

Assessment of the Alignment of the Costs and Benefits of Clean Energy Assets

Prepared for:

Blakes

Prepared by:

Navigant
Bay Adelaide Centre
333 Bay Street, Suite 1250
Toronto, Ontario M5H 2R2

navigant.com

Reference No.: 195515
September 29, 2017

TABLE OF CONTENTS

Glossary.....	iii
1. Overview	1
2. ReAllocation Methodology	2
3. Estimating the fair allocation curve.....	3
3.1 Status Quo Costs	3
3.2 Fair Allocation Curve without Interest	4
3.3 Debt Schedule and Interest Costs	5
3.4 Fair Allocation Curve with Interest	6
4. Adjustments for 2005 to 2017	7
4.1 Overpayment Balance	7
4.2 Adjusted Debt Schedule and Interest Costs	8
4.3 Adjusted Fair Allocation Curve	9
4.4 Net Reduction in Consumer Costs.....	10

Disclaimer

This report was prepared by Navigant Consulting Ltd. for Blake, Cassels & Graydon LLP for the purpose of informing legal advice from Blakes to the Ontario Ministry of Energy.

The work presented in this report represents Navigant's professional judgment based on the information available at the time this report was prepared. Navigant is not responsible for the reader's use of, or reliance upon, the report, nor any decisions based on the report. NAVIGANT MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESSED OR IMPLIED.

Readers of the report are advised that they assume all liabilities incurred by them, or third parties, as a result of their reliance on the report, or the data, information, findings and opinions contained in the report.

GLOSSARY

Clean energy benefits: the value of the benefits determined to be derived by or accruing to specified consumers as a result of the clean energy initiative, including as a result of clean energy costs

Clean energy costs: the value of the costs allocated to specified consumers as a result of the clean energy initiative, including as a result of past, present and expected costs incurred in respect of,

(a) the amounts to be paid or reflected by the IESO in adjustments made under section 25.33 of the *Electricity Act, 1998* or any provision that is the successor to that provision, which relate to contracts or amounts for,

- (i) renewable energy generation or capacity,
- (ii) conservation and demand management,
- (iii) energy storage,
- (iv) energy efficiency,
- (v) natural gas generation and capacity, excluding contracts relating to amounts payable by the IESO under section 78.2 of the Ontario Energy Board Act, 1998 and excluding such other contracts as may be prescribed,

(b) payments made or expected to be made under section 78.5 of the Ontario Energy Board Act, 1998, and

(c) such other costs or estimated costs as may be prescribed;

Clean energy initiative: the policies of the Government of Ontario related to,

(a) eliminating coal generation and fostering the growth of and investment in clean, modern and reliable energy sources and technologies,

(b) removing barriers to and promoting opportunities for clean and renewable energy sources and technologies,

(c) promoting conservation, demand management and energy efficiency, and

(d) investing in energy infrastructure to ensure a clean, modern and reliable system;

Fair Hydro Act: A statute [or act] of the Legislative Assembly of Ontario designed to align clean energy costs with clean energy benefits.

1. OVERVIEW

Blake, Cassels & Graydon LLP (Blakes) retained Navigant Consulting Ltd. (Navigant), for the purpose of informing legal advice from Blakes to the Ontario Ministry of Energy. Blakes retained Navigant to:

1. Evaluate the extent to which clean energy costs are incurred over the same period as clean energy benefits;
2. Establish a methodology to reallocate clean energy costs to fully align with clean energy benefits;
3. Assess the associated refinancing costs; and
4. Develop an adjustment mechanism to account for differences between reallocated costs and actual costs prior to the implementation of the Fair Hydro Act.¹

This analysis builds off the Navigant report *Assessment of the Operability of Clean Energy Assets Post Power Purchase Agreement Expiry* (“Asset Life Report”), which evaluated the feasibility of operating clean energy assets such as natural gas, wind, and solar power generation facilities beyond the term of their existing power purchase agreements, and the associated costs. Navigant determined that natural gas facilities in Ontario can operate for 40 years with prudent maintenance and some component replacement. Navigant also determined that wind and solar facilities can operate for 25 years, which can be extended to 50 years with a full repowering investment at the end of year 25.

Ontario ratepayers currently pay for the entire cost of constructing a natural gas, wind, and solar electricity generation asset over the term of their original power purchase agreement, which is generally 20 years. Provincial ratepayers pay for conservation programs in the year the costs are incurred. Similarly, over the period of 2009 to 2014, ratepayers made annual payments associated with the early shutdown of coal fired-generation assets.

