retail Tariff Methodology) General Determination 2025 dated 22 January 2025 (the "GD") and the principles set out in part 6 of the EA.

Furthermore, the Regulatory Authority Act states that the principal functions of the RA are to:

a. "to promote and preserve competition;
b. To promote the interests of the residents and consumers of Bermuda;
c. To promote the development of the Bermudian economy, Bermudian employment and Bermudian ownership;
d. To promote innovation; and
e. To fulfil any additional functions specified by sectoral legislation."[1]

In order to ensure that the way rates are calculated are aligned with these mandates, are transparent, cost-reflective, and fair, the RA contracted Ricardo to provide support in carrying out a comprehensive review of the island's rate structure. The study covers the following:

4) Review Bermuda's current rate structure and its cost-reflectivity, fairness and transparency
5) Assess rate design options to improve cost-reflectivity, fairness and transparency
6) Provide a recommendation of a scenario and pathway forward

However, we acknowledge that the RA may have additional principles to consider, which may differ from our own.

2.2 Legislative Framework

The core legal framework relevant to the setting of retail tariffs is based on the Regulatory Authority Act (RAA), the EA and the National Electricity Sector Policy.

The RAA established a cross-sectoral independent and accountable regulatory body "to protect the rights of consumers, encourage the deployment of innovative and affordable services, promote sustainable competition, foster investment, promote Bermudian ownership and employment and enhance Bermuda's position in the global market"[2].

In 2015, the Ministry of Economic Development of Bermuda published the National Electricity Sector Policy ("the Policy")[3]. The policy set out the groundwork for the establishment of the subsequent EA and

[1] Regulatory Authority Act 2011, p. 15. https://cdn.prod.website-files.com/62670c93ceef61f2e8acc1ce/65689e64a851c0cfd65c1d3f_Regulatory%20Authority%20Act%202011.pdf

[2] Regulatory Authority Act 2011, p.5

[3] Ministry of Economic Development (2015), "The National Electricity Sector Policy of Bermuda"

the desired structure of the electricity sector of Bermuda and it also outlined four broad policy objectives for the sector. These policy objectives encourage the pursuit of an electricity service that is (i) least cost and high quality, (ii) environmentally sustainable, (iii) secure and (iv) affordable[4]. The policy stipulates that the RA has responsibility for regulating tariffs and service quality among other things.

The EA received Royal Assent on 27 February 2016 and came into operation on 28 October 2016, pursuant to the Electricity Act 2016 Commencement Day Notice 2016 (BR 101/2016). The EA repealed the Energy Act 2009.

The Minister responsible for electricity can issue Ministerial Declarations that establish policies for the electricity sector[5] and can also issue Ministerial Directions to the RA concerning any matter within the Minister's authority with regard to the electricity sector[6]. In formulating Ministerial Directions, the Minister shall set priorities and resolve trade-offs or conflicts that arise from the purposes of the EA in a way that the Minister believes best serves the public interest[7].

The RA's roles and responsibilities within the Bermuda electricity sector are laid out in broad terms in the policy and in more detail in the EA. The RA has the power to supervise, monitor and regulate the electricity sector in Bermuda in accordance with the purposes of the EA. Such purposes, as set forth in Section 6 of the EA, are to seek to:

1) "ensure the adequacy, safety, sustainability and reliability of electricity supply in Bermuda so that Bermuda continues to be well positioned to compete in the international business and global tourism markets;
2) encourage electricity conservation and the efficient use of electricity;
3) promote the use of cleaner energy sources and technologies, including alternative energy sources and renewable energy sources (RES);
4) provide sectoral participants and end-users with non-discriminatory interconnection to transmission and distribution systems;
5) protect the interests of end-users with respect to prices and affordability, and the adequacy, reliability and quality of electricity service; and
6) to promote economic efficiency and sustainability in the generation, transmission, distribution and sale of electricity."[8]

To further the EA's purposes, it grants various functions to the RA. Section 14 of the EA stipulates that the function of the RA is "generally to monitor and regulate the electricity sector"[9]. Section 14 (2) (c) (ii) of the EA states that the functions of the RA shall include, among other things, the "making of administrative determinations to provide for the control and conduct of the provision of electricity services", "including transparency measures and notice requirements relating to the rates, charges and other terms and conditions for the provision of electricity services for the benefit of end-users."[10]

[4] Ministry of Economic Development (2015), "The National Electricity Sector Policy of Bermuda", p.4

[5] Electricity Act 2016, Section 7(2)

[6] Electricity Act 2016, Section 8(1)

[7] Electricity Act 2016, Section 9

[8] Electricity Act 2016, Section 6

[9] Electricity Act 2016, Section 14(1)

[10] Electricity Act 2016, Section 14(2) (c) (ii)

Section 35(1) of the EA states that the RA shall determine the retail tariffs in accordance with the methodology set by the GD and a defined set of principles. Furthermore, the EA states that "a licensee may not charge an end-user any other tariff or make use of provisions in agreements other than that determined or approved by the Authority [RA]" pursuant to the EA and the regulations and rules."[11] Additionally, "no licensee shall vary the tariff or any published schedule of prices or charges for electricity unless notice in writing of the intention to vary the tariff, and the amount of the variation, has been approved by the Authority [RA]."[12]

2.3 Ministerial Direction

The rate design exercise which aims to improve cost reflectivity and fairness of electricity rates also aligns with the Ministerial Direction provided by the Ministry of Home Affairs to the RA on 2 May 2025. In the Ministerial Direction, the RA was directed to:

"*reasonably consider the introduction of differentiated tariff classes for:*

a) Consumers fully reliant on the electricity grid;
b) Consumers partially reliant; and
c) Consumers minimally reliant

*To promote **fairer** and more **transparent cost allocation** in the electricity sector in accordance with Section 36(2)(a) of the EA 2016."*[13]

Currently, customers with partial or minimal reliance on the grid, due to having distributed generation, pay the same fixed rates ($/month) as customers that do not have distributed generation (with the exception of residential customers who pay the average of the fixed rates). However, that structure does not fully reflect and help recover costs that these customers incur on the system, especially as these customers import less from the grid than they would without their distributed generation, meaning they face lower bills than they would if they were fully reliant on the grid.

To resolve the concerns raised above and comply with the Ministerial Direction, the RA considered the following under the rate restructuring exercise:

a) Introducing new tariff subclasses that clearly distinguish between customers with and without distributed generation
b) Starting to rebalance the fixed and variable costs in customer bills to help ensure fairer allocation of costs between customers
c) Unbundling volumetric rates, showing a generation rate and a network rate in all customer bills to help improve transparency

2.4 Key Steps of this process

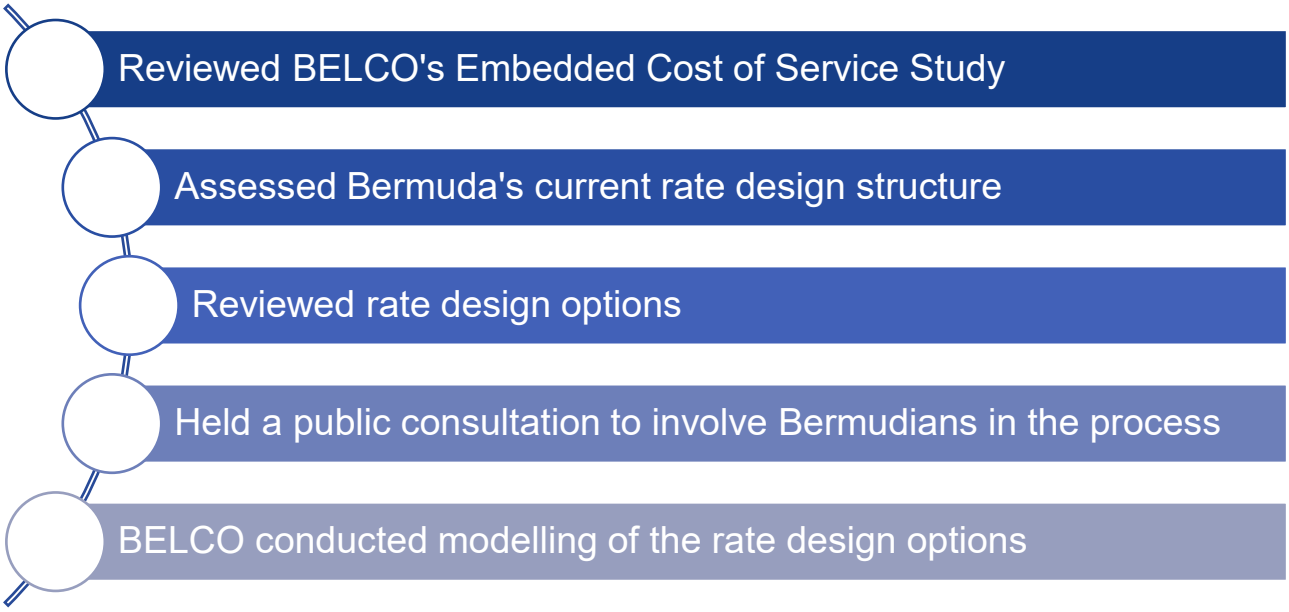
Figure 1 summarises some of the key activities and interactions that have taken place in the context of the rate design study.

[11] Electricity Act 2016, Section (35)(5)

[12] Electricity Act 2016, Section (35)(6)

[13] Ministry of Home Affairs, Direction to the Regulatory Authority on Governance, Accountability, Interim Tariff Reform, and Consumer Protection, May 2, 2025

Figure 1. Key steps of the rate design process



The following chapters deep dive into the steps outlined above.

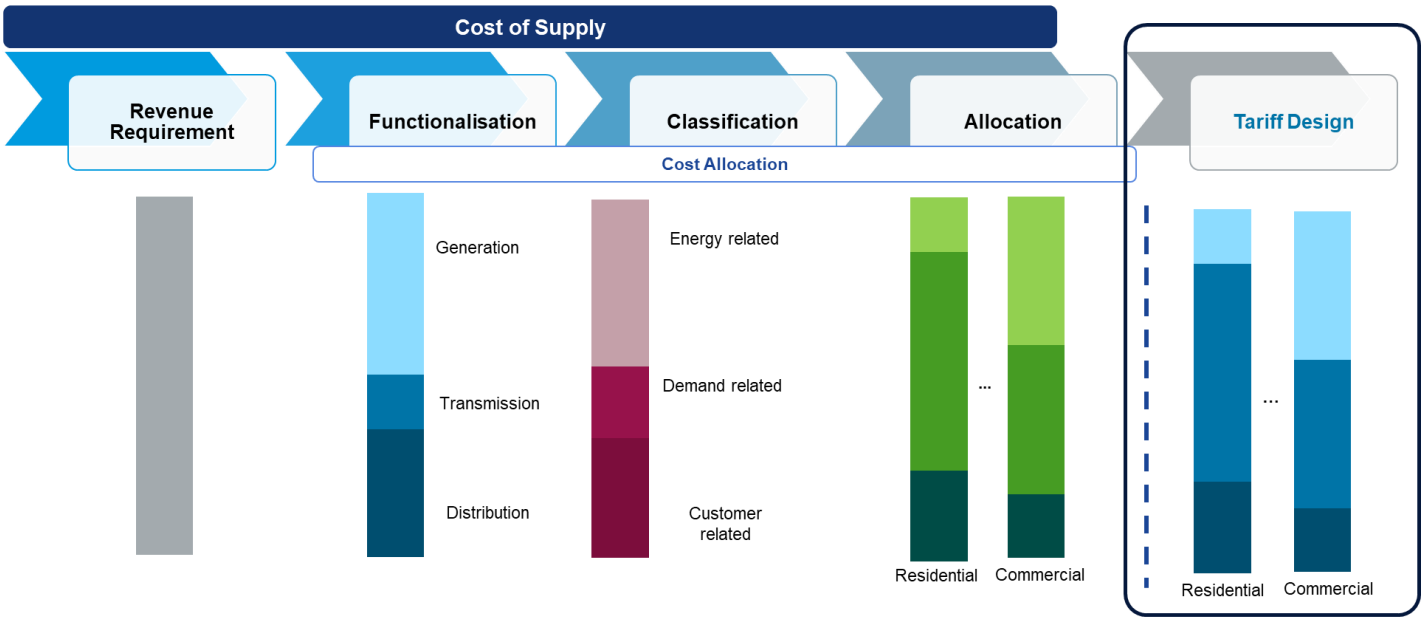
3. Embedded Cost of Service Study

3.1 Introduction

In 2021, and beginning of 2022, Ricardo supported the RA in reviewing BELCO's Embedded Cost of Service Study (ECOSS). An ECOSS helps to determine how a utility's total costs, and then revenues, should be allocated among different customer classes. This is a crucial study to understand what costs are incurred and how they should be allocated across customers and types of rates, helping to set fair and cost-reflective electricity rates. The goal is for rates to reflect the costs to serve as much as possible, which helps minimise cross-subsidisation.

Typically, an ECOSS follows a three-step approach: functionalization, classification, and allocation, which then help with the final tariff design:

Figure 2. Tariff Setting Steps



- **Step 1 – Functionalization:** Functionalization involves separating the costs into the functions of the utility, essentially understanding why costs were incurred. In this case, BELCO's functions include generation of electricity, transmission, distribution, and retail. For example, the costs associated with a power plant would be linked to generation of electricity, whilst network infrastructure would be linked to transmission or distribution, depending on the details.
- **Step 2 – Classification:** In this step, the functionalized costs are then classified into specific utility operations and cost drivers are identified for each component. The costs are allocated into groups based on characteristic of providing the service or characteristics to be used to determine the customer's proportion of the share of costs:
    - **Demand-related costs:** These are costs that vary with peak demand and can consist of infrastructure investment.
    - **Energy-driven costs:** These are costs which vary with the volume of generation of electricity. These costs can include fuel costs or other variable costs.
    - **Customer-driven costs:** These are costs that are constant regardless of the volume of electricity and predominantly associated with the number of customers.

  Typically, the different functions are associated with specific classifications:
    - Production costs tend to be classified as either demand- or energy-related costs
    - Transmission functionalized costs tend to be classified as demand-related costs
    - Distribution functionalized costs are typically classified as either demand- or customer-related costs
    - Retail functionalized costs tend to be classified as customer-related costs

  For example, if we look at specific costs of a power plant, variable operations and maintenance and fuel costs associated with the plant vary based on volume of electricity, which would mean that we could classify them as energy-driven costs. On the other hand, if we look at the capital of the plant, we could classify it more as a demand-related cost if the primary purpose of the plant is to help meet peak demand.
- **Step 3 – Allocation:** The final step is to allocate the functionalized and classified revenues or costs to the different customer classes using allocation factors that are based on cost causation. The aim

is to try and ensure that each rate class is contributing or paying the appropriate level relative to the total revenue requirement. Some examples of allocation factors include:

- **Demand-related costs:** To determine the relative demand costs associated with a specific customer or customer type, the contribution of the customer to demand in peak time can be used.
- **Energy-driven costs:** To determine the relative energy costs associated with a specific customer or customer type, the contribution of the energy consumption relative to the system can be used.
- **Customer-driven costs:** To determine the relative customer costs associated with a specific customer or customer type, the spread can be determined using the number of customers relative to the total customer base.

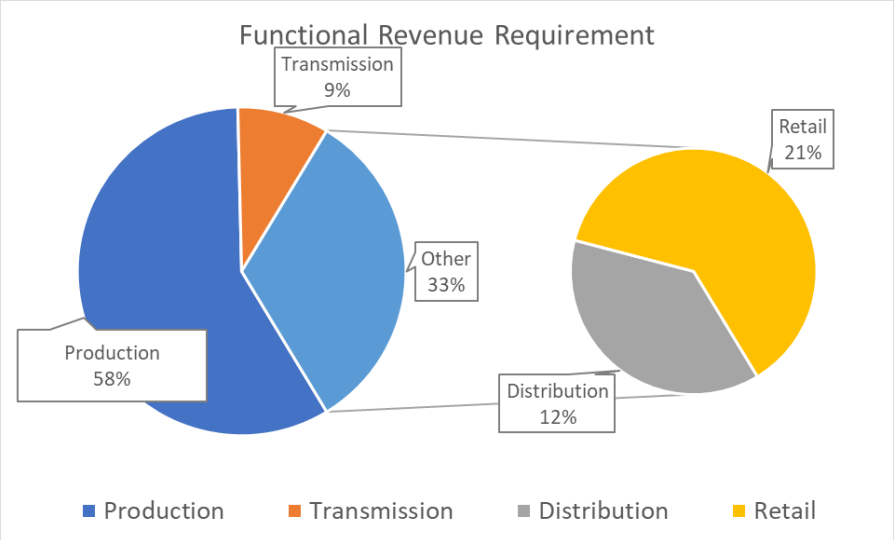
In November 2021, BELCO produced an ECOSS and accompanying report, with support from Concentric Energy Advisors, as part of the 2022/2023 Retail Tariff Review process. The ECOSS was prepared for an unadjusted test year 2020.

