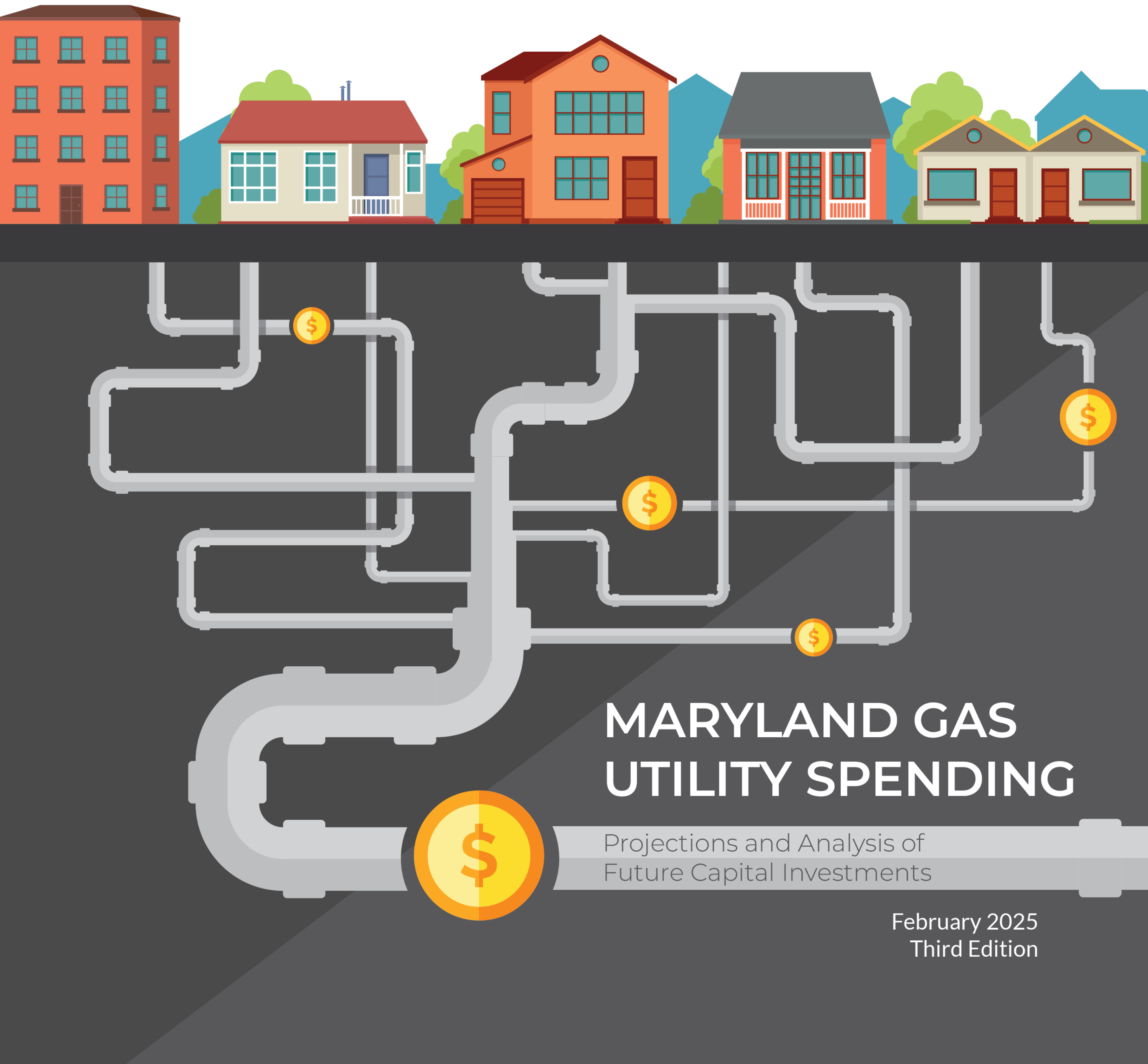
OPC

OFFICE OF PEOPLE'S COUNSEL

State of Maryland



MARYLAND GAS UTILITY SPENDING

Projections and Analysis of Future Capital Investments

February 2025

Third Edition

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EXECUTIVE SUMMARY

Maryland's gas utilities are at a critical juncture. As gas use in buildings faces increasing competition from highly efficient electric technologies, and as the State pursues ambitious climate goals, the future role of natural gas infrastructure is uncertain. Yet despite this shifting landscape, Maryland's gas companies continue to propose and pursue significant capital investments in their distribution systems, both through the State's Strategic Infrastructure Development and Enhancement (STRIDE) law and through non-STRIDE infrastructure programs.