However, the benefits associated with the natural gas, wind, and solar electricity generation assets are tied to their full useful life, which extends beyond the term of the original power purchase agreement. Similarly, the benefits associated with conservation and the early retirement of coal-fired electricity generation assets are tied to the avoided electricity generation and the avoided emissions, respectively. These benefits occur over the entire life of the conservation measures and the expected remaining life of retired coal-fired generation assets.

¹ Clean energy costs and clean energy benefits are as defined in the Fair Hydro Act, 2017.

2. REALLOCATION METHODOLOGY

The Fair Hydro Act allows for the reallocation of clean energy costs to 2047. As a result, Navigant's methodology only considers clean energy costs incurred between 2005 and the earlier of a clean energy assets end of life or 2047.

Navigant's methodology includes five major components.

1. Status Quo Costs

Develop a schedule of status quo costs for individual assets or groups of assets with similar characteristics (i.e. contract price, first year of operation, technology, fuel-type). The status quo clean energy costs include power purchase agreement payments, as well as ongoing operations and maintenance costs and repowering costs beyond the term of the power purchase agreement.

Determine the total cost associated with an individual asset or group of assets in the status quo from its commercial operation date, or the date the investment was made, until the earlier of the asset's end of life or 2047.

2. Fair Allocation Curve without Interest

Reallocate the total cost evenly over each year the asset is operational, or providing a clean energy benefit. Note this step assumes that costs can be reallocated without incurring additional debt or financing costs. The total cost in each year across all the clean energy assets is the fair allocation curve without interest costs ("FAC w/ No Interest Cost").

3. Debt Schedule and Interest Costs

In each year, the difference between the total status quo clean energy costs and the fair allocation curve without interest amount, represents the annual borrowing requirement (in early years) or principal repayment (in later years) associated with the reallocation of costs.

4. Fair Allocation Curve with Interest

The annual interest costs associated with the accumulated debt is added to the fair allocation curve without interest to determine the total cost to be passed through to ratepayers under the reallocation. The sum of the fair allocation amount without interest and the annual interest cost represents the fair allocation curve with interest ("FAC w/ Interest").

5. Fair Allocation Curve with Adjustment Period and Interest

Recognizing that consumers have paid the status quo costs since 2005, establish the amount of overpayment / underpayment that has occurred relative to the fair allocation curve with interest and use this overpayment / underpayment to adjust the fair allocation curve to reflect the targeted reductions eligible consumer costs under the Fair Hydro Act.

3. ESTIMATING THE FAIR ALLOCATION CURVE

This section describes the outcome of each of the first four components of the reallocation methodology described above.

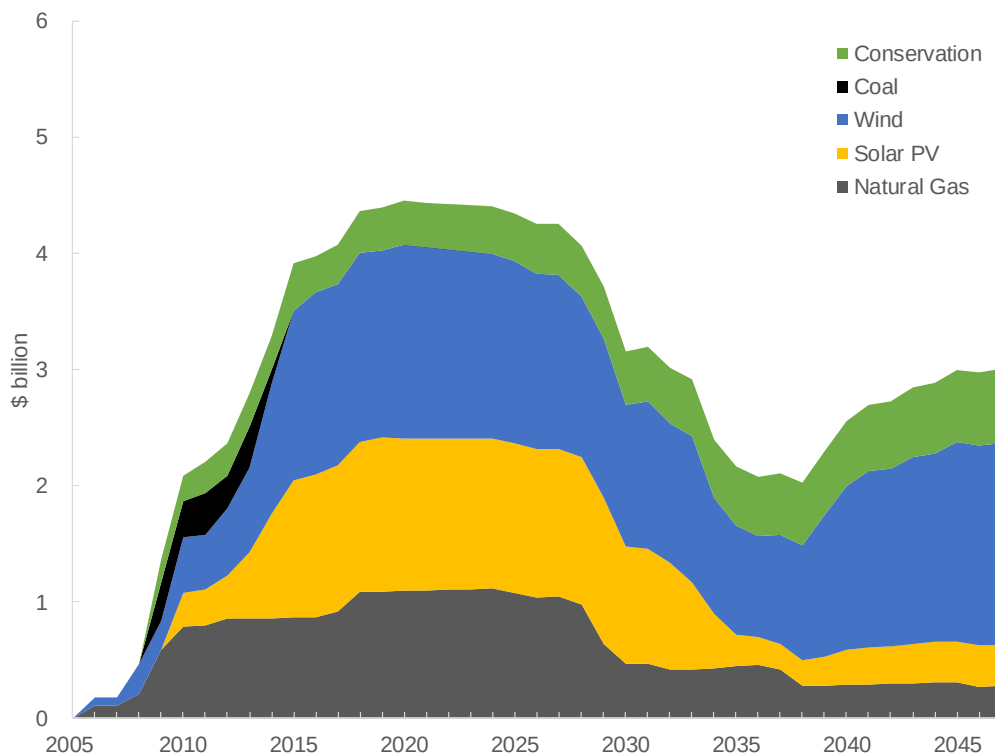
3.1 Status Quo Costs

The status quo costs for natural gas, wind, and solar photovoltaic generation resources are based on the terms of each assets' power purchase agreements. These costs were estimated based on known and estimated power purchase agreement prices and estimated production or contracted capacity levels. Following the expiry of the power purchase agreements, the status quo costs include estimated operating and maintenance expenditures and annual costs associated with the financing of any repowering costs.