3.2 Assessment

Ricardo conducted a review of BELCO's ECOSS which is useful to the development of revenue allocation between customer classes.

According to the ECOSS submitted by BELCO, BELCO's revenue requirement by function is predominantly related to production, whilst transmission is the smallest component, as observed in Figure 3. According to the report, this trend is associated with the investment in new generation equipment such as the North Power Station and East Power Station.

Figure 3. Functionalized revenue from BELCO's ECOSS[14]



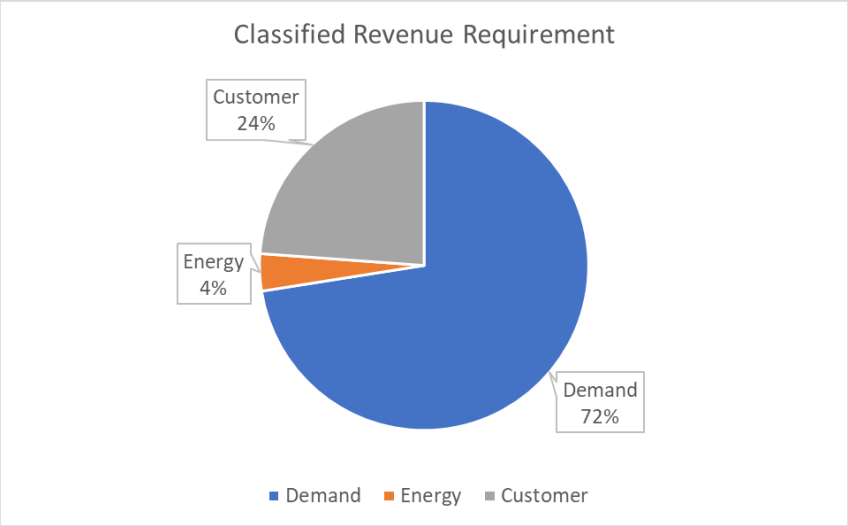
Furthermore, when classifying the revenue requirement, it was observed that the revenue requirement is predominantly demand-related, followed by customer, and lastly energy-related. This helps highlight two things:

[14] BELCO's Updated Embedded Cost of Service Study, November 2021

1. The majority of costs, or revenue, should be allocated using demand allocators.
2. The cost of service is predominantly fixed instead of variable, meaning that the majority of costs incurred do not vary by energy consumed. Therefore, for electricity bills to be cost reflective, more of the cost recovery should occur through fixed rates (customer and demand) instead of volumetric (energy-related).

The results from BELCO's study are shown in Figure 4.

Figure 4. Classified Revenue from BELCO's ECOSS[15]



Additionally, the study revealed that some customer classes such as small commercial are under-recovering their revenue requirement, and therefore, getting subsidised by other customer classes.

In the report, BELCO caveated that there were shortcomings in the load research data as they had not finished installing the AMI meters. Considering the mentioned caveats, there is a benefit in redoing the ECOSS as more AMI meters are installed to obtain more accurate results.

We consider BELCO's caveats in the report noting that the results should be "considered directionally correct"[16] and observe the following key takeaways which should be addressed to improve cost reflectivity and transparency of electricity rates:

- The majority of the revenue requirement should be recovered through fixed and demand rates instead of volumetric rates to better reflect cost causation.
- There is some level of cross-subsidisation occurring at the moment between classes.

[15] BELCO's Updated Embedded Cost of Service Study, November 2021

[16] BELCO's Updated Embedded Cost of Service Study, November 2021

4. Rate design

4.1 Introduction

Following the ECOSS, conversations progressed to investigating rate restructuring. The ECOSS, as discussed previously, highlighted the need to reconsider the allocation of revenues not only across customer classes but also across different types of rates (i.e. fixed or variable).

Alongside BELCO's ECOSS submission, BELCO submitted an initial tariff report providing their assessment of Bermuda's rate structure. Ricardo reviewed this assessment back in 2022. Thereafter, the RA and Ricardo worked together on assessing the different options available to improve the rate structure, which resulted in a public consultation.

The following chapters deep dive into the current rate design, BELCO's assessment submitted in 2021, and then discusses the options considered for rate restructuring as well as summarising the outputs of the public consultation.

4.2 Current Rate Design

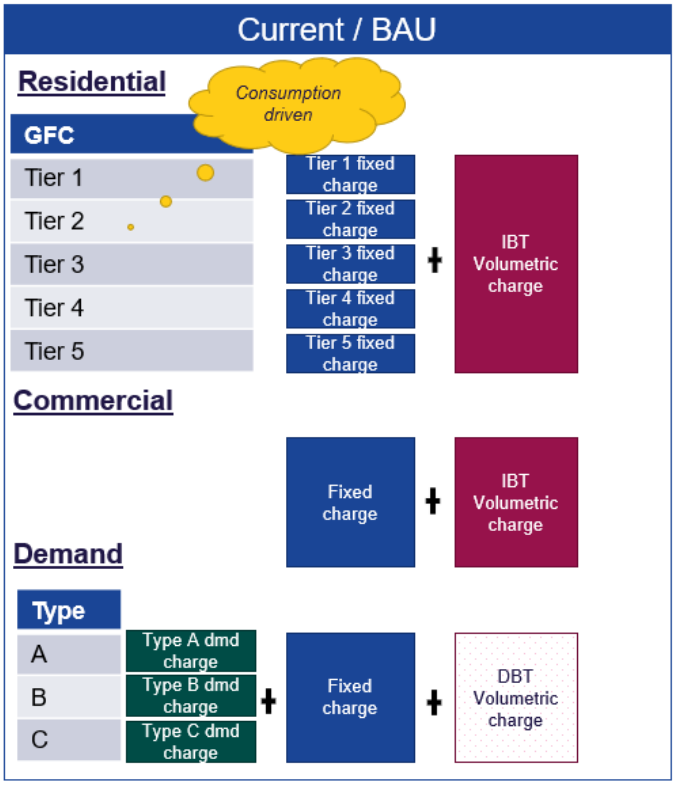
At present, BELCO recovers its revenue allowance through electricity rates set for the different customer classes, each with their specific rate structure. The following are the different types of customer classes at present:

1. **Residential customer class:** Provided electricity at private residencies and public authorities.
2. **Commercial customer class:** Primarily composed of commercial customers.
3. **Demand customer class:** Associated with large commercial customers or industrial businesses that have a minimum demand of 50kW. These are further categorized as follows:
    a. **Demand A:** Customers in Demand A provide a vault and purchase transformer and switchgear and are responsible for their own equipment.
    b. **Demand B:** Customers in Demand B provide a vault which can also accommodate other customers. BELCO provides transformers and equipment, with the customer paying for a percentage of the supply of the equipment. BELCO is responsible for the maintenance of the equipment.
    c. **Demand C:** Customers in Demand C do not provide a vault, and BELCO provides transformers and equipment. Similar to Demand B, customers pay a percentage of the supply of equipment, and BELCO is responsible for maintenance.
4. **Other Customers (Misc. Commercial):** Streetlighting, churches, quarries.

An overview of the rate structure per class is presented in the figure below.

Figure 5. Bermuda's current rate structure[17]

[17] Where "IBT" refers to Inclining Block Tariffs, where rates in $/kWh increase with increasing levels of consumption, and where "DBT" refers to Declining Block Tariffs, where rates in $/kWh decrease with increasing levels of consumption.



As illustrated in the figure above, all customer classes have a combination of fixed charges and volumetric charges. The fixed charges are in $/month and are fixed regardless of the level of consumption. Residential customers pay the fixed charges through the Graduated Facilities Charges (GFC) which are structured in five tiers. The tiers reflect the average level of consumption per day of the customer and increase with increasing levels of consumption. An additional note is that any customers that have distributed generation (DG) pay the average of the GFC tiers, which is similar to that of Tier 3.

Similarly, commercial and demand customers have fixed charges. Whilst both commercial and demand customers have a fixed $/month charge, demand customers have an additional fixed charge derived from the peak power they draw from the system, in $/kW. These customers are divided even further into three subcategories, A, B, or C (as mentioned previously).

Residential and commercial customers observe increasing electricity rates in $/kWh as their consumption increases, known as inclining block tariffs. This is to incentivise energy efficiency as customers may want to reduce consumption, knowing they will be paying higher rates. Conversely, demand customers observe a decrease in charges as their consumption increases.

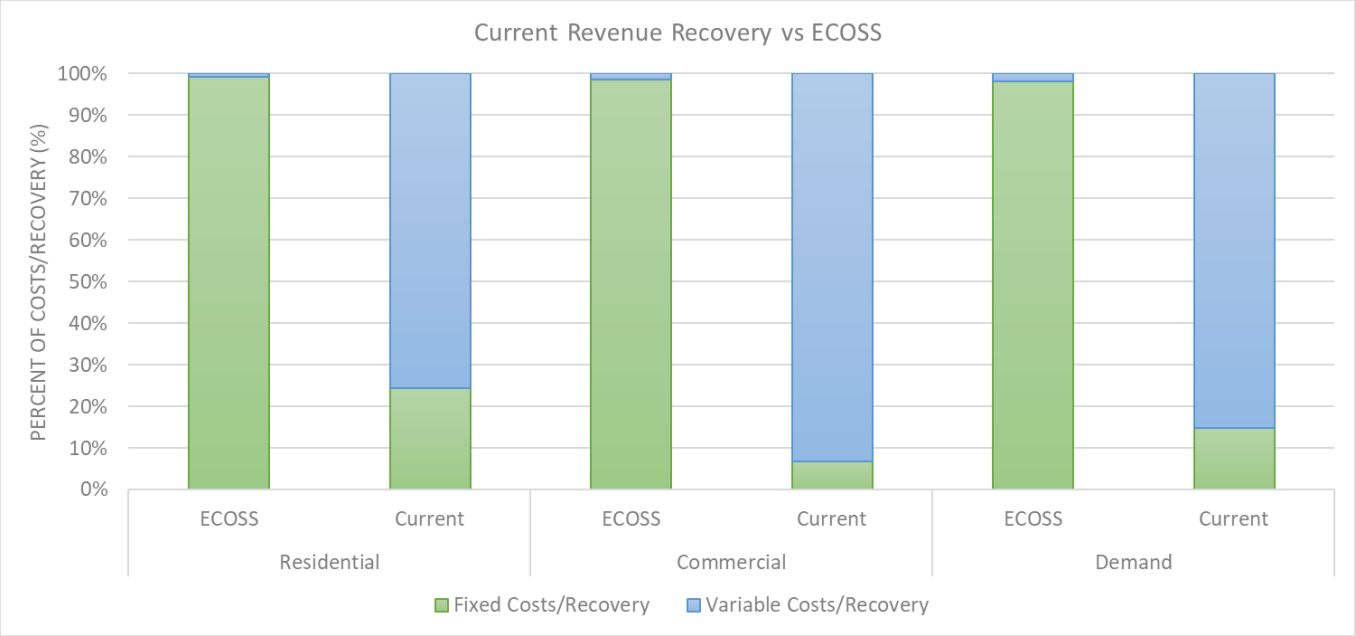
Furthermore, customers only see one type of variable charge on their bill, aggregating generation, transmission and distribution costs.

Currently, only a small portion of the actual fixed costs to serve customers are recovered through the fixed rates. Instead, the majority of the recovery comes from the variable, energy consumption charges. Figure 6 below shoes that trend, comparing the recovery of costs to the classification results from the ECOSS. To create the figure, we have collected the ECOSS values reported in BELCO's "BELCO Rate Design 2026_Feb 2 2026 IR"[18] excel model and calculated the percentage of fixed and volumetric costs, where fixed considers both demand and customer-related costs. Then, we compared these to the way

[18] BELCO Rate Design 2026_Feb 2 2026 IR

that rates are currently structured by taking the allocation factors used in BELCO's most recent compliance filing: "Retail Tariff Application Rate Design 2026 – Compliance Filing_Final for filing (11.21.2025)"[19].

Figure 6. Cost recovery from current rates versus cost allocation from ECOSS



As observed above, the fixed costs that BELCO incurs to serve customers is higher than what is reflected on bills whilst the variable costs are lower than what is reflected on bills. Therefore, under the current approach, the mismatch between fixed and variable costs means certain customers pay more than the cost to serve them and some pay less, leading to cross-subsidisation.

Whilst this rate structure has worked for Bermuda thus far, there is an ongoing shift in trends that requires consideration and assessment of the appropriateness of the current structure going forward. Bermuda's energy consumption has been decreasing due to increase in DG and energy efficiency. This means that more and higher true ups of BELCO's revenue allowance need to be included. Additionally, there is an increasing number of customers that are self-generating and self-consuming with DG. The current approach is blind to the difference this causes as it fails to collect fixed fees from these customers, who could have small levels of consumption. These costs would then be shifted to customers that do not have that self-generation.

The shift in costs and evolution of the electricity sector, coupled with the current rate structure, is increasing the gap between the actual costs to serve customers and their charges. Therefore, there is a need to reassess the structure to ensure that rates are cost-reflective, fair, and transparent.

4.3 BELCO's Assessment

The following section summarises and discusses two of BELCO's submissions relating to tariff design in Bermuda:

[19] Retail Tariff Application Rate Design 2026 – Compliance Filing_Final for filing (11.21.2025)

- In November 2021, BELCO submitted a report called *Assessment of Current Tariffs* to the RA
- In May 2022, BELCO submitted a report called *Tariff Design Modernization Strategy* to the RA

4.3.1 Assessment of Current Tariffs Report from November 2021[20]

In November 2021, BELCO produced and submitted a report to the RA discussing its assessment of the current tariff structure in Bermuda. Although BELCO mentioned in the report that it believes that revenue is recovered in a reasonably efficient manner, BELCO noted:

- Tiered charges are generally not well understood by the public (i.e. GFCs and tiered energy charges) and are likely not cost reflective
- The difference between commercial and demand customers is not well understood
- Refining and creating targeted cost-based rates could benefit the hospitality industry
- Consolidating some of the tariffs may help improve customer understanding and reduce confusion
- BELCO is still keen to maintain the different Demand categories (A-C) to reflect the different levels of investment

Furthermore, BELCO states the challenges that it foresees with the growth in DG. BELCO notes that as DG grows, BELCO's role in ensuring reliability of the system will become more difficult and BELCO notes that properly pricing grid services is key to ensure that DG customers are paying an appropriate level.

Another aspect of BELCO's discussion in the report focused on the refinement and consolidation of electricity tariffs to help reduce customer confusion. At that time, BELCO noted they were not in a position to "propose specific tariff consolidation or expansion,"[21] however, they did provide principles and comments to that regard. These comments and considerations included the following:

- **Tariff classes should be practical and group customers with similar cost characteristics:** Customer classes could be designed to group those that have similar characteristics as it is not feasible to have a different rate for each customer.
- **Tariff classes should separate customers with different cost characteristics:** Considering the first point, classes should not be too broad that they include customers with clear differences as this could create intra-class subsidisation.
- **The number of tariff classes should be reasonable:** The number of customer classes should try and balance cost-causation and cost-reflectivity with practicalities, considering administrative burden. Having too many rate classes could create a lot of administrative burden and create confusion.

BELCO then proceeds to expand on the advantages and disadvantages of creating more customer classes. As for the advantages, BELCO notes:

- **Better price responsiveness:** If tariffs are designed to better match the type of customer, they are more likely to behave in an expected manner.