For the last decade, these investments have been driving significant increases in gas utility customer bills. To understand the future impacts of these investments, Maryland's Office of People's Counsel (OPC) engaged DHInfrastructure to develop projections of investment levels and corresponding rate impacts for the State's three largest gas distribution companies—Baltimore Gas and Electric (BGE), Washington Gas Light (WGL), and Columbia Gas of Maryland (CMD)—based on the companies' current respective spending trajectories. This report—the third version, following versions published in October 2022 and November 2023—presents and analyzes DHInfrastructure's projections and explains how they were developed. It also examines how natural gas distribution and commodity rates have changed over the last decade based on actual data. Below we summarize the findings.

Maryland's three largest gas companies continue to pursue massive capital investment programs either directly through STRIDE or other programs aligned with STRIDE objectives...

In 2013, the Maryland General Assembly enacted the STRIDE law, section 4-210 of the Public Utilities Article, Annotated Code of Maryland. The STRIDE statute authorized Maryland gas utility companies to file infrastructure investment plans and corresponding project cost-recovery schedules to the Commission for approval.

The statute requires that companies receive approval of their STRIDE plans on five-year cycles. BGE, WGL, and CMD all requested and received approval for both initial five-year plans that began in 2014 and second five-year plans that were completed in 2023. As of January 2025, WGL is the only company with an active five-year STRIDE 3 plan, which the company will implement from 2022 through 2028. Columbia submitted an initial STRIDE 3 plan in 2023, then withdrew that plan and filed a revised plan in July 2024, only to withdraw the revised plan on December 30, 2024. As for BGE, it did not file a STRIDE 3 plan for its ongoing pipe replacement work. Instead, the company is pursuing that work under its second multi-year rate plan ("MYRP 2"), which covers the three-year period from 2024 through 2026.

WGL and BGE may have taken different paths with their STRIDE 3 plans, but their overall capital replacement strategies remain the same. Both companies continue to follow wholesale replacement strategies that aim to replace every single pipe made of materials targeted through their approved STRIDE 2 plans. In fact, the scope and duration of the company's STRIDE plans appear to be expanding. As part of its STRIDE 3 filing, WGL indicated that its STRIDE activities would not be completed until 2043, eight years later than the original end-date of WGL's STRIDE work.

Although it is unclear whether CMD will file another STRIDE plan, both of the company's withdrawn STRIDE 3 applications indicated that the company has ambitions to extend its accelerated replacement activities well beyond the timeline it presented in its STRIDE 1 and 2 plans. At the end of STRIDE 2, the company was on track to complete its targeted STRIDE replacements in 2026. Instead of short-term plans to address the remaining pipe materials targeted under STRIDE 1 and 2, both of CMD's STRIDE 3 plans proposed replacing new categories of pipe materials and other assets. This could extend the company's STRIDE program by up to 20 years.

Table 1.1 shows the amounts that BGE, WGL, and CMD spent on their first two STRIDE plans (2014-2023) and projects the companies' spending on accelerated infrastructure replacement activities from 2024 to 2043. BGE's spending is based on the STRIDE-like program in the company's current MYRP. (Again, BGE does not currently have a STRIDE plan per se). WGL's spending is based on the company's current STRIDE plan. CMD is conservatively assumed not to pursue further STRIDE plans. Essentially, Table 1.1 indicates that BGE and WGL's STRIDE plans are less than halfway complete and that there is upwards of $7,200 million remaining to be invested through STRIDE alone over the next 20 years.