The status quo costs also include the costs of conservation and demand management programs, and the costs (payments made by ratepayers) associated with the early shutdown of coal fired-generation assets. These costs are based on actual spending levels through 2016 and estimated spending levels through 2047.

As illustrated in the figure below, status quo costs are expected to peak at over CAD \$4 billion in the 2020s and then decline in the 2030s as generation resources reach the end of the original term of their power purchase agreements. By the late 2030s repowering investments in wind, and to a lesser extent solar, put upward pressure on status quo costs.

Figure 1. Status Quo Costs (nominal CAD)



Note: Analysis assumes a 2.0% annual inflation rate

Source: Navigant analysis

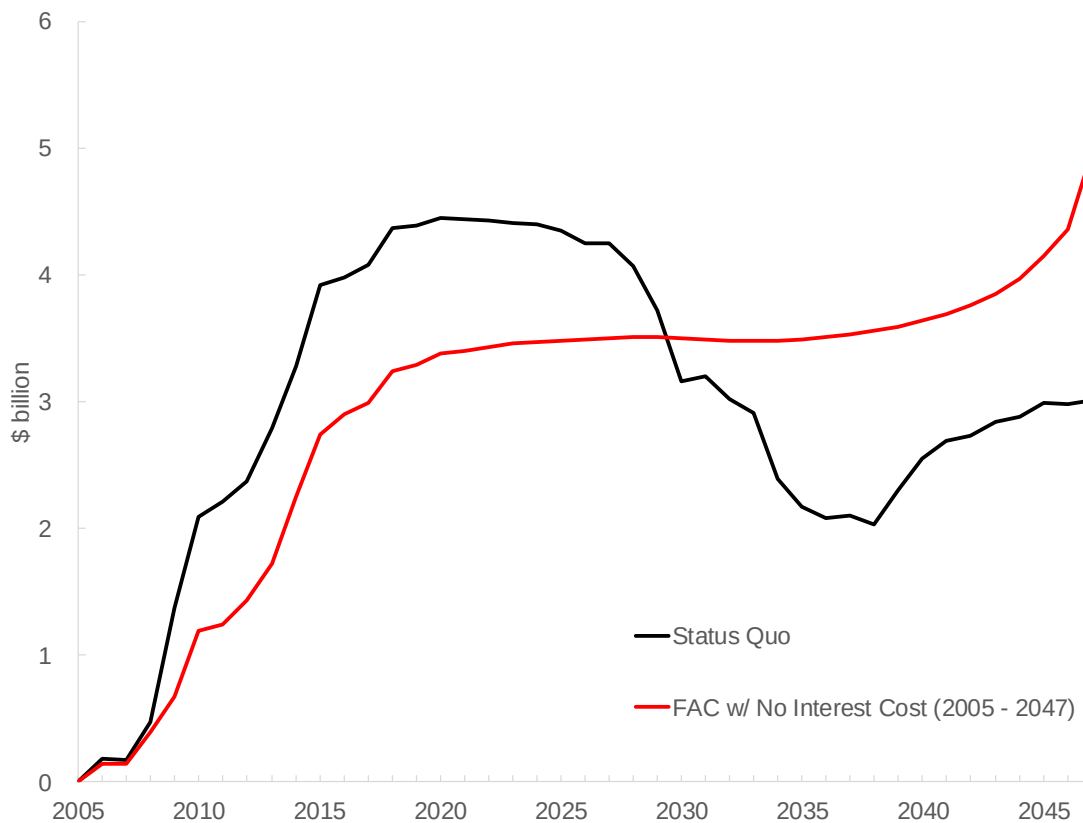
3.2 Fair Allocation Curve without Interest

Total status quo costs incurred between 2005 and 2047 for each asset were reallocated evenly over the useful life of each asset. The reallocation is carried out on an asset by asset or asset group by asset group basis and then aggregated to determine the total province-wide impact. This results in the fair allocation curve without interest.