[20] Assessment of Current Tariffs, BELCO, November 2021

[21] Assessment of Current Tariffs, BELCO, November 2021

- **More targeted incentives:** Having more classes and more granular pricing also allows the ability to target customers with specific needs. BELCO notes the example of the Government previously supporting the hospitality industry with special pricing.
- **More efficient energy procurement strategies:** Similar to the second point, having very few customer classes could risk grouping customers with a wide range of cost-causation characteristics into one class. This could potentially incentivise customers with lower-than-average costs to under consume and even install on-site generation. Therefore, it is important to create customer classes that are small enough where the average rate reasonably reflects the costs for most of the customers in the class.

On the other hand, there are also disadvantages from creating more customer classes. Some of the disadvantages listed by BELCO include:

- **Create inefficient behaviour:** Having several customer classes could incentivise customers to "tariff shop". When designing tariffs, it is important to create the right incentives through the tariff. As an example, BELCO brings up the residential and commercial customers, which may, from an objective perspective look similar. However, the usage is very different, and they do not have the same impact on the network.
- **Confusion:** Having more customer classes can risk confusing the public, which can increase administrative burden and costs.

Considering all of the above, BELCO proceeds to provide input on potential areas of improvements for tariffs including:

- **Budget Billing:** BELCO notes the challenges that arose from the Global Pandemic back in 2020 which impacted both BELCO and customers. In order to reduce the risks and harmful impacts to customers, BELCO has continued to work with customers on providing flexible payment arrangements. Budget billing provides customers the service to smooth electricity bills over the year. This helps by providing customers a fixed bill over the period, which can help customers budget over time.
- **Economic Development Rates:** BELCO has been considering mechanisms to support struggling businesses in the hospitality industry.
- **Vulnerable Customer Pricing:** BELCO finds that customers tend to be aware of assistance opportunities that are available. However, BELCO does note the concern that tariffs designed purely on an economic basis may harm those with lower use, who are assumed to have lower income levels. However, BELCO has investigated the concern in more detail and does not believe that the assumption is necessarily robust. Yet, BELCO believes that tiered rates, and more specifically the GFC Tiers in the residential class are not targeted enough, particularly to address concerns with vulnerable customers.
- **Ideal Mix of Fixed and Volumetric Charges:** BELCO believes that selecting the level of fixed versus variable cost recovery should begin by considering the role of electricity prices, which are a signalling device. BELCO believes that recovering system costs through volumetric rates has the potential to harm customers. Furthermore, BELCO notes that historically and on average, energy sales have made up approximately 78% of residential customer bills, 95% of small commercial customer bills, and 87% of demand customer bills, which is a significant portion of cost recovery through volumetric charges. Therefore, BELCO believes that there should be a gradual movement towards more recovery from fixed charges and away from volumetric charges. Furthermore, BELCO notes that having high levels of recovery through volumetric charges can lead to price volatility, particularly in periods with higher consumption.

4.3.2 Tariff Modernization Strategy Report from May 2022[22]

Following BELCO's submission of the report assessing rates in Bermuda, BELCO submitted a *Tariff Modernization Strategy* report to the RA in May 2022 as part of the 2022/23 Retail Tariff Review. The report takes into consideration discussion points from the November 2021 report summarised in the previous section. BELCO provides additional pricing considerations and alternative pricing structures that should be considered for Bermuda. Although BELCO's submission provides a lot of details and discussions around different types of rate design options including time varying pricing, wholesale rates, economic development rates, and other topics, this section will only focus on BELCO's discussion on rate unbundling.

In the report, BELCO introduces three alternatives of rate unbundling to the current rate structure. Although BELCO mentions that even though using the results from a cost-of-service study (section 3) could be appealing, implementing those results would be impractical due to the current rate structure, and bill impacts would be unreasonable for most customers. Therefore, instead of jumping straight to a structure based of pure cost-based rates, BELCO presents three alternatives, reflecting different and increased degrees of cost reflectivity:

1. Alternative 1: Simplify BELCO's current rates.
2. Alternative 2: Demand-based charges through modified GFCs
3. Alternative 3: Demand-based charges using AMI data

Some key points from the alternatives proposed by BELCO are highlighted below:

- Under Alternative 1, we understand that BELCO suggests unbundling the rates into the functionalized elements but with a similar design of rates. For example, existing volumetric rates could be unbundled into generation, transmission, and distribution components – creating three rates instead of one. Furthermore, Alternative 1 could simplify the inclining block rate structure and keep only a flat volumetric charge.
- Alternative 2 keeps the unbundled volumetric rates from Alternative 1 and focuses on adjusting the fixed charges. At present, the GFC tiers are set based on the electricity consumption which are not related to the costs incurred or associated with the costs that are meant to be recovered through the GFCs. Therefore, instead of GFCs tiers based on energy charges and charged as $/month, we understand that Alternative 2 would allocate customers to tiers based on demand rather than energy usage. Furthermore, the charges would be based on demand and charged on a monthly basis. Additionally, the alternative would introduce a single fixed monthly charge that aims to recover the customer-related costs.
- Lastly, Alternative 3 would maintain the unbundled volumetric rates from Alternative 1 and 2. Additionally, Alternative 3 would maintain the fixed monthly customer charge from Alternative 2. Under Alternative 3, instead of having tiered demand charges like in Alternative 2, we understand that the residential class would only have a single demand tariff. Therefore, each customer in the class would pay a unique bill based on their demand.

BELCO views that future rate design should recover more costs through demand or fixed costs. Although it is possible to remove volumetric charges as a whole, BELCO cautions against it. BELCO notes that keeping volumetric prices, particularly those reflecting generation costs, can send signals to consumers,

[22] Tariff Design Mondernization Strategy, BELCO, May 2022

and that although alone they may not change customer behaviour, they could act as a protection against inefficient use.

4.4 Rate Design options considered

Ricardo considered BELCO's assessments from the submissions discussed in the previous sections and the ECOSS results to assess the different pathways available for Bermuda. Ricardo acknowledges that the current bill structure is relatively easy for BELCO to implement, however, there is room for improvement to improve cost-reflectivity in the way fixed costs and variable costs are recovered and transparency to enhance customer understanding. Therefore, to address the concerns, we considered four alternatives, which were inspired by BELCO's alternatives with modifications.

The four options (Options A-D) are discussed in the following subsections which have increasing degrees of complexity in terms of BELCO's implementation and also the public's understanding.

Figure 7. Options considered for rate design

	Current Approach	Option A	Option B	Option C	Option D
Residential Class					
Fixed charge ($/month)	Consumption-driven GFC tiers	Consumption-driven GFC tiers	Consumption-driven GFC tiers	1 fixed charge	1 fixed charge
Variable Charges ($/kWh)	1 IBT rate	2 non-IBT rates: Generation and TD&R/Residual	3 non-IBT rates: Generation, Transmission, and Distribution/Residual	3 non-IBT rates: Generation, Transmission, and Distribution/Residual	3 non-IBT rates: Generation, Transmission, and Distribution/Residual
Demand Charges ($/kW)	None	None	None	Demand-driven GFC tiers	1 demand-driven charge
Fixed Cost in Variable Charges	Status quo	Incrementally lower than the status quo	Lower than in Option A	Lower than in Option B	Lower than in Option C
Commercial Class					
Fixed charge ($/month)	1 fixed charge	1 fixed charge	1 fixed charge	1 fixed charge	1 fixed charge
Variable Charges ($/kWh)	1 IBT rate	2 IBT rates: Generation and TD&R/Residual	3 IBT rates: Generation, Transmission, and Distribution/Residual	3 IBT rates: Generation, Transmission, and Distribution/Residual	3 IBT rates: Generation, Transmission, and Distribution/Residual
Demand Charges ($/kW)	None	None	None	1 demand charge	1 demand charge
Fixed Cost in Variable Charges	Status quo	Incrementally lower than status quo	Lower than in Option A	Lower than in Option B	Lower than in Option C
Demand Class					
Fixed charge ($/month)	1 fixed charge	1 fixed charge	1 fixed charge	1 fixed charge	1 fixed charge

	Current Approach	Option A	Option B	Option C	Option D
Variable Charges ($/kWh)	1 DBT rate	2 DBT rates: Generation and TD&R/Residual	3 DBT rates: Generation, Transmission, and Distribution/Residual	3 DBT rates: Generation, Transmission, and Distribution/Residual	3 DBT rates: Generation, Transmission, and Distribution/Residual
Demand Charges ($/kW)	Three types of demand charges	Three types of demand charges	Three types of demand charges	Three types of demand charges	Three types of demand charges
Fixed Cost in Variable Charges	Status quo	Incrementally lower than status quo	Lower than in Option A	Lower than in Option B	Lower than in Option C

4.4.1 Option A

Option A's structure is summarised in Figure 8 and Table 4 below. The key features of Option A include:

- Removing the inclining volumetric tariffs in the residential class, and instead, the residential classes would see two volumetric charges regardless of their consumption levels – one reflecting generation and the other reflecting the transmission, distribution, and retail (TD&R) costs and any other residual costs.
- The commercial class and demand class would maintain the inclining block rates and declining block rates, respectively. However, they would also be unbundled so that customers would see two rates on their bills – generation and TD&R/residual.
- The unbundling of the variable charges would help to improve transparency and allow customers to better understand how their charges relate to the costs to serve them.
- The fixed charge structure would remain the same as they are now across all customer classes.
- A larger fraction of the revenue collected would be charged through fixed rates, slowly shifting away from the variable tariffs.

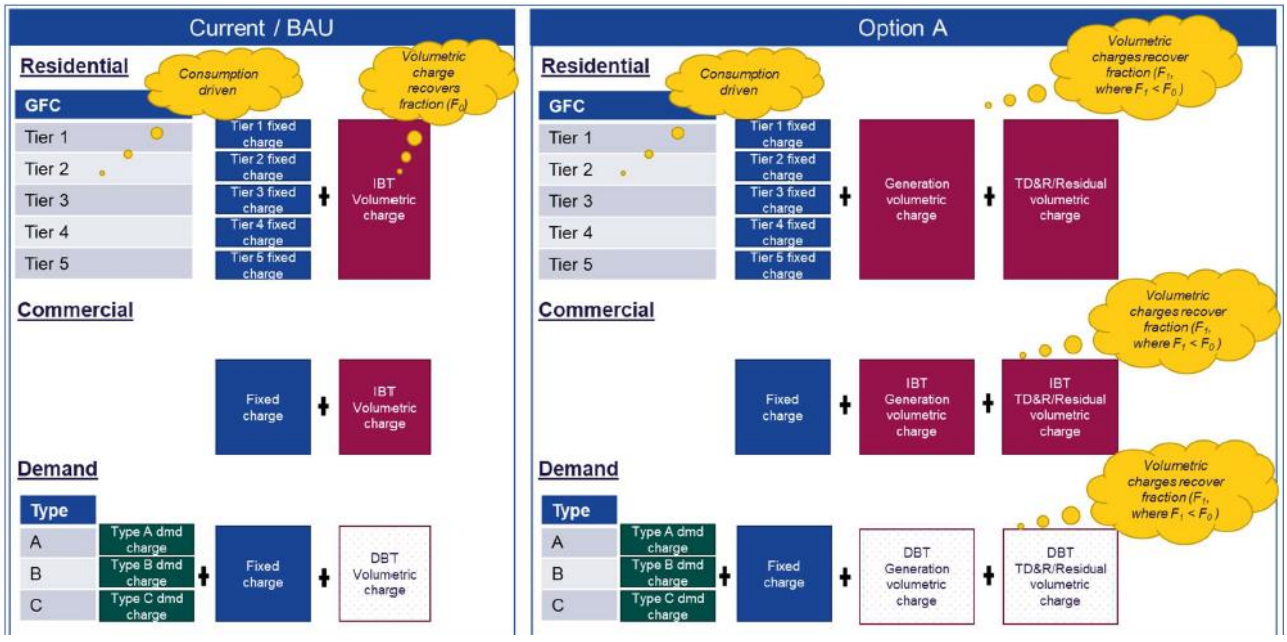
Option A is a good start to improving cost transparency and cost-reflectivity in electricity tariffs in Bermuda while keeping some levels of continuity which can help mitigate confusion and price shocks.

Table 4. Comparison of Current Bill Structure and Option A

	Current Approach	Option A
Residential		
Fixed charge ($/month)	Consumption-driven GFC tiers	Consumption-driven GFC tiers
Variable Charges ($/kWh)	1 IBT rate	2 non-IBT rates: Generation and TD&R/Residual
Demand Charges ($/kW)	None	None
Fixed Cost in Variable Charges	Status quo	Incrementally lower than the status quo

	Current Approach	Option A
Commercial		
Fixed charge ($/month)	1 fixed charge	1 fixed charge
Variable Charges ($/kWh)	1 IBT rate	2 IBT rates: Generation and TD&R/Residual
Demand Charges ($/kW)	None	None
Fixed Cost in Variable Charges	Status quo	Incrementally lower than status quo
Demand		
Fixed charge ($/month)	1 fixed charge	1 fixed charge
Variable Charges ($/kWh)	1 DBT rate	2 DBT rates: Generation and TD&R/Residual
Demand Charges ($/kW)	Three types of demand charges	Three types of demand charges
Fixed Cost in Variable Charges	Status quo	Incrementally lower than status quo

Figure 8. Option A Rate Structure



4.4.2 Option B

Option B's structure is summarised in Figure 9 and Table 5 below. The key features of Option B include:

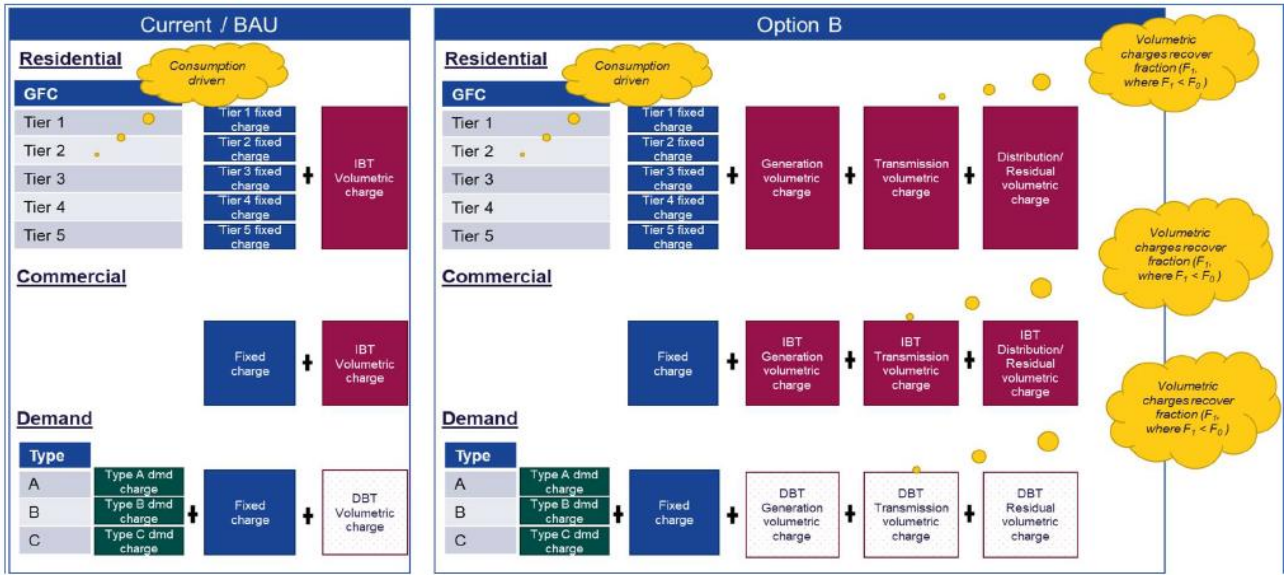
- Option B builds on Option A, and therefore, all changes made to Option A are also present in Option B.

- Instead of only having two unbundled volumetric rates as is the case in Option A, Option B would have three unbundled volumetric rates to reflect generation, transmission, and distribution/residual costs the customers incur on the system.
- Separating the volumetric rates further can enhance transparency and can help the customers understand the relationship between costs and bills.
- In Option B, the level of fixed costs recovered through variable charges would be lower than the status quo and even lower than in Option A.
- Lastly, fixed charges would continue to operate in the same way as they are now.