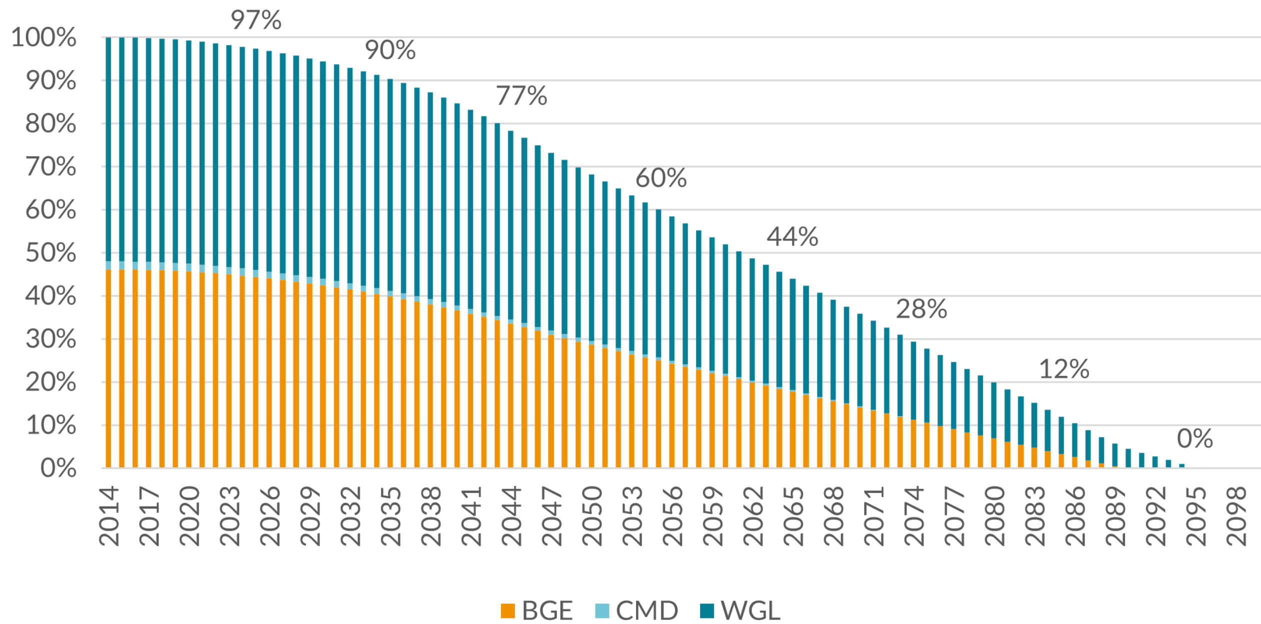
Maryland customers are only at the early stages of paying for STRIDE…

We determined the portion of the total STRIDE costs that have already been recovered through rates and, conversely, what portion of the STRIDE costs remains to be recovered. An investment is being "recovered" through rates until it is fully depreciated. Utilities under rate-of-return regulation receive a "return on" the undepreciated value of an investment in the form of a return on equity and a "return of" the investment in the form of depreciation expenses. Accordingly, we use cumulative STRIDE depreciation to represent the amounts recovered through rates.

Table 1.1: STRIDE/STRIDE-Like Investment Plans of Maryland's Three Largest Gas Utilities (million $)

	BGE	WGL	CMD
Actual STRIDE 1 (2014-2018) spend	$522.7	$220.8	$66.2
Actual STRIDE 2 (2019-2023) spend	$781.9	$377.9	$104.8
Estimated STRIDE 3 (2024-2028) budget	$653.7	$330.1	$0
Estimated STRIDE 4 (2029-2033) budget	$722.0	$614.6	$0
Estimated STRIDE 5 (2034-2038) budget	$777.8	$1,099.5	$0
Estimated STRIDE 6 (2039-2043) budget	$837.9	$2,195.7	$0
All-time Total STRIDE 1 to STRIDE 6	**$4,295.9**	**$4,838.6**	**$171.0**
Future Total = STRIDE 3 to STRIDE 6	**$2,991.3**	**$4,239.9**	**$0**
Three-company All-time Total		**$9,305.5**	
Three-company Future Total		**$7,231.2**	

Figure 1.1: Amount of STRIDE Cost Recovery Remaining Across Maryland's 3 Largest Gas Utilities



We combined the results of the individual companies into Figure 1.1 to provide a holistic view of the remaining years that STRIDE costs will be recovered through rates in Maryland. What is important to recognize from this figure is that right now, in February 2025, only 3 percent of total projected STRIDE costs have been recovered through rates. If spending is allowed to continue on the current trajectory, Maryland customers will be paying for STRIDE costs until 2094.