As illustrated in the figure below, from 2005 to 2029, the status quo is higher than the fair allocation without interest. From 2030 onwards, the status quo is below the fair allocation without interest.

Both the status quo and fair allocation curve without interest ramp up significantly between 2005 and 2020. This is due to the increase in the number and size of clean energy assets, in particular natural gas, wind, and solar generation facilities, which increase to over 14,000 MW by 2020.

Figure 2. Fair Allocation Curve without Interest



Source: Navigant analysis

3.3 Debt Schedule and Interest Costs

The status quo costs represent existing obligations. Changing the amount of that obligation that is paid by ratepayers annually either results in a requirement to borrow funds to cover an underpayment or a credit of funds to recognize an overpayment.

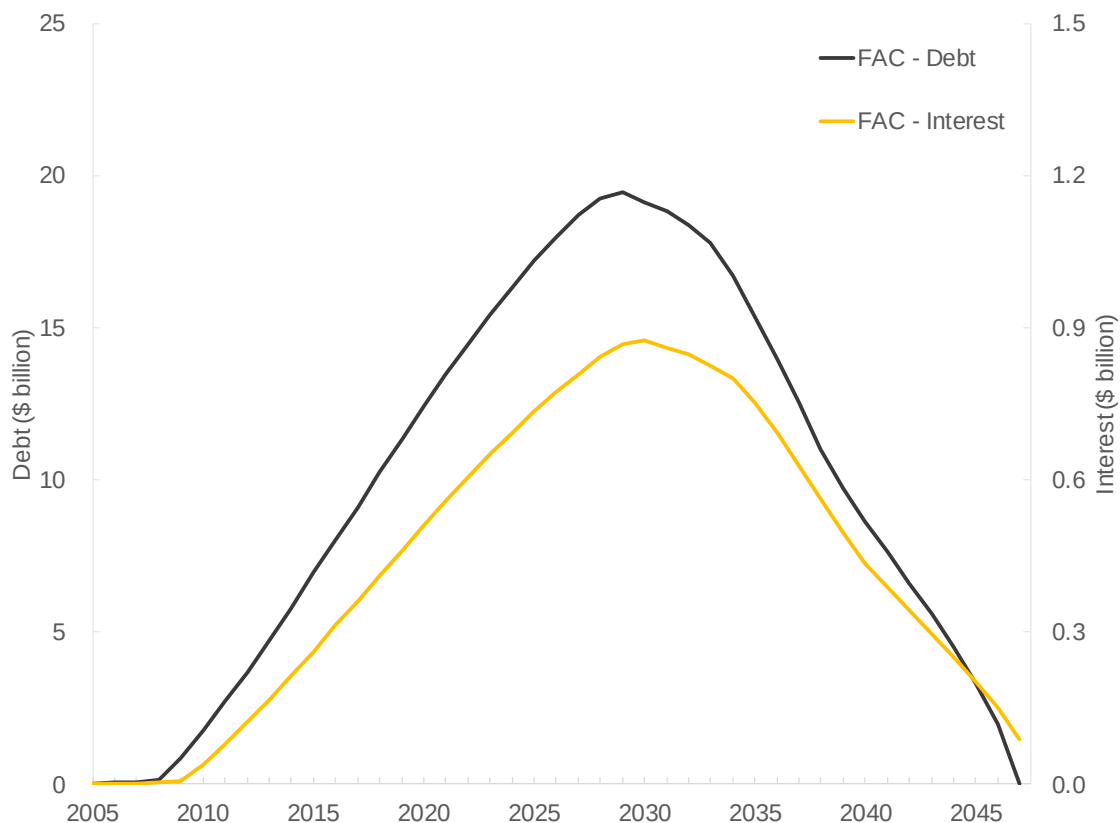
The difference between the status quo and the fair allocation curve without interest represents annual borrowing requirement (in early years) or principal repayment (in later years) required to finance the reallocation of costs on behalf of Ontario ratepayers.

As debt is accumulated in each year, the interest payments on the accumulated debt can either be passed through to customers or carried forward to future years and increase the level of accumulated debt. Navigant has modeled the impact of the reallocation on the basis that interest payments are passed through to ratepayers in the year they are incurred.

As illustrated in the figure below, accumulated debt increased to approximately CAD \$19.5 billion by 2029 and the annual interest payment increases to approximately CAD \$875 million over the same period.

At the end of 2047, all debt and interest costs associated with the fair allocation are paid off and ratepayers return to the status quo payment stream starting in 2048.