Table 5. Comparison of Current Bill Structure and Option B

	Current Approach	Option B
Residential		
Fixed charge ($/month)	Consumption-driven GFC tiers	Consumption-driven GFC tiers
Variable Charges ($/kWh)	1 IBT rate	3 non-IBT rates: Generation, Transmission, and Distribution/Residual
Demand Charges ($/kW)	None	None
Fixed Cost in Variable Charges	Status quo	Lower than in Option A
Commercial		
Fixed charge ($/month)	1 fixed charge	1 fixed charge
Variable Charges ($/kWh)	1 IBT rate	3 IBT rates: Generation, Transmission, and Distribution/Residual
Demand Charges ($/kW)	None	None
Fixed Cost in Variable Charges	Status quo	Lower than in Option A
Demand		
Fixed charge ($/month)	1 fixed charge	1 fixed charge
Variable Charges ($/kWh)	1 DBT rate	3 DBT rates: Generation, Transmission, and Distribution/Residual
Demand Charges ($/kW)	Three types of demand charges	Three types of demand charges
Fixed Cost in Variable Charges	Status quo	Lower than in Option A

Figure 9. Option B Rate Structure



4.4.3 Option C

Option C's structure is summarised in Figure 10 and Table 6 below. The key features of Option C include:

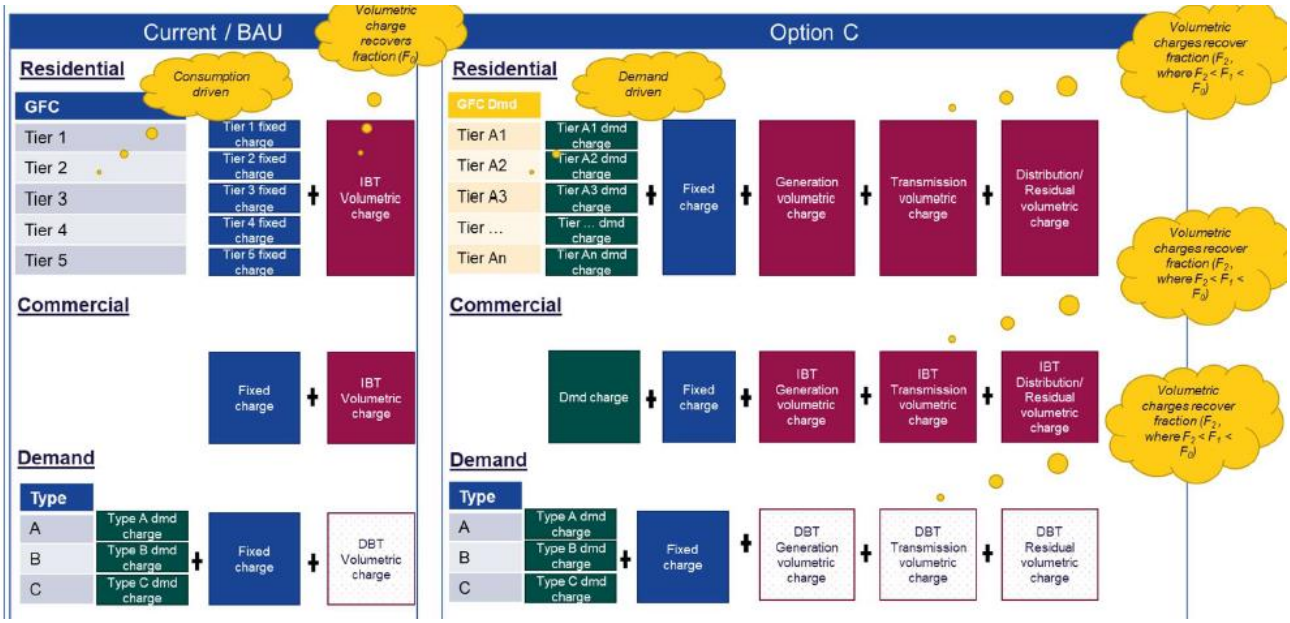
- Option C builds on Option B, and therefore, all changes made to Option B are also present in Option C.
- Option C would keep the unbundled generation, transmission, and distribution/residual variable charges.
- Furthermore, Option C would observe a chance to the GFCs in the residential class. Currently, the GFC charges are trying to recover some of the fixed costs incurred to serve customers, which does not align with the level of energy usage. Therefore, instead of having GFC tiers based on energy usage (kWh), they would be based on peak demand (kW). However, Ricardo is mindful that even though this change better aligns costs and bills, it does add complexity to the implementation and could add a layer of confusion for the customers, which requires a well thought out communication strategy.
- Similarly, a demand charge would be introduced in the commercial class ($/kW), charging customers based on the peak demand.
- Option C would also introduce a single fixed monthly customer charge in the residential class ($/month) to aim to recover customer-related costs, which are independent of the customer's energy usage or demand.
- Furthermore, Option C recovers even less off the fixed costs through variable charges than Option B.

Table 6. Comparison of Current Bill Structure and Option C

	Current Approach	Option C
Residential		
Fixed charge ($/month)	Consumption-driven GFC tiers	1 fixed charge

	Current Approach	Option C
Variable Charges ($/kWh)	1 IBT rate	3 non-IBT rates: Generation, Transmission, and Distribution/Residual
Demand Charges ($/kW)	None	Demand-driven GFC tiers
Fixed Cost in Variable Charges	Status quo	Lower than in Option B
Commercial		
Fixed charge ($/month)	1 fixed charge	1 fixed charge
Variable Charges ($/kWh)	1 IBT rate	3 IBT rates: Generation, Transmission, and Distribution/Residual
Demand Charges ($/kW)	None	1 demand charge
Fixed Cost in Variable Charges	Status quo	Lower than in Option B
Demand		
Fixed charge ($/month)	1 fixed charge	1 fixed charge
Variable Charges ($/kWh)	1 DBT rate	3 DBT rates: Generation, Transmission, and Distribution/Residual
Demand Charges ($/kW)	Three types of demand charges	Three types of demand charges
Fixed Cost in Variable Charges	Status quo	Lower than in Option B

Figure 10. Option C Rate Structure



4.4.4 Option D

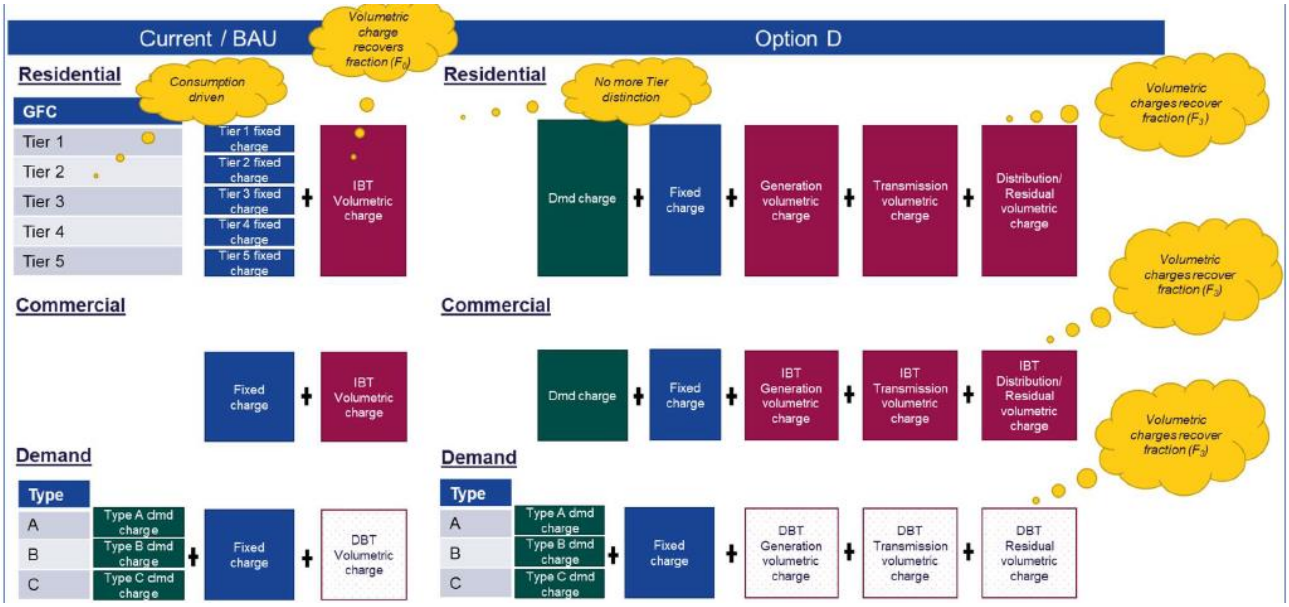
Option D's structure is summarised in Figure 11 and Table 7 below. The key features of Option D include:

- Option D builds on Option C, and therefore, all changes made to Option C are also present in Option D.
- Instead of having the demand-driven GFC tiers from Option C, Option D would introduce a single demand charge, in $/kW in the residential class.
- Lastly, Option D recovers even less of the fixed costs through variable charges than Option C.

Table 7. Comparison of Current Bill Structure and Option D

	Current Approach	Option D
Residential		
Fixed charge ($/month)	Consumption-driven GFC tiers	1 fixed charge
Variable Charges ($/kWh)	1 IBT rate	3 non-IBT rates: Generation, Transmission, and Distribution/Residual
Demand Charges ($/kW)	None	1 demand-driven charge
Fixed Cost in Variable Charges	Status quo	Lower than in Option C
Commercial		
Fixed charge ($/month)	1 fixed charge	1 fixed charge
Variable Charges ($/kWh)	1 IBT rate	3 IBT rates: Generation, Transmission, and Distribution/Residual
Demand Charges ($/kW)	None	1 demand charge
Fixed Cost in Variable Charges	Status quo	Lower than in Option C
Demand		
Fixed charge ($/month)	1 fixed charge	1 fixed charge
Variable Charges ($/kWh)	1 DBT rate	3 DBT rates: Generation, Transmission, and Distribution/Residual
Demand Charges ($/kW)	Three types of demand charges	Three types of demand charges
Fixed Cost in Variable Charges	Status quo	Lower than in Option C

Figure 11. Option D Rate Structure


Current / BAU
Volumetric charge recovers fraction (F_0)
Residential
Consumption driven
GFC
Tier 1
Tier 2
Tier 3
Tier 4
Tier 5
Tier 1 fixed charge
Tier 2 fixed charge
Tier 3 fixed charge
Tier 4 fixed charge
Tier 5 fixed charge
IBT Volumetric charge
Commercial
Fixed charge
IBT Volumetric charge
Demand
Type
A
B
C
Type A dmd charge
Type B dmd charge
Type C dmd charge
Fixed charge
DBT Volumetric charge
Option D
Residential
No more Tier distinction
Dmd charge
Fixed charge
Generation volumetric charge
Transmission volumetric charge
Distribution/ Residual volumetric charge
Volumetric charges recover fraction (F_3)
Commercial
Dmd charge
Fixed charge
IBT Generation volumetric charge
IBT Transmission volumetric charge
IBT Distribution/ Residual volumetric charge
Volumetric charges recover fraction (F_3)
Demand
Type
A
B
C
Type A dmd charge
Type B dmd charge
Type C dmd charge
Fixed charge
DBT Generation volumetric charge
DBT Transmission volumetric charge
DBT Residual volumetric charge
Volumetric charges recover fraction (F_3)

4.5 Public consultation

In order to get the public's opinion on the different rate design options under consideration, the RA published the *Retail Tariff Design Restructuring Report* in October 2022. This report summarised the different options discussed above in addition to introducing other pricing considerations such as time varying pricing, budget billing, and fair pricing for customers with DG.

The report included a feedback form with 27 questions for the public to answer and provide their opinion on all of the discussed topics. The report was open for public feedback until 21 November 2022 and received five responses. However, not all of the respondents answered every question in the feedback form. More specifically, only BELCO and BAC Engineering answered the questions, whilst the other three respondents only left comments. This section will focus on the responses that are directly related to the rate design options discussed in the previous section.

4.5.1 BELCO's Response

BELCO's response to the public report was very similar to that provided in their reports submitted to the RA. Some of the points made included:

- Out of options A-D presented in the public report and introduced in the previous section, BELCO noted that they preferred Option A for short-term rate continuity, but that they preferred either Option C or D for long-term cost reflectivity.
- Furthermore, BELCO expressed that they are in favour of eliminating the inclining block rates as they are unlikely to be cost reflective, and that removing such rates can improve transparency and can make rates easier to understand.
- They also noted that they are in favour of gradually shifting cost recovery to fixed rates from variable rates, balancing cost causation and customer acceptability. They think that the high levels of cost recovery through variable rates can lead to price shocks and volatile bills for customers.
- BELCO mentioned that they prefer to move away from consumption-based GFC tiers, which can be confusing and not targeted enough. Instead, BELCO recommends replacing GFCs with a single fixed charge.
- On assessing how DG customers should be charged, BELCO does not agree with implementing a separate customer class rate for customers with DG as they think that could be seen as rate discrimination. Instead, BELCO suggests a well-designed delivery tariff along with an avoided-cost based feed-in tariff would help address the issues.

4.5.2 BAC Engineering

Regarding the rate design options presented, BAC Engineering noted the following in their response:

- BAC Engineering believe the inclining block rates present in the current structure alleviate some of the costs for low-income households. However, they also mention that they also discourage solar adoption. They note that they did not see any option proposed that would rectify this discrepancy without increasing the costs for non-DG customers.
- On whether a separate rate for DG customers should be introduced, BAC Engineering mentioned that the RA should focus on encouraging renewables instead of increasing fixed charges.

4.6 Outcome

Ricardo carefully assessed BELCO's reports, the public's feedback, and the current structure in Bermuda. After consideration, Ricardo recommended to proceed with Option A in the short-term, which Ricardo believes is a good first step in improving the structure whilst balancing some levels of rate continuity for customers. In the long-term, Ricardo does recommend slowly shifting towards Option C or D.

However, Ricardo recommended some modifications to Option A to further support a smooth transition for customers and improve fairness by helping ensure that those less reliant on the grid also pay for the costs they incur on the system (i.e. DG customers).

Ricardo's updated recommended Option A is summarised in Figure 8 and Table 4 below. The key features of Option A, with the modifications, include:

- Unbundling the volumetric rates across all customer classes. Customers would observe two volumetric charges regardless of their consumption levels – one reflecting generation and the other reflecting the transmission, distribution, and retail (TD&R) costs and any other residual costs.
- The unbundling of the variable charges would help to improve transparency and allow customers to better understand how their charges relate to the costs to serve them.
- All customer classes would maintain the inclining block rates and declining block rates, respectively, to support continuity.
- In order to improve cost reflectivity and causation for DG customers, DG customers would no longer be paying the average GFC tier in the residential class. Instead, they would be classified in GFC tier 5. This change aligns with the Ministerial Direction to improve cost reflectivity for varying levels of reliance on the grid.
- Similarly, in order to improve cost reflectivity and cost causation for DG customers, there would be a specific fixed charge ($/month) for DG customers and a separate fixed charge for non-DG customers in the commercial and demand customer classes. This change aligns with the Ministerial Direction to improve cost reflectivity for varying levels of reliance on the grid.
- The demand charge for the demand customer class would be segregated into two: generation demand charges and then transmission, distribution, retail, and residual demand charges.
- A slightly larger fraction of the revenue collected would be charged through fixed rates ($/month or $/kW), slowly shifting away from the variable tariffs.
- While misc. commercial customers did not have a fixed charge previously, we thought it was appropriate to introduce fixed charges for special government, churches, and quarries to help improve fairness. The fixed charge introduced to these customers would be set equal to that of the wider commercial class.