...and companies will also continue to invest in gas infrastructure outside of STRIDE well into the future.

Maryland gas utilities are also continuing to invest in other capital asset categories not covered by their STRIDE and STRIDE-like plans. This includes the normal or non-accelerated replacement activities that CMD will likely pursue absent an approved STRIDE plan. Our conservative estimate is that if the companies spend on non-STRIDE activities at current levels, they will make another $42,098 million in investments outside of STRIDE between 2024 and 2100. As shown in Table 1.2 the combined STRIDE and non-STRIDE investments are $49,329 million. In 2025 alone, Maryland gas utilities will spend a projected $744 million on gas capital expenditures.

Table 1.2: Maryland Gas Capital Expenditure (CAPEX) Investments, 2024-2100 (million $)

Utility	STRIDE (2024-2043)	Non-STRIDE (2024-2043)	Non-STRIDE (2044-2100)	Total (2024-2100)	Change in Total from 2022 Study ($)	Change in Total from 2022 Study (%)
BGE	$2,991	$8,448	$24,076	$35,515	+$11,780	+50%
WGL	$4,240	$2,158	$6,149	$12,547	+$3,933	+46%
CMD	--	$487	$779	$1,267	+$386	+44%
Total	$7,231	$11,093	$31,005	$49,329	+$16,099	+48%

If this pace of investment continues, the capital component of the revenue requirements collected from customers will more than double over the next 25 years…

To understand the impact of our capital investment projections on gas utility rates, we first developed a revenue requirement model that estimated the capital-related components of the revenue requirement. Roughly speaking, the "revenue requirement" consists of the utility's total revenue needed to serve customers for a given year. The annual revenue requirement is divided by anticipated sales to arrive at the per therm rate that customers pay. (The term is defined in the glossary at the end of this report.) Importantly for customers, the capital investment portion of the revenue requirement accounts only for the costs related to a utilities' spending on capital expenditures such as depreciation, return on equity, and property taxes; it does not include (a) the utilities' operational costs nor (b) gas commodity costs that customers pay in their bills.

All utility capital investment enters the utility's rate base. The rate base is the undepreciated value of utility plant-in-service, comprised of the utility's prior capital investments less accumulated depreciation. Rate base determines the capital investment-related portion of the utility's revenue requirement (i.e., the annual revenues the utility is authorized to recover from its customers through its rates). Capital investments are recovered from the utility's customers over time—through a depreciation charge—often more than 30 years, and as long as 70 years, depending on the expected life of the asset—until it is fully depreciated. Customers pay both a "return of" investments, in the form of depreciation, and a "return on" investments. The "return on" component equals the utility's weighted cost of capital (WACC)—a combination of debt and shareholder equity—expressed as a percentage multiplied by the utility's rate base.

Each utility has its own WACC, which is sometimes referred to as its "rate of return." The WACC is "grossed up" so that customers pay for the utility's taxes due on its anticipated profits.[1] The WACC with the gross up is generally around 10 percent, which is analogous to an interest rate paid on the amounts in rate base. Since the WACC with the gross up is multiplied by the utility's rate base, the larger the rate base, the greater the utility's return and shareholder profits.

The pyramid in figure 1.2 reflects the gas companies' revenue requirement. This figure provides context for the current status of the utilities' overall STRIDE plans. As identified by the arrow and dotted line, the combined 2024 capital investment component of the utilities' revenue requirement of approximately $249 million across the three STRIDE programs represents a fraction, 25 percent, of the $970 million peak in STRIDE revenue requirements that we project for 2044. In other words, if STRIDE plans continue as currently constituted, Maryland customers could eventually be paying, annually, upward of three times more for STRIDE investments than the amounts customers spent in 2024.

The STRIDE annual revenue requirement amounts pictured above represent only a fraction of the total aggregate capital investment related revenue requirements customers will need to pay to cover capital investments made over the next 80 years. As shown in Figure 1.2, the STRIDE and non-STRIDE capital additions we project through 2100 would result in annual capital revenue requirements for the three utilities exceeding $2.33 billion dollars by 2044 or **2.8** times the combined $849 million in capital investment related revenue requirements customers paid through rates in 2024. Put another way, customers today are responsible for paying less than half of the capital investment related costs that customers will be responsible for in 2044.