Figure 3. Accumulated Debt and Annual Interest Amounts



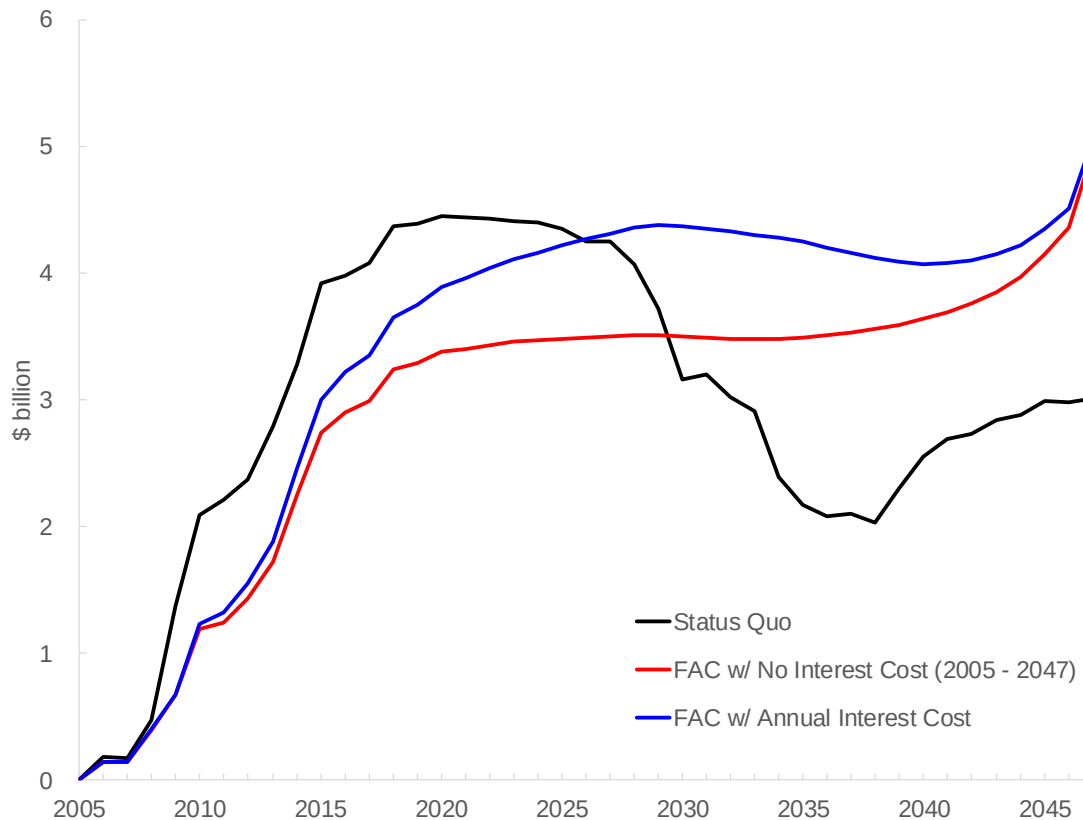
Note: Analysis assumes a 4.5% cost of debt

Source: Navigant analysis

3.4 Fair Allocation Curve with Interest

Layering the annual interest costs on top of the fair allocation curve without interest results in a fair allocation curve with interest costs. This represents the total reallocated cost in each year to be passed on to Ontario ratepayers.