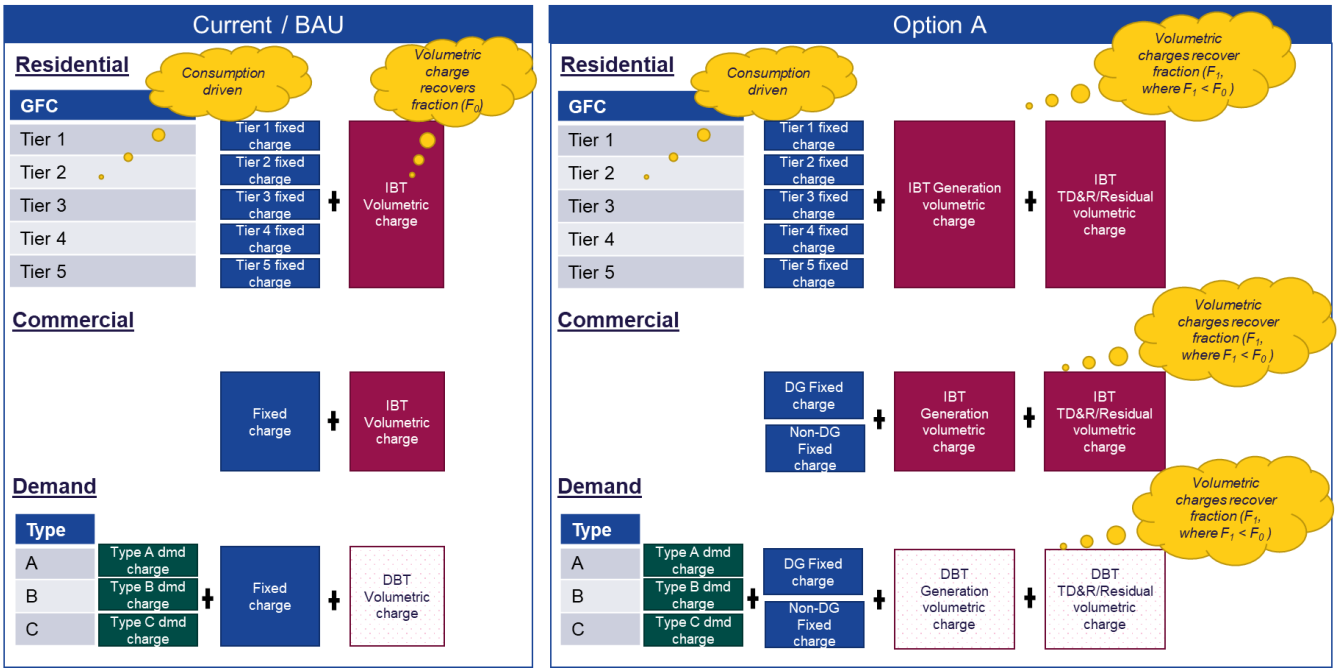
Option A is a good start to improving cost transparency and cost-reflectivity in electricity tariffs in Bermuda while keeping some levels of continuity which can help mitigate confusion and price shocks.

Table 8. Comparison of Current Bill Structure and Option A

	Current Approach	Option A
Residential		

	Current Approach	Option A
Fixed charge ($/month)	Consumption-driven GFC tiers with DG customers paying the average GFC rate	Consumption-driven GFC tiers with DG customers in GFC tier 5
Variable Charges ($/kWh)	1 IBT rate	2 IBT rates: Generation and TD&R/Residual
Demand Charges ($/kW)	None	None
Fixed Cost in Variable Charges	Status quo	Incrementally lower than the status quo
Commercial		
Fixed charge ($/month)	1 fixed charge	2 fixed charges: 1 for non-DG customers and 1 for DG-customers
Variable Charges ($/kWh)	1 IBT rate	2 IBT rates: Generation and TD&R/Residual
Demand Charges ($/kW)	None	None
Fixed Cost in Variable Charges	Status quo	Incrementally lower than status quo
Demand		
Fixed charge ($/month)	1 fixed charge	2 fixed charges: 1 for non-DG customers and 1 for DG-customers
Variable Charges ($/kWh)	1 DBT rate	2 DBT rates: Generation and TD&R/Residual
Demand Charges ($/kW)	Three types of demand charges	Generation demand charges with three types (A, B, C), and TD&R/Residual demand charges with three types (A,B,C)
Fixed Cost in Variable Charges	Status quo	Incrementally lower than status quo

Figure 12. Option A Rate Structure


Current / BAU
Residential
Consumption driven
Volumetric charge recovers fraction (F_0)
GFC
Tier 1
Tier 2
Tier 3
Tier 4
Tier 5
Tier 1 fixed charge
Tier 2 fixed charge
Tier 3 fixed charge
Tier 4 fixed charge
Tier 5 fixed charge
IBT Volumetric charge
Commercial
Fixed charge
IBT Volumetric charge
Demand
Type
A
B
C
Type A dmd charge
Type B dmd charge
Type C dmd charge
Fixed charge
DBT Volumetric charge
Option A
Residential
Consumption driven
Volumetric charges recover fraction (F_1, where $F_1 < F_0$)
GFC
Tier 1
Tier 2
Tier 3
Tier 4
Tier 5
Tier 1 fixed charge
Tier 2 fixed charge
Tier 3 fixed charge
Tier 4 fixed charge
Tier 5 fixed charge
IBT Generation volumetric charge
IBT TD&R/Residual volumetric charge
Commercial
Volumetric charges recover fraction (F_1, where $F_1 < F_0$)
DG Fixed charge
Non-DG Fixed charge
IBT Generation volumetric charge
IBT TD&R/Residual volumetric charge
Demand
Volumetric charges recover fraction (F_1, where $F_1 < F_0$)
Type
A
B
C
Type A dmd charge
Type B dmd charge
Type C dmd charge
DG Fixed charge
Non-DG Fixed charge
DBT Generation volumetric charge
DBT TD&R/Residual volumetric charge

5. Analysis and Takeaways

Once we discussed and agreed that Option A, as discussed in section 4.6, would be an appropriate next step in rate redesign, we then had to assess allocation factors. This involved analysing and deciding on how much of the cost recovery should be recovered through fixed rates versus variable rates, relative to today's levels to better align with the ECOSS results. While many scenarios were considered and modelled, the next subsections only detail some of those considered and only present the results for the preferred scenario.

5.1 Scenarios considered

Once we agreed on the rate structure to take forward (i.e. Option A), we needed to determine an appropriate level of cost recovery from variable rates and fixed electricity rates that helped improve cost reflectivity but did not cause a large disruption to the customer base. We considered a range of allocation factors with progressive degree recovery from fixed rates relative to volumetric rates. Some of the allocation factors considered between fixed and variable charges are shown in the table below.

Table 9. Rate Design Rate Component Revenue Allocation

	Scenario 1			Scenario 2			Scenario 3			Scenario 4		
	RES	COMM	DMND	RES	COMM	DMND	RES	COMM	DMND	RES	COMM	DMND
Class Facilities Charge (%)	30.0%	10.0%	0.6%	40.0%	20.0%	0.6%	50.0%	30.0%	0.6%	99.2%	99.2%	3.5%
Block 1 Energy Charge (%)	14.7%	20.2%	54.8%	12.7%	18.0%	44.5%	10.5%	15.7%	34.2%	0.3%	0.2%	0.7%
Block 2 Energy Charge (%)	26.7%	32.2%	22.5%	22.8%	28.7%	18.3%	19.0%	25.1%	14.1%	0.3%	0.3%	0.6%
Block 3 Energy Charge (%)	28.6%	37.5%	2.7%	24.5%	33.3%	2.2%	20.5%	29.2%	1.7%	0.2%	0.3%	0.2%
Class A Demand Charge (%)	0.0%	0.0%	18.2%	0.0%	0.0%	32.3%	0.0%	0.0%	46.4%	0.0%	0.0%	89.3%
Class B Demand Charge (%)	0.0%	0.0%	1.0%	0.0%	0.0%	1.7%	0.0%	0.0%	2.4%	0.0%	0.0%	4.7%
Class C Demand Charge (%)	0.0%	0.0%	0.2%	0.0%	0.0%	0.4%	0.0%	0.0%	0.5%	0.0%	0.0%	1.1%

We considered the different scenarios listed in the table above, which increased in degrees of recovery from variable to fixed charges to better reflect how costs are incurred (scenario 1 to 5). Modelling was conducted for all scenarios, however, the allocation factors from Scenario 1 were selected and recommended to limit the level of disruption to the customer base.

In addition to the allocation factors that spread the revenue across the rate components, we also reviewed and assessed the allocation factors used to distribute the revenue across customer classes. While we considered adjusting the distribution to improve reflectivity, we proceeded with allocation factors that lead to a 0% change across customer classes to offer more continuity for customers.

Furthermore, for the specific DG fixed rate, we conducted analysis and assessed that an appropriate starting fixed rate for DG customers could be implemented by:

- Charging residential DG customers the GFC Tier 5 rate instead of the average GFC Tier rate
- Charging commercial DG customers around $200/month/customer
- Charging demand DG customers around $250/month/customer

The next section presents the results and statistical analysis submitted by BELCO considering Option A rate structure and allocation factors for the different rate components under Scenario 1, which forms our preferred option to carry forward. However, as mentioned previously, we did consider and assess different scenarios throughout the exercise, but ultimately Option A with allocation factors from Scenario 1 were preferred due its progression while limiting disruption to the customer base relative to other more advanced options.

5.2 Rate impact analysis

After several modelling iterations, we received the final rate modelling submission from BELCO on March 23, 2026 which included the results and modelling for Option A rate structure and allocation factors under Scenario 1.

The following figure depicts the results of the rate design modelling under this preferred option, which are shown next to the current electricity rates for comparison.

Figure 13. Current Rates and Redesigned Rates for Option A1[23]

[23] BELCO Rate Design 2026_Feb 2 2026 IR.xlsx

2026 Approved Rates

		Unit	2026 Rates	Approved Rates	Difference Relative to Existing: Difference $	Difference %
Schedule A - Residential						
Facilities Charge - Residential						
GFC Tier 1	0-10 kWh per day	$/month	$ 25.44	$ 31.33	$ 5.89	23.2%
GFC Tier 2	10-15 kWh per day	$/month	$ 38.17	$ 47.00	$ 8.83	23.1%
GFC Tier 3	15-25 kWh per day	$/month	$ 50.83	$ 62.59	$ 11.76	23.1%
GFC Tier 4	25-50 kWh per day	$/month	$ 79.51	$ 97.91	$ 18.40	23.1%
GFC Tier 5	50+ kWh per day	$/month	$ 120.86	$ 148.83	$ 27.97	23.1%
Customer Charge - DG		$/month	$ 52.48	$ 148.83	$ 96.35	183.6%
Energy Charges (Bundled)						
0-250 kWh	First Block	$/kWh	$ 0.15690	$ 0.14520	$ (0.01170)	-7.5%
251-700 kWh	Second Block	$/kWh	$ 0.27674	$ 0.25611	$ (0.02063)	-7.5%
700+ kWh	Tail Block	$/kWh	$ 0.42685	$ 0.39504	$ (0.03181)	-7.5%
Energy Charges (Unbundled)						
Generation						
0-250 kWh	First Block	$/kWh	n/a	$ 0.08986	n/a	
251-700 kWh	Second Block	$/kWh	n/a	$ 0.15850	n/a	
700+ kWh	Tail Block	$/kWh	n/a	$ 0.24448	n/a	
Network						
0-250 kWh	First Block	$/kWh	n/a	$ 0.05534	n/a	
251-700 kWh	Second Block	$/kWh	n/a	$ 0.09761	n/a	
700+ kWh	Tail Block	$/kWh	n/a	$ 0.15056	n/a	
Schedule B - Small Commercial						
Facilities Charge - Small Commercial						
Customer Charge		$/month	$ 50.43	$ 72.67	$ 22.24	44.1%
Customer Charge - DG		$/month	$ 50.43	$ 200.00	$ 149.57	296.6%
Energy Charges (Bundled)						
0-1000 kWh	First Block	$/kWh	$ 0.29156	$ 0.28137	$ (0.01019)	-3.5%
1001-5000 kWh	Second Block	$/kWh	$ 0.32769	$ 0.31625	$ (0.01144)	-3.5%
5001+kWh	Tail Block	$/kWh	$ 0.39460	$ 0.38082	$ (0.01378)	-3.5%
Energy Charges (Unbundled)						
Generation						
0-1000 kWh	First Block	$/kWh	n/a	$ 0.18911	n/a	
1001-5000 kWh	Second Block	$/kWh	n/a	$ 0.21255	n/a	
5001+kWh	Tail Block	$/kWh	n/a	$ 0.25595	n/a	
Network						
0-1000 kWh	First Block	$/kWh	n/a	$ 0.09226	n/a	
1001-5000 kWh	Second Block	$/kWh	n/a	$ 0.10370	n/a	
5001+kWh	Tail Block	$/kWh	n/a	$ 0.12487	n/a	

Schedule C - Demand Service					
Facilities Charge - Demand Service					
Customer Charge	$/month	$ 127.59	$ 117.47	$ (10.12)	-7.9%
Customer Charge - DG	$/month	$ 127.59	$ 250.00	$ 122.41	95.9%
Demand Charges (Bundled)					
A) 1st 50 kW	$/kW	$ 15.72	$ 21.44	$ 5.72	36.4%
remaining kW - A	$/kW	$ 15.72	$ 21.44	$ 5.72	36.4%
B) 1st 50 kW	$/kW	$ 16.08	$ 21.93	$ 5.85	36.4%
remaining kW - B	$/kW	$ 16.08	$ 21.93	$ 5.85	36.4%
C) 1st 50 kW	$/kW	$ 16.21	$ 22.11	$ 5.90	36.4%
remaining kW - C	$/kW	$ 16.21	$ 22.11	$ 5.90	36.4%
Demand Charges (Unbundled)					
Generation					
A) 1st 50 kW	$/kW	n/a	$ 17.15	n/a	
remaining kW - A	$/kW	n/a	$ 17.15	n/a	
B) 1st 50 kW	$/kW	n/a	$ 17.54	n/a	
remaining kW - B	$/kW	n/a	$ 17.54	n/a	
C) 1st 50 kW	$/kW	n/a	$ 17.68	n/a	
remaining kW - C	$/kW	n/a	$ 17.68	n/a	
Network					
A) 1st 50 kW	$/kW	n/a	$ 4.29	n/a	
remaining kW - A	$/kW	n/a	$ 4.29	n/a	
B) 1st 50 kW	$/kW	n/a	$ 4.39	n/a	
remaining kW - B	$/kW	n/a	$ 4.39	n/a	
C) 1st 50 kW	$/kW	n/a	$ 4.43	n/a	
remaining kW - C	$/kW	n/a	$ 4.43	n/a	
Energy Charges (Bundled)	$/kWh				
1st 200 x Demand	$/kWh	$ 0.33103	$ 0.31089	$ (0.02014)	-6.1%
2nd 200 x Demand	$/kWh	$ 0.16644	$ 0.15631	$ (0.01013)	-6.1%
remaining kWh - energy	$/kWh	$ 0.06209	$ 0.05831	$ (0.00378)	-6.1%
Energy Charges (Unbundled)					
Generation					
1st 200 x Demand	$/kWh	n/a	$ 0.23494	n/a	
2nd 200 x Demand	$/kWh	n/a	$ 0.11813	n/a	
remaining kW - energy	$/kWh	n/a	$ 0.04407	n/a	
Network					
1st 200 x Demand	$/kWh	n/a	$ 0.07595	n/a	
2nd 200 x Demand	$/kWh	n/a	$ 0.03818	n/a	
remaining kW - energy	$/kWh	n/a	$ 0.01424	n/a	

Schedule D - Miscellaneous Commercial										
Facilities Charge - Miscellaneous Commercial										
Customer Charge (Codes 4308, 4408, 4309, 4417)	$/month		n/a		$	72.67		n/a		
Energy Charges (Bundled)										
Street Lighting	$/kWh	$	0.22110		$	0.22110		$ -		0.0%
Special Government Structures (Codes 4308, 4408)	$/kWh	$	0.25141		$	0.24096		$ (0.01045)		-4.2%
Churches (Code 4309)	$/kWh	$	0.29062		$	0.22992		$ (0.06070)		-20.9%
Quarry (Code 4417)	$/kWh	$	0.31066		$	0.30826		$ (0.00240)		-0.8%
Energy Charges (Unbundled)										
Generation										
Street Lighting	$/kWh		n/a		$	0.03826		n/a		
Special Government Structures (Codes 4308, 4408)	$/kWh		n/a		$	0.16195		n/a		
Churches (Code 4309)	$/kWh		n/a		$	0.15453		n/a		
Quarry (Code 4417)	$/kWh		n/a		$	0.20718		n/a		
Network										
Street Lighting	$/kWh		n/a		$	0.18284		n/a		
Special Government Structures (Codes 4308, 4408)	$/kWh		n/a		$	0.07901		n/a		
Churches (Code 4309)	$/kWh		n/a		$	0.07539		n/a		
Quarry (Code 4417)	$/kWh		n/a		$	0.10108		n/a		
TD&R RAF	$/kWh	$	0.00545		$	0.00545		$ -		0.0%
FAR	$/kWh	$	0.13799		$	0.13799		$ -		0.0%

In addition to the above, BELCO produced statistical analysis for the rate design option to show the impact that could be observed across the different customer classes. Overall, the average rate will stay the same across customer classes and those who will be more unlikely to see a noticeable increase will be those customers with higher load factors and no distributed generation. On the other hand, customers with lower load factors or who have distributed generation, are more likely to see noticeable increases. The following table summarises the estimated rate impacts by customer class as calculated by BELCO, and the next subsections will deep dive into the analysis conducted for each customer class.