1 The tax "gross-up" covers the federal and state income taxes due if the utility earns its WACC, the property taxes related to the capital investment and certain other miscellaneous fees.

Figure 1.2: STRIDE Annual Revenue Requirement Pyramid

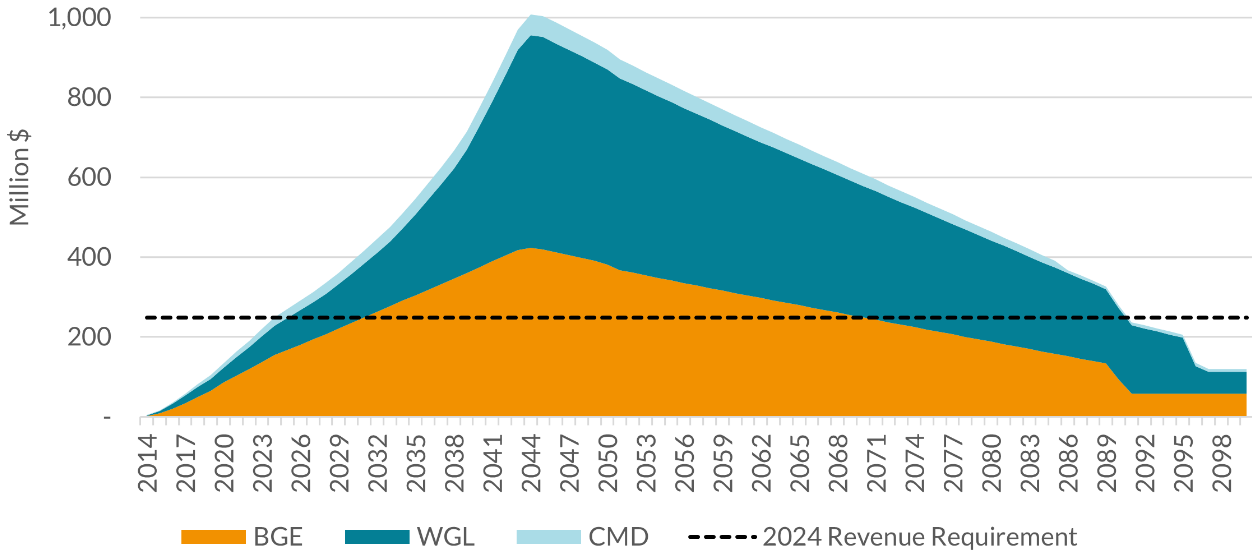
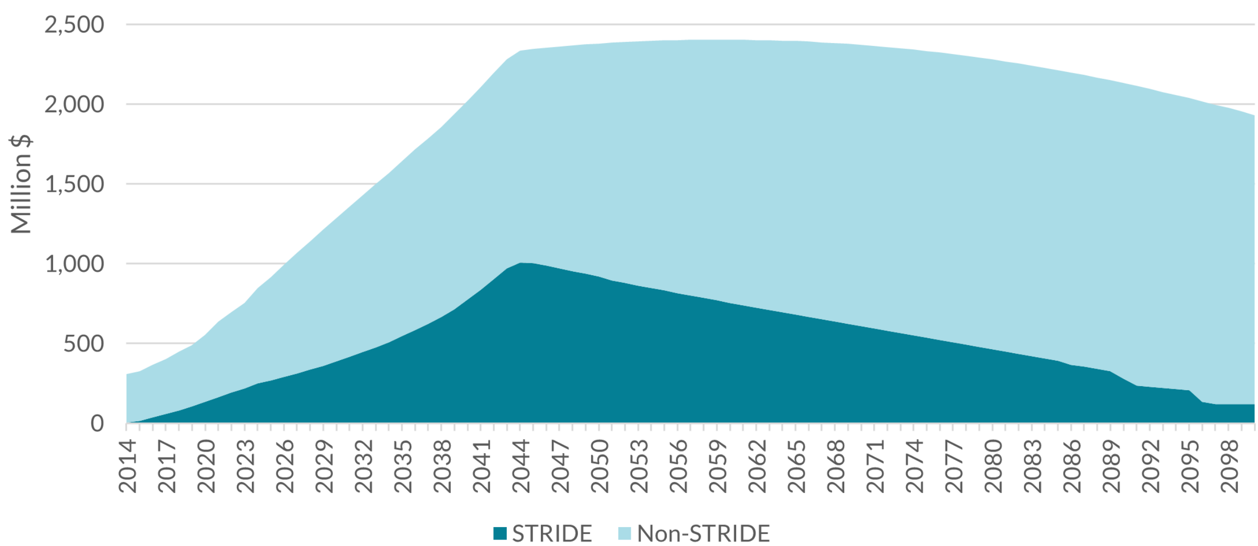