Figure 4. Fair Allocation Curve with Interest Costs



4. ADJUSTMENTS FOR 2005 TO 2017

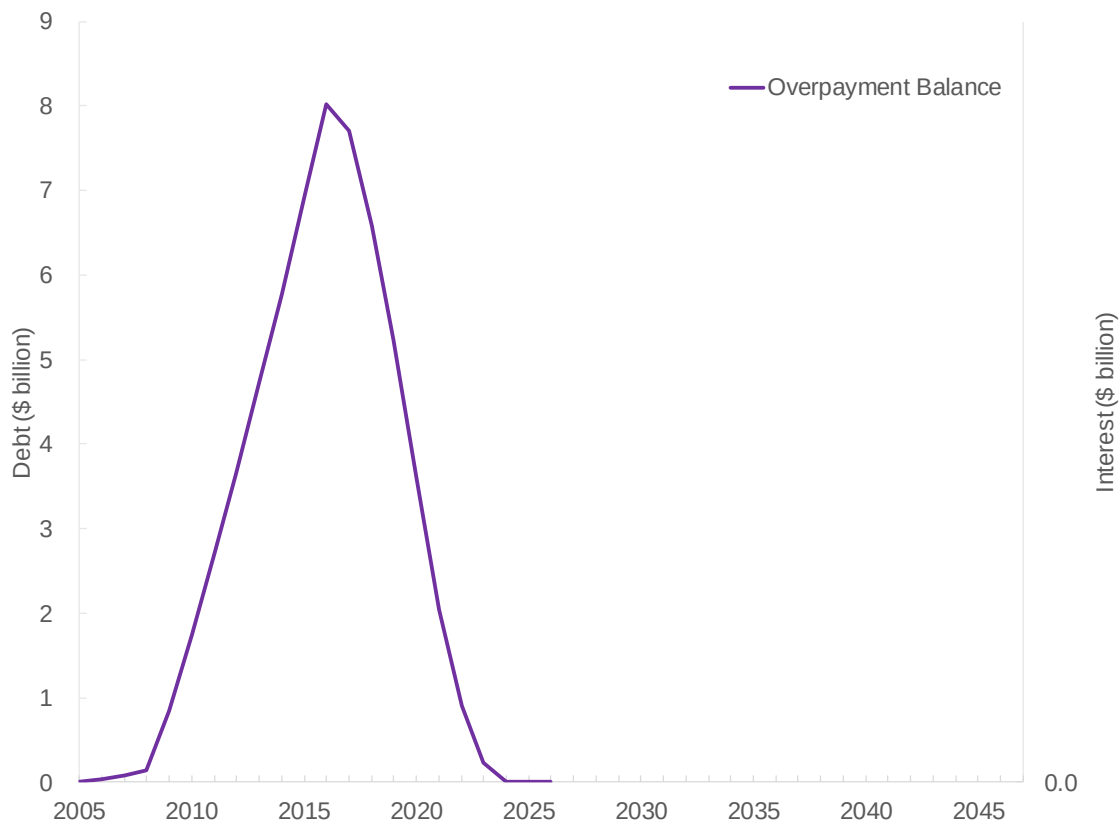
This section describes the outcome of the fifth component of the reallocation methodology described above.

Since 2005 ratepayers in Ontario have paid the status quo costs. As illustrated in the figure above, these costs were higher than the fair allocation curve with interest. The accumulated overpayment, including interest to the benefit of ratepayers, from 2005 up to the end of 2016 represents the amount that can be used to achieve the target reduction in eligible consumer costs under the Fair Hydro Act.

4.1 Overpayment Balance

From 2005 to the end of 2016, considering interest accrued on overpayments, ratepayers overpaid relative to the fair allocation with interest by approximately CAD \$8 billion. This overpayment balance represents the amount that can be used to achieve the target reduction in eligible consumer costs in 2017 (\$1.396 billion), 2018 (\$2.189 billion), 2019 (\$2.296 billion), 2020 (\$2.414 billion) and 2021 (\$2.204 billion). At the end of 2021, there remains an overpayment balance of approximately CAD \$2 billion. This amount is repaid to customers over the next three years in a manner that limits the year-over-year rate increase. By the end of 2023 the overpayment balance is completely depleted.