Table 10. Rate impact assessment

	% that will see a decrease or no change	% that will see an increase	Max increase
Residential – non DG	25%	75%	$10/month
Residential - DG	10%	90%	$100/month
Commercial – non DG	30%	70%	$25/month
Commercial - DG	20%	80%	$150/month
Demand – non DG	60%	40%	13%*
Demand - DG	10%	90%	7%*

* the vast majority would see an increase that is <3%

5.2.1 Residential customer class

The figures below show BELCO's statistical analysis for the residential class and the impacts on customer bills in relative percentage terms and monthly dollar impact.

Figure 14. Statistical analysis for Option A1 for Residential - % of Total Bill[24]

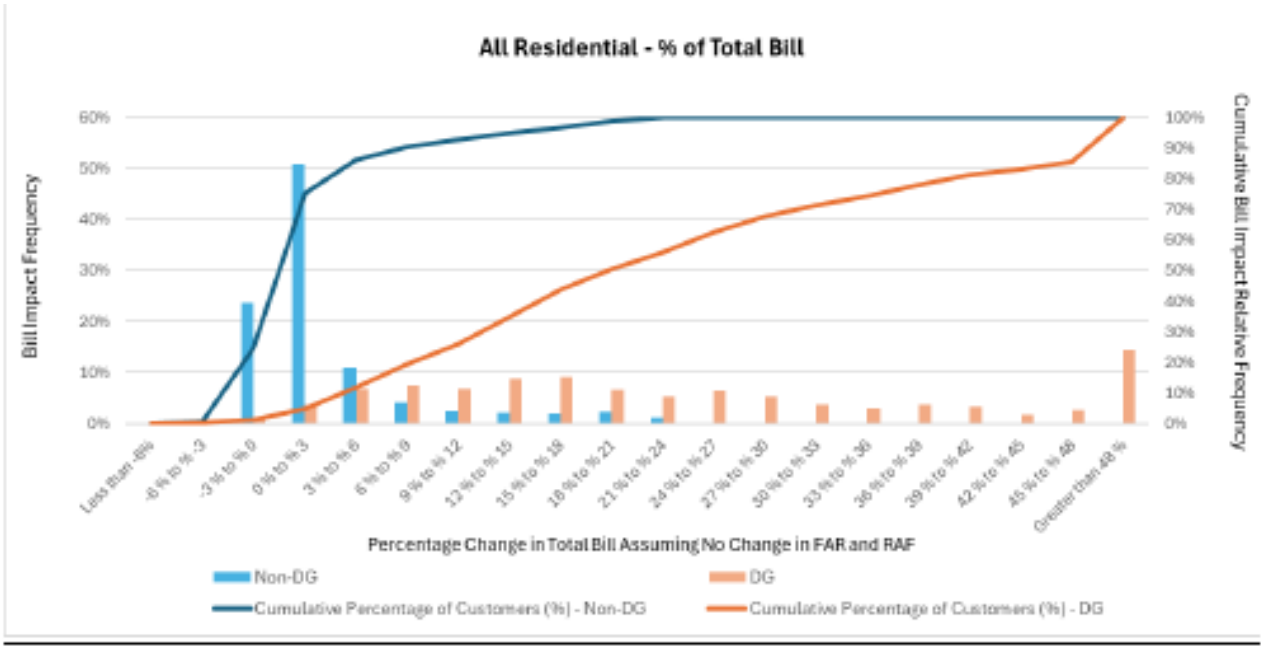
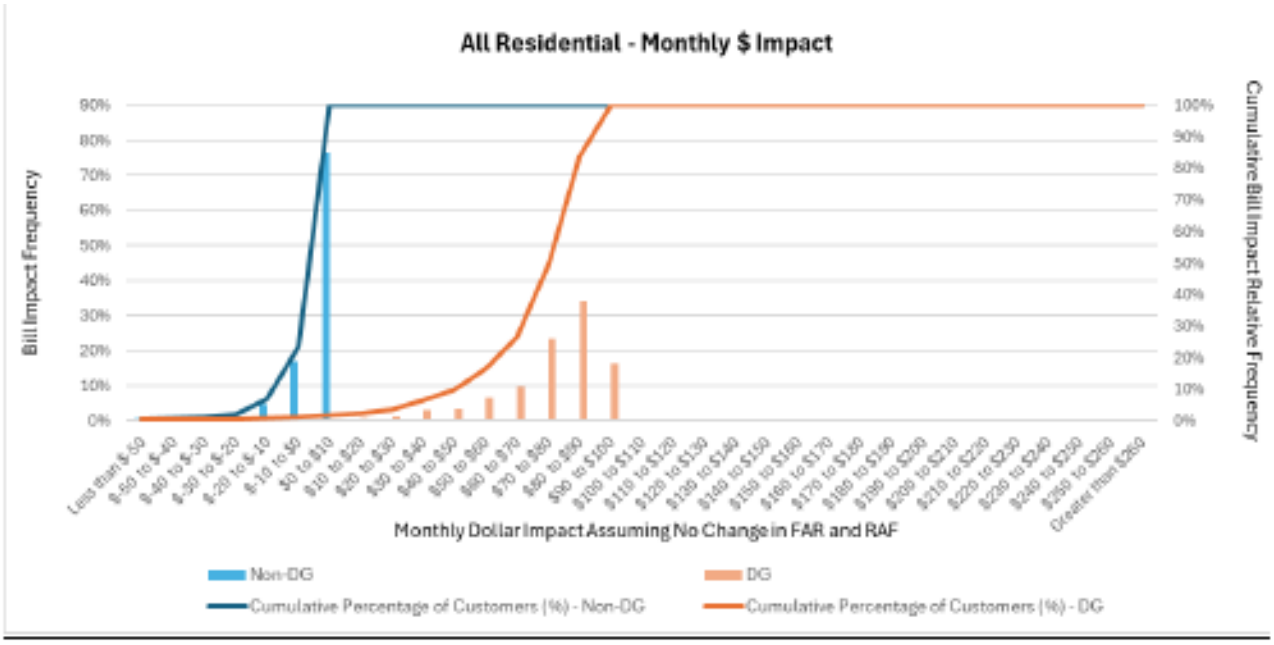


Figure 15. Statistical analysis for Option A1 for Residential – Monthly $ Impact[25]



[24] BELCO submission: B-R497 Ltr to RA 23Mar26 on Tariff Redesign (03.23.2026) Appendix A.pdf

[25] BELCO submission: B-R497 Ltr to RA 23Mar26 on Tariff Redesign (03.23.2026) Appendix A.pdf

Figure 16. Statistical analysis for Option A1 for Residential by GFC Tier – % of Total Bill[26]

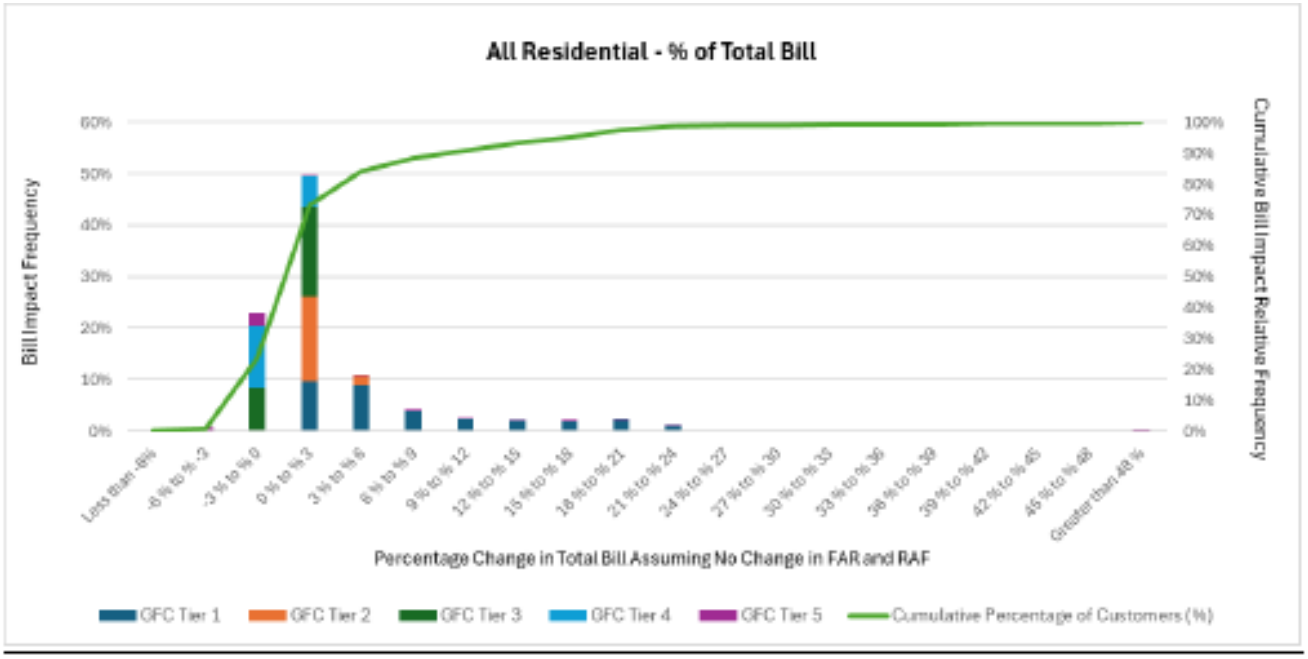
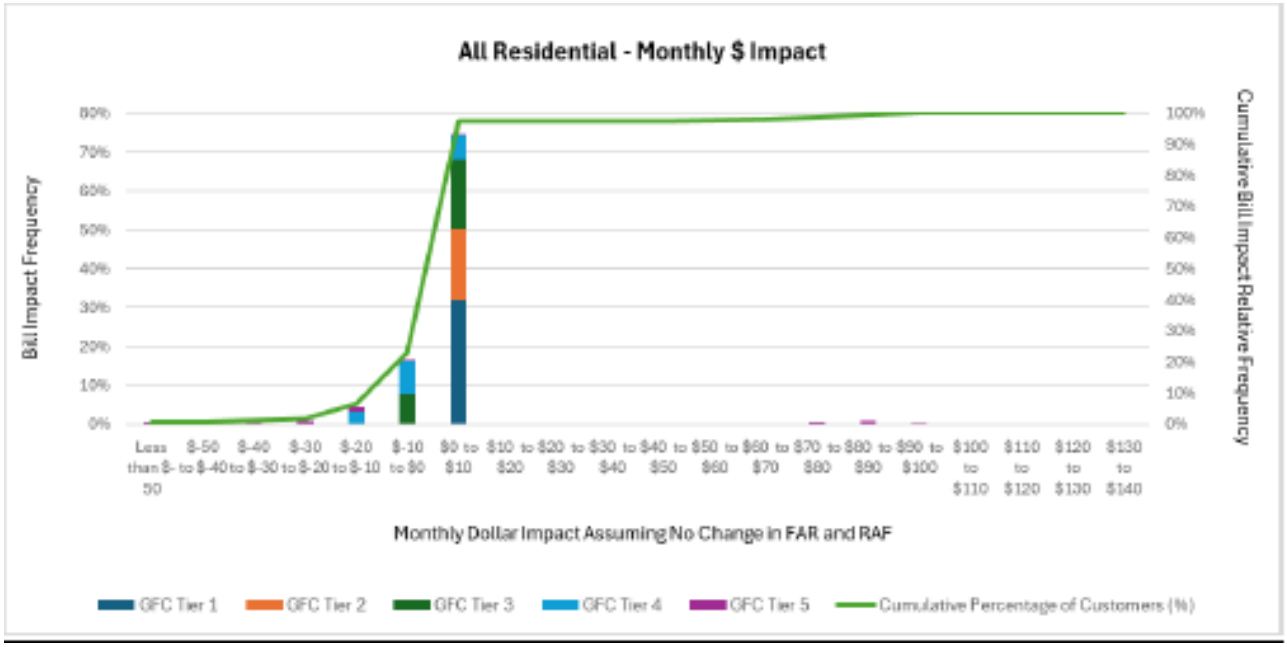


Figure 17. Statistical analysis for Option A1 for Residential by GFC Tier – Monthly $ Impact[27]



[26] BELCO submission: B-R497 Ltr to RA 23Mar26 on Tariff Redesign (03.23.2026) Appendix A.pdf

[27] BELCO submission: B-R497 Ltr to RA 23Mar26 on Tariff Redesign (03.23.2026) Appendix A.pdf

Figure 18. Statistical analysis for Option A1 for Non-DG Residential - % of Total Bill[28]

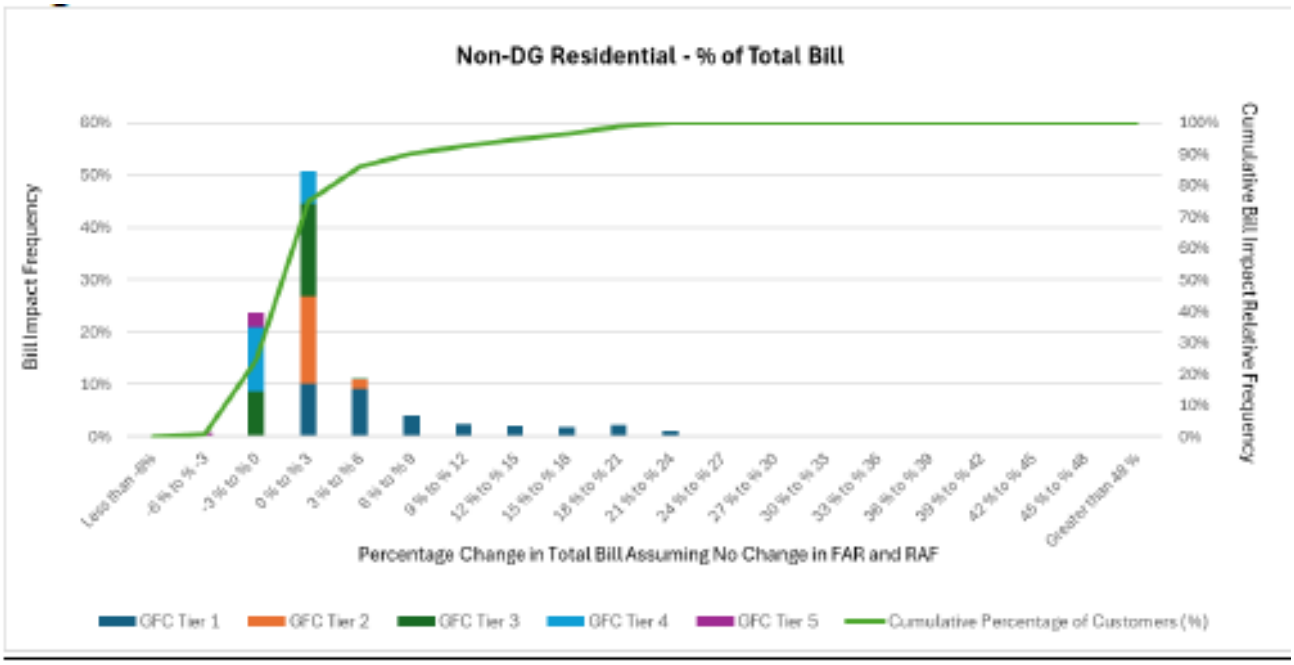
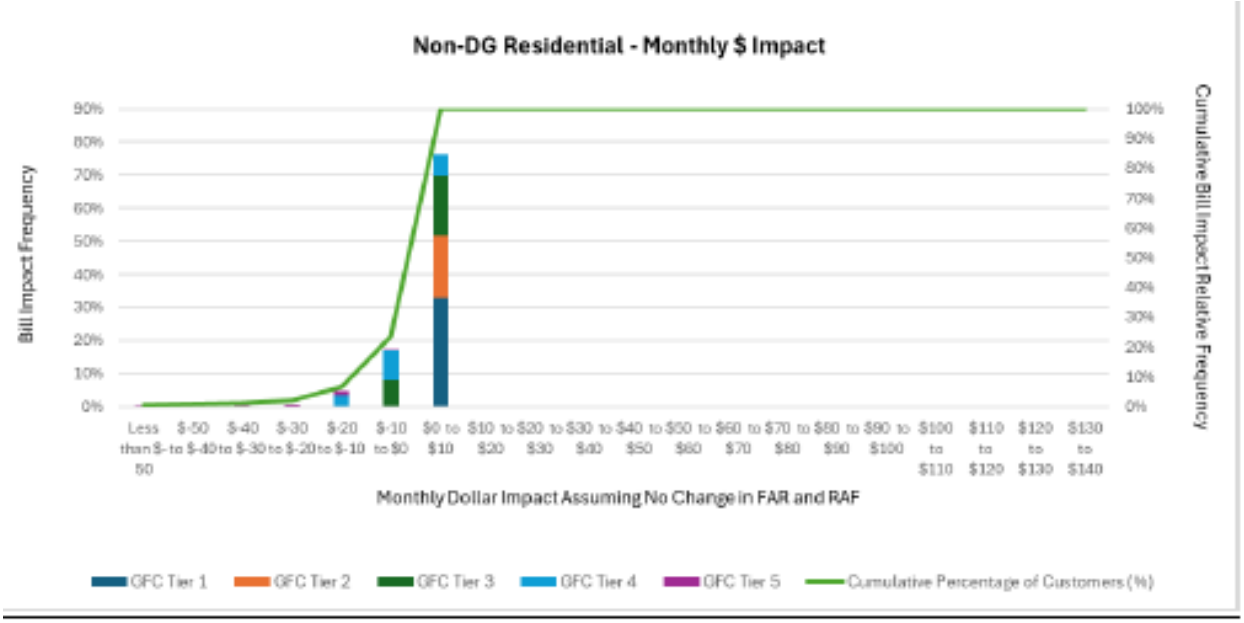


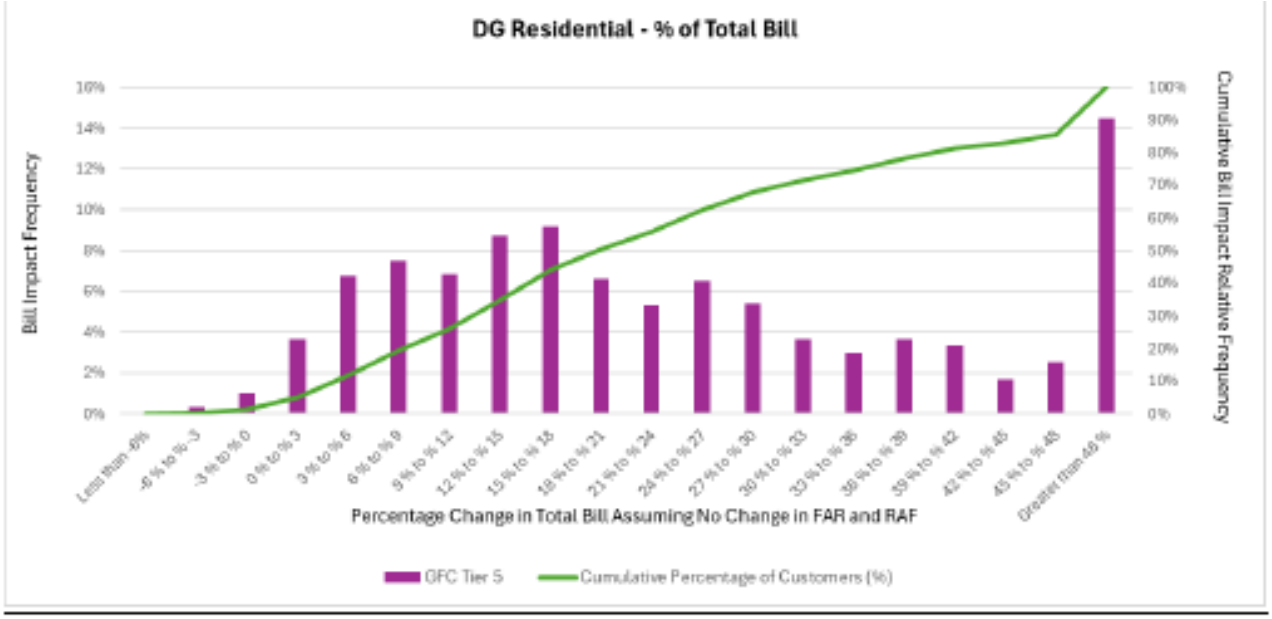
Figure 19. Statistical analysis for Option A1 for Non-DG Residential – Monthly $ Impact[29]



[28] BELCO submission: B-R497 Ltr to RA 23Mar26 on Tariff Redesign (03.23.2026) Appendix A.pdf

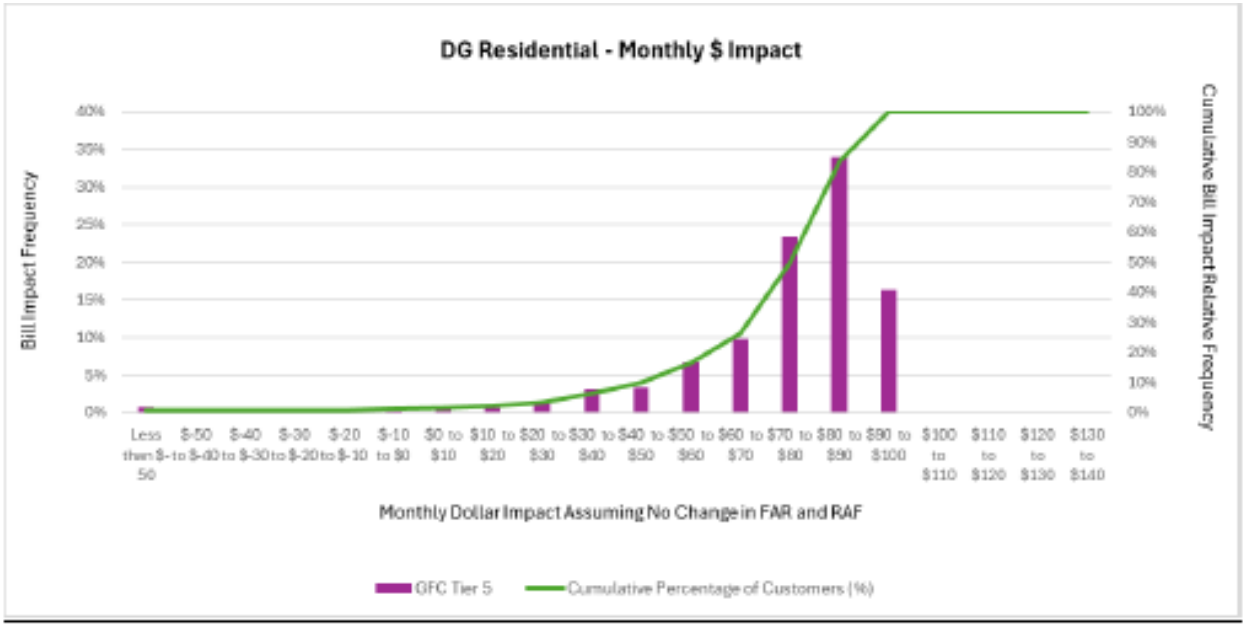
[29] BELCO submission: B-R497 Ltr to RA 23Mar26 on Tariff Redesign (03.23.2026) Appendix A.pdf

Figure 20. Statistical analysis for Option A1 for DG Residential - % of Total Bill[30]



[30] BELCO submission: B-R497 Ltr to RA 23Mar26 on Tariff Redesign (03.23.2026) Appendix A.pdf

Figure 21. Statistical analysis for Option A1 for DG Residential – Monthly $ Impact[31]



Some of the key observations from the figures include the following for non-DG residential customers:

- Non-DG residential customers could see bill impacts ranging from a decrease of around 5% up to an increase of 23% in monthly bills.
- Around 25% of customers would see no change or decrease to their monthly bills, while the remaining would observe an increase.
- Around 50% of customers would see an increase to monthly bills by no more than 3%.
- The remaining 25% of customers would see an increase to monthly bills of more than 3% but no higher than 24%.
- Those that see an increase are not expected to see an increase that is more than $10 per month.
- Those that experience a decrease in bills, may experience a decrease ranging from $0 - $50/month.
- Customers in lower GFC tiers will predominantly experience an increase in bills due to the slight shift to allocate more of the recovery of revenue through fixed rates from variable rates.

Some of the key observations from the figures include the following for DG residential customers:

- DG residential customers could see impacts ranging from a decrease in 4% to an increase of 150% in monthly bills. The increase is related to the higher rate increase in fixed charge for DG customers relative to non-DG customers.
- The majority of DG customers would observe an increase to their monthly bills (>90%).
- Around 50% of customers would see an increase of less than 21%, and around 10% could see an increase that is greater than 48%.
- The increase faced by DG residential customers could reach up to $100/month.

[31] BELCO submission: B-R497 Ltr to RA 23Mar26 on Tariff Redesign (03.23.2026) Appendix A.pdf

5.2.2 Commercial customer class

The figures below show BELCO's statistical analysis for the commercial class and the impacts on customer bills in relative percentage terms and monthly dollar impact.

Figure 22. Statistical analysis for Option A1 for All Commercial - % of Total Bill[32]

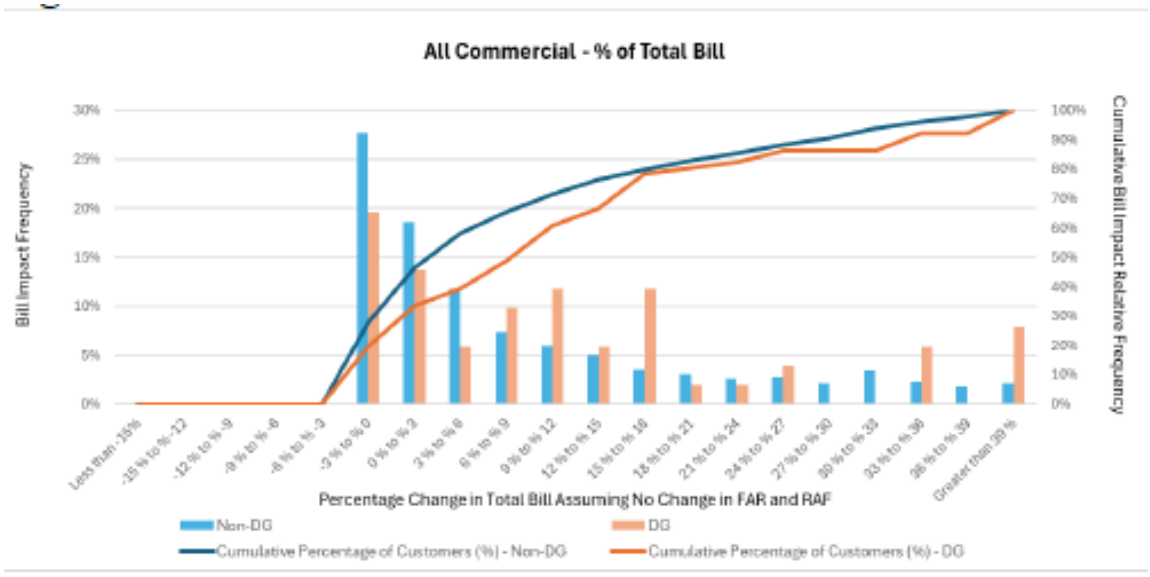
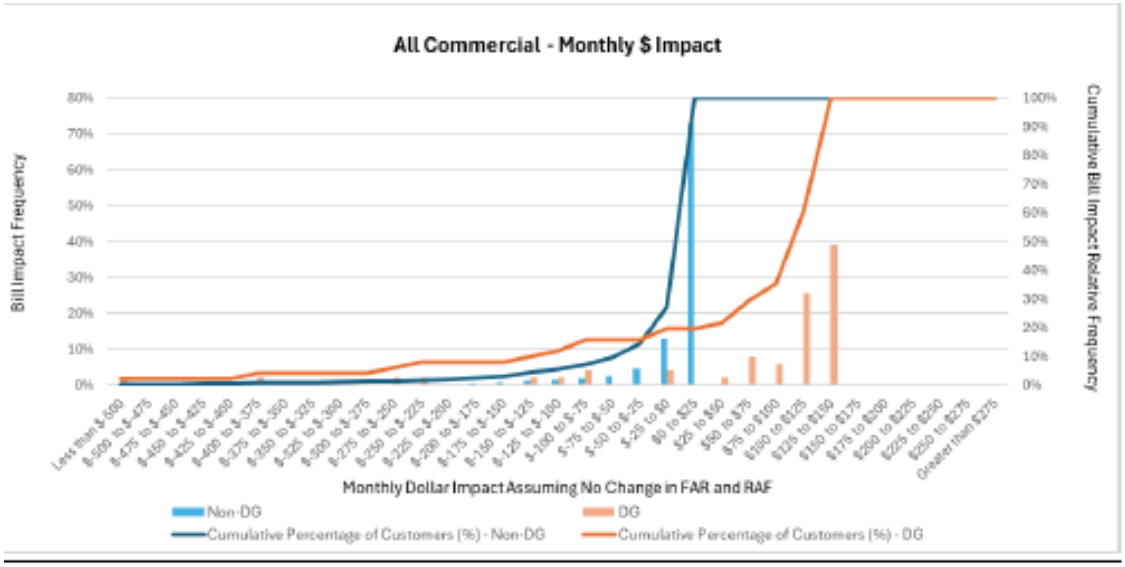


Figure 23. Statistical analysis for Option A1 for All Commercial – Monthly $ Impact[33]



Some of the key observations from the figures include the following for non-DG commercial customers:

[32] BELCO submission: B-R497 Ltr to RA 23Mar26 on Tariff Redesign (03.23.2026) Appendix A.pdf

[33] BELCO submission: B-R497 Ltr to RA 23Mar26 on Tariff Redesign (03.23.2026) Appendix A.pdf

- Customers could observe impacts ranging from a decrease of up to around 3% up to an increase of 43% in monthly bills.
- Almost 30% of customers would observe little change or a decrease in monthly bills, and around 20% could see an increase of up to 3%.
- Translating into a dollar impact, those that experience an increase (~70%) will not experience an increase of more than $25 a month.
- Whilst those that observe a decrease, could see a decrease of up to $200 a month, with the majority of those that observe a decrease seeing a decrease that is more between $0-$25/month.

Some of the key observations from the figures include the following for DG commercial customers:

- DG commercial customers could see impacts ranging from a decrease in monthly bills by 2% up to an increase of almost 70%.
- Around 20% of customers could see their bills not change or decrease, whilst the remainder would see an increase.
- Around 60% of customers would see an increase up to 18%.
- Around 10% would see an increase that is greater than 39%.
- In terms of dollar values, around 65% would observe an increase between $100-150/month.
- The remaining customers that observe an increase would see an increase from $0-100/month.
- The increase in DG customers' bills is associated with the introduction of the separate DG fixed rate in the commercial class.

5.2.3 Miscellaneous Commercial

The figures below show BELCO's statistical analysis for the misc. commercial class and the impacts on customer bills in relative percentage terms and monthly dollar impact.