Figure 5. Overpayment Balance



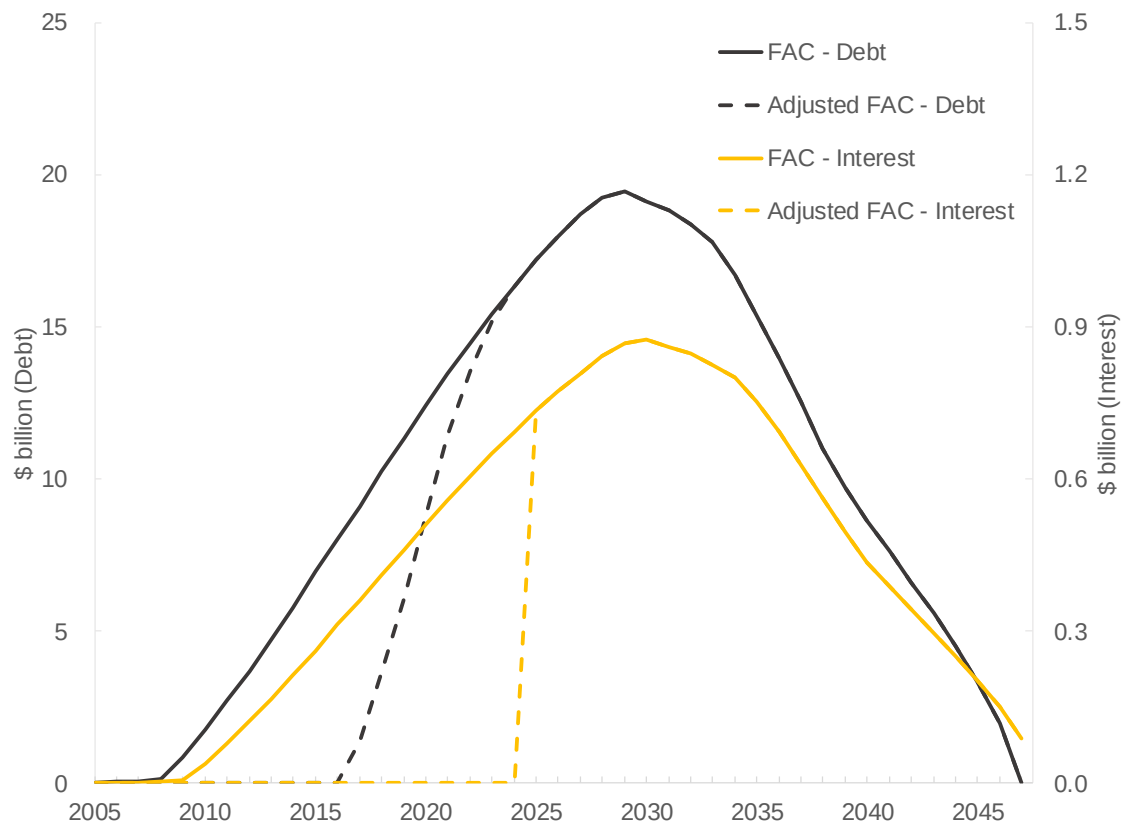
Source: Navigant Analysis

4.2 Adjusted Debt Schedule and Interest Costs

The fact that ratepayers paid the status quo costs from 2005 through 2016, and the overpayment balance will be used to provide deeper reductions in eligible consumer costs between 2017 and 2022 changes the debt schedule and interest costs relative to the fair allocation described earlier in this report.

No incremental debt was accumulated through 2016, because ratepayers paid the status quo costs. From 2017 to 2024, incremental debt will accumulate faster as the overpayment balance is depleted. Over the period where the overpayment balance is depleted, interest costs are carried forward to future years and increase the level of accumulated debt². As illustrated in the figure below, starting in 2025, after the adjustment period, both the accumulated debt and the annual interest payments return to the same level as in the fair allocation described earlier in this report.

Figure 6. Adjusted Accumulated Debt and Annual Interest Amounts



Note: Analysis assumes a 4.5% cost of debt.

Source: Navigant Analysis

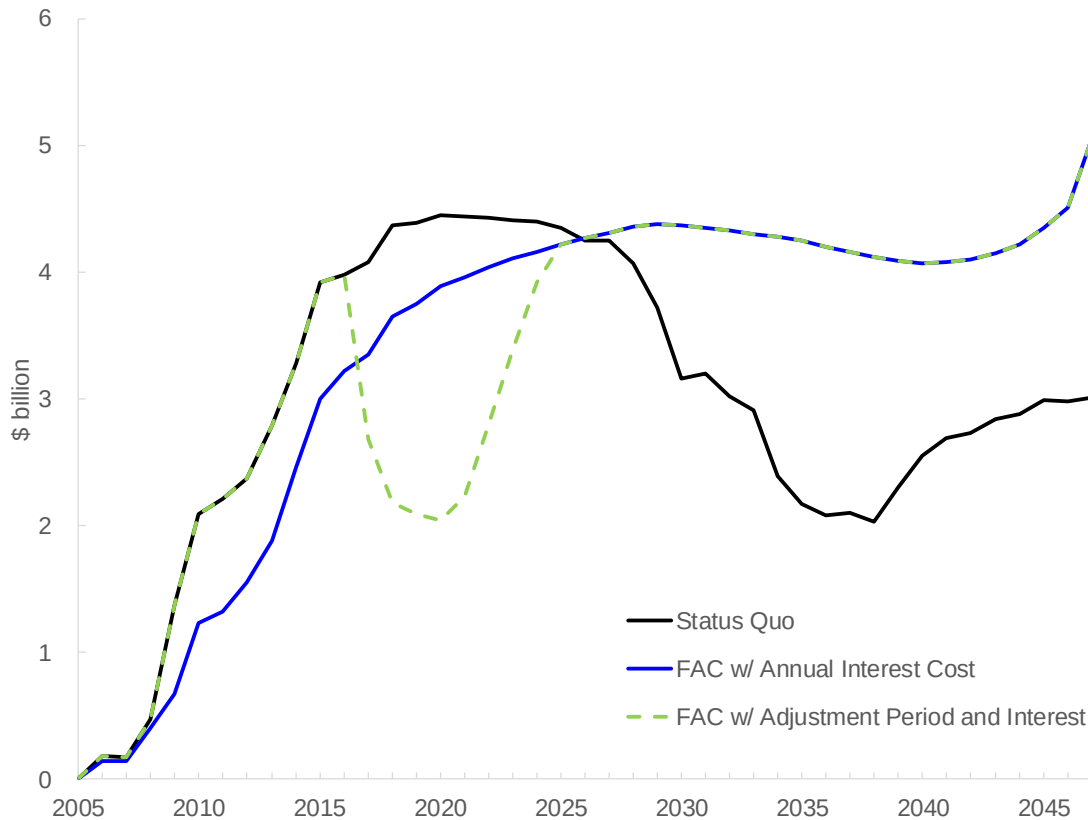
² Accumulating the interest costs during the adjustment periods allows ratepayers to realize the full target reductions under the Fair Hydro Plan.