Figure 24. Statistical analysis for Option A1 for Misc. Commercial - % of Total Bill[34]

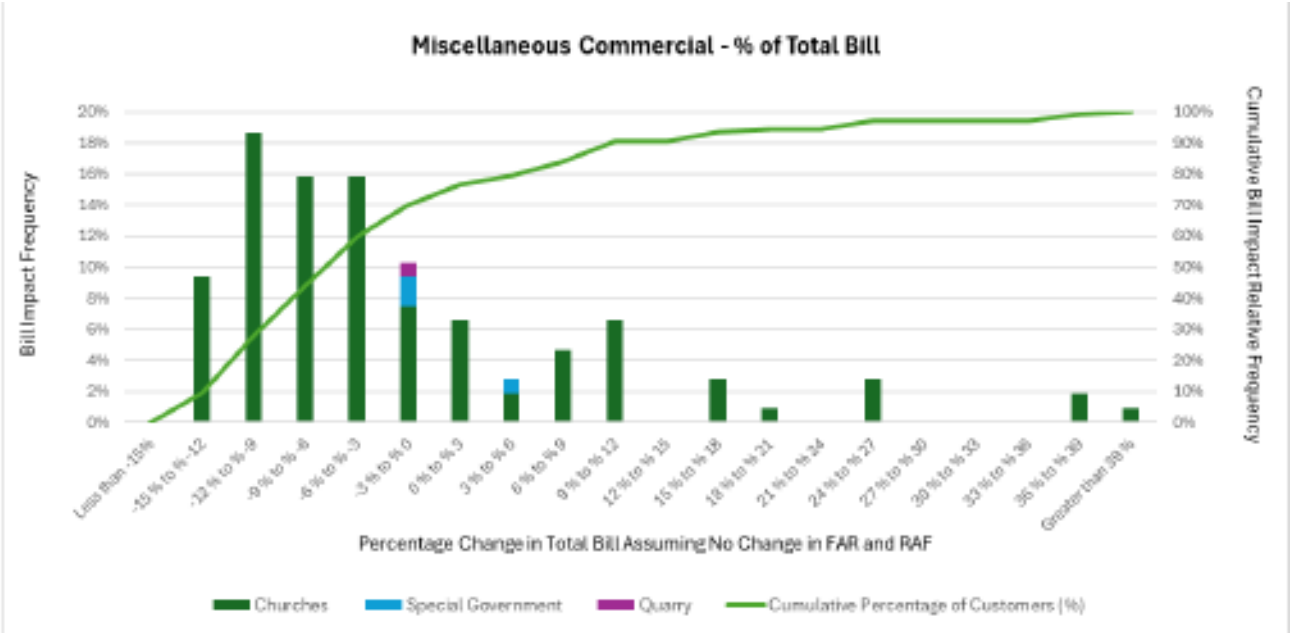
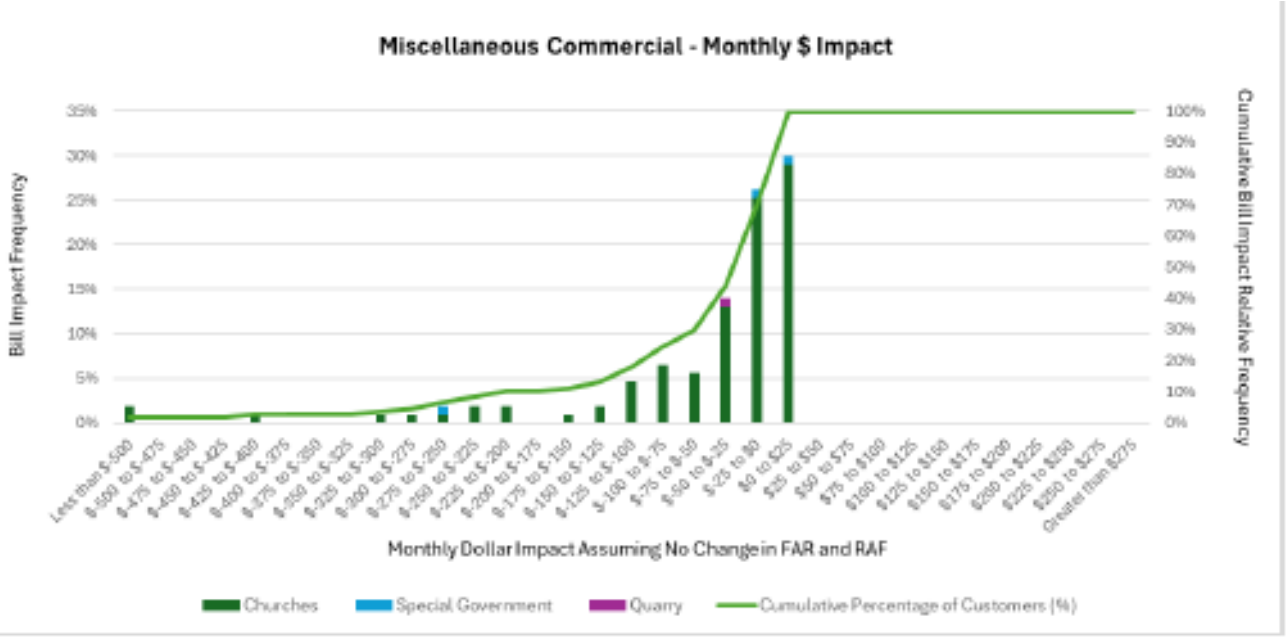


Figure 25. Statistical analysis for Option A1 for Misc. Commercial – Monthly $ Impact[35]



Some of the key observations from the figures include the following:

- Quarries are expected to observe a decrease in monthly bills up to 3%, equivalent to a decrease of around $25-$50/month.

[34] BELCO submission: B-R497 Ltr to RA 23Mar26 on Tariff Redesign (03.23.2026) Appendix A.pdf

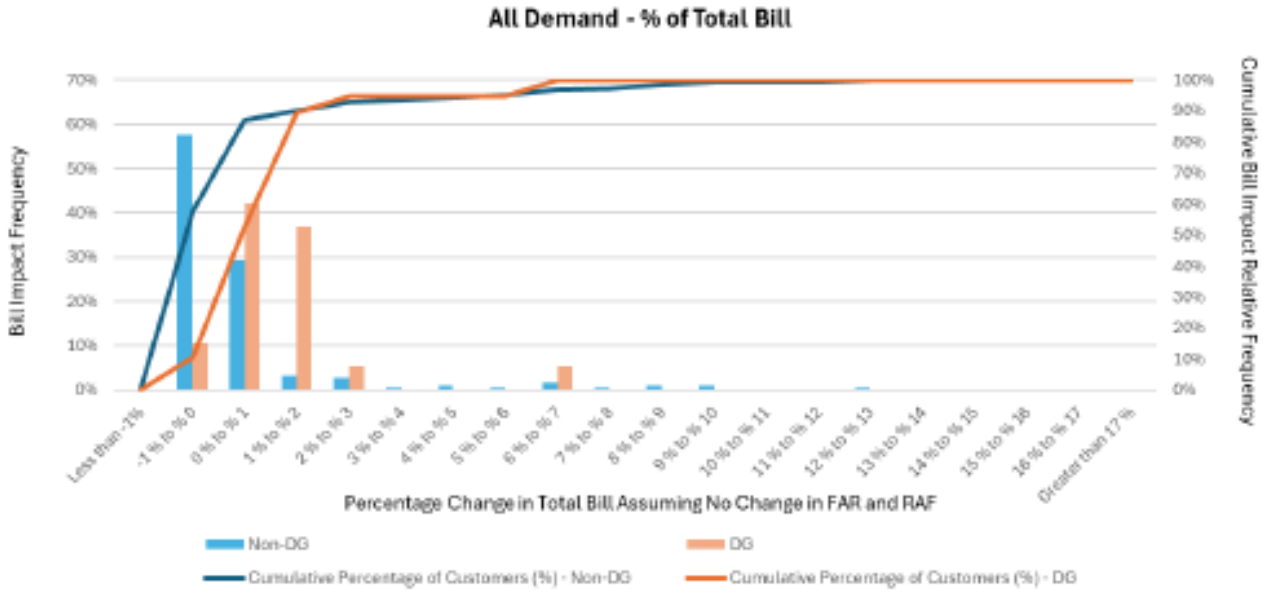
[35] BELCO submission: B-R497 Ltr to RA 23Mar26 on Tariff Redesign (03.23.2026) Appendix A.pdf

- Some customers classified as “Special Government” are expected to observe a decrease ranging between $250-$275/month or some up to $25/month, whilst others are expected to see an increase which could reach $25/month.
- No customer in the class expected to see an increase that is more than $25/month, however in relative terms, it could reach more than 39% of the monthly bill.
- The majority of churches would observe a decrease in bills reaching up to 15% decrease in monthly bills, or a decrease of more than $500/month. However, most of the churches that observe a decrease would see decreases between $0-125/month.

5.2.4 Demand

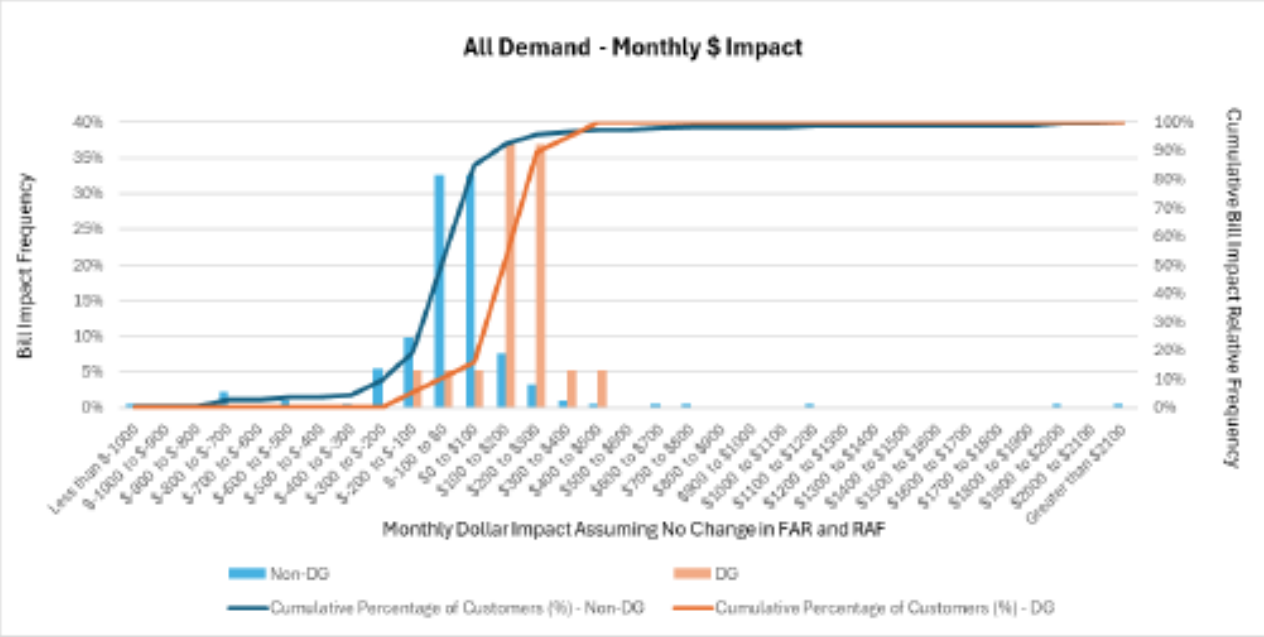
The figures below show BELCO’s statistical analysis for the demand class and the impacts on customer bills in relative percentage terms and monthly dollar impact.

Figure 26. Statistical analysis for Option A1 for Demand - % of Total Bill[36]



[36] BELCO submission: B-R497 Ltr to RA 23Mar26 on Tariff Redesign (03.23.2026) Appendix A.pdf

Figure 27. Statistical analysis for Option A1 for Demand – Monthly $ Impact[37]



Some of the key observations from the figures include the following for non-DG demand customers:

- According to BELCO, demand customers could see impacts ranging from a decrease in bills of 0.6% up to an increase of 12.9% for non-DG customers.
- Looking at non-DG customers, BELCO estimates that almost 60% could see a decrease in monthly bills, whilst around 30% could see an increase in bills of less than 1%. The remainder could see an increase reaching up to 13%.
- According to BELCO, around 33% of non-DG customers could see decrease in their monthly bill up to $100/month, whilst another 33% could see an increase of up to $100/month. The remainder could observe increases which could reach greater than $2,100/month.

Some of the key observations from the figures include the following for DG demand customers:

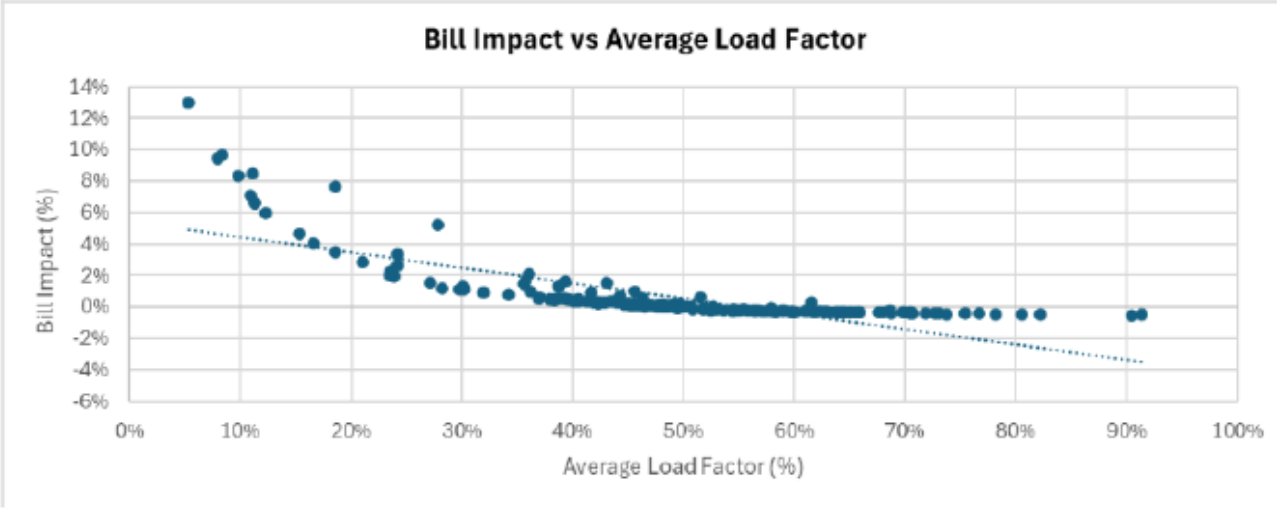
- On the other hand, BELCO estimates that DG demand customers could see impacts ranging from a decrease in 0.2% up to an increase of 6.5% in monthly bills.
- Around 10% of DG customers would observe a decrease in monthly bills, whilst the remainder could observe an increase. Around 80% of DG customers could observe an increase of up to 2%.
- According to BELCO, around 10% of customers could see a decrease in monthly bills of up to $200/month.
- Around 42% of customers could see an increase of up to $200/month, and around another 42% of customers could see an increase between $200-$400/month.

The impact observed by demand customers is highly sensitive to the specific load factor of the customer. Below, the figure presented by BELCO alongside the sensitivity analysis shows the bill impact in percentage terms as a function of the average load factor of the customer. The figure is useful to illustrate that customers with higher load factors, and therefore, with energy usage that is more evenly distributed relative to their peak demand, could experience lower bill impacts. The reason is because those customers are less sensitive to changes in the relative weight of demand or fixed charges, since it

[37] BELCO submission: B-R497 Ltr to RA 23Mar26 on Tariff Redesign (03.23.2026) Appendix A.pdf

is not as large of a component in their bill, relative to a customer with a lower load factor, whose demand charge would constitute a larger portion of their monthly bill.

Figure 28. Bill Impact vs Average Load Factor Figure[38]



5.3 Recommendations

After considering BELCO's analysis, the objectives of the exercise, and the public, we recommend proceeding with Option A rate structure with the preferred allocation factors across the rate design shown from Scenario 1. Ricardo recommends this combination as it could be a good step in the right direction, whilst providing a level of continuity and transition to help with customer understanding while limiting the disruption to customers from a more aggressive scenario. Whilst other less progressive scenarios could have been considered as well, for example, purely unbundling volumetric rates instead of also shifting recovery slightly away from volumetric rates, Ricardo recommends that a shift is introduced. While it will provide a larger impact than purely unbundling the rates, Ricardo thinks it is appropriate to slowly start shifting the cost recovery and taking advantage that the rate restructuring update is not at the same time as a larger tariff update, which can help with customer understanding and isolating impacts.

We recommend that a staggered approach towards fairer, more transparent and cost-reflective rates is taken to help minimise confusion and price spikes. Even with this recommended option, the RA needs to design and implement a thoughtful and clear communication strategy to ensure that customers understand not only the changes but the reason for the changes. It is important to ensure that customers are onboard and are taken along the journey as this is only the first step into improving transparency and cost-reflectivity across electricity bills in Bermuda.

[38] BELCO submission: B-R497 Ltr to RA 23Mar26 on Tariff Redesign (03.23.2026) Appendix A.pdf

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