4.3 Adjusted Fair Allocation Curve

The adjusted fair allocation curve with interest follows the status quo costs through 2016. Starting in 2017, based on the targeted reduction in eligible consumer costs under the Fair Hydro Act, it drops below the unadjusted fair allocation curve with interest. It remains below during the adjustment period until 2025 when the overpayment balance is depleted and the accumulated debt and annual interest costs return to unadjusted levels.

From 2025 onwards the levels of accumulated debt are consistent with the reallocation described earlier in this report and the interest costs are passed through annually to ratepayers. As a result, from 2025 onwards the actual adjusted fair allocation curve with interest is the same as the unadjusted fair allocation curve. This is illustrated in the figure below.

Figure 7. Fair Allocation Curve with Adjustment Period and Interest

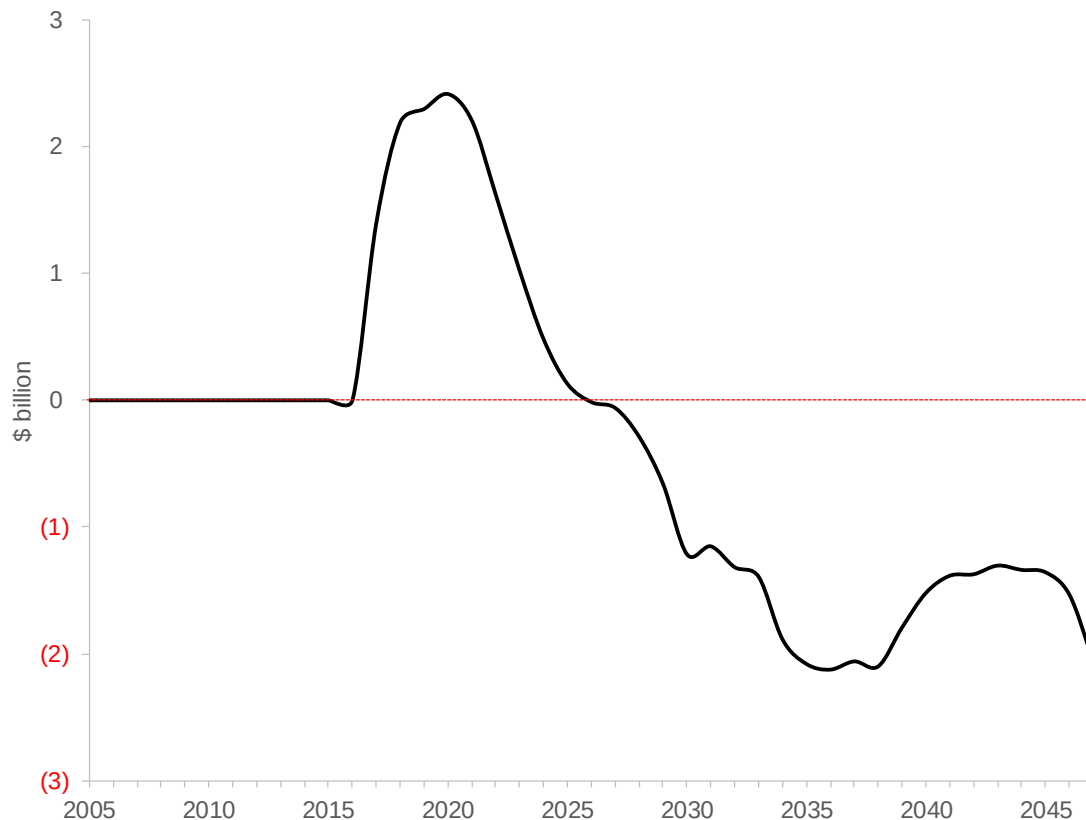


Source: Navigant analysis

4.4 Net Reduction in Consumer Costs

The difference between the status quo costs and the fair allocation curve with the adjustment period and interest costs represents the annual net reduction (positive) and increase (negative) in eligible consumer costs and is illustrated in the figure below.

Figure 8. Annual Reduction (+) / Increase (-) in Eligible Consumer Costs



Source: Navigant analysis