Figure 1.3 provides both a comparison of the combined non-STRIDE (aqua) and STRIDE (teal) capital investment-related revenue requirements across the combined three companies and shows how the total capital investment related revenue requirements (aqua + teal) will evolve over time.

...which will result in corresponding increases in base rates charged to customers to cover the rise in rate base.

Next, we identified how the capital investments will affect customer rates. This step allocates revenue to the residential heating class of each company using the revenue allocation factors from the most recent STRIDE filings. We set the billing determinants for customer-months and usage based on the revenue calculations in the compliance filing from each company's most recent rate case. We assumed the customer and sales numbers are constant over the evaluation period. Stated otherwise, the projections

Figure 1.3: Combined Three-Company STRIDE and Non-STRIDE CAPEX Annual Revenue Requirement



do not account for any migration of gas customers to electric service as a result of electrification policies.

To show the bill impacts over time, we evaluate the typical bill for a winter customer using 160 therms per month in January and February. We use this period because these months tend to have the highest gas bills for customers.

Figure 1.4 shows that the BGE typical residential customer's bill will grow from an average of $240 in 2022-2024 to $402, a 67 percent increase, by 2035 and $498, a 107 percent increase, by 2050. This estimate assumes commodity prices stay around the five-year averages and that gas sales do not decline. If gas prices experience another shock like in 2022, when commodity prices reached around $1.00 per therm, then that would add an additional $51 per month to the typical winter bill. The effects of declines in gas consumption for each company are addressed further below.

Figure 1.5 shows that the WGL typical residential customer's bill will grow from an average of $194 in

Figure 1.4: BGE Typical Winter Bill, 2014-2100

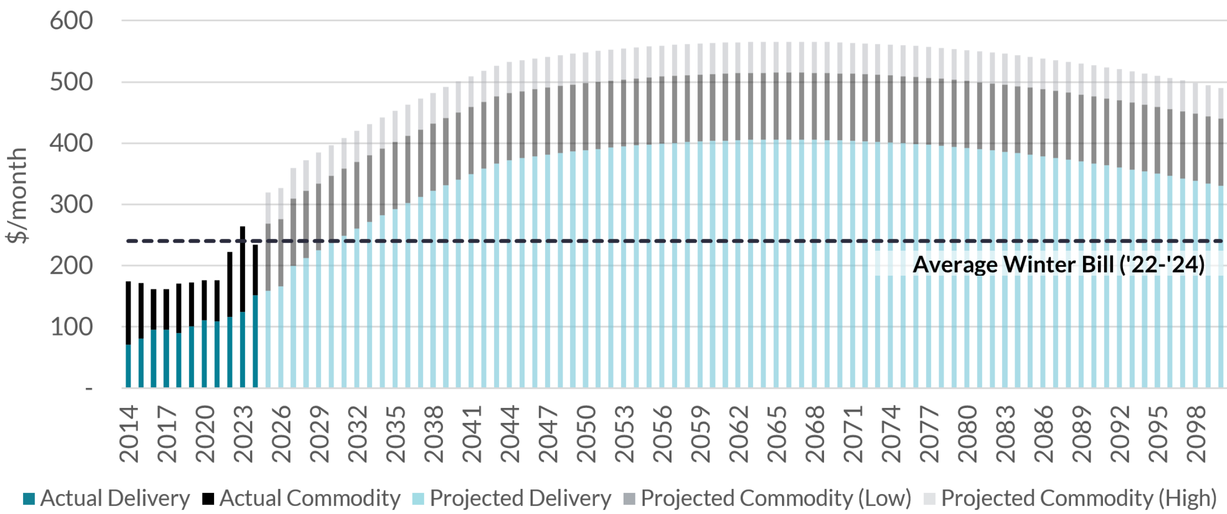


Figure 1.5: WGL Typical Winter Bill, 2014-2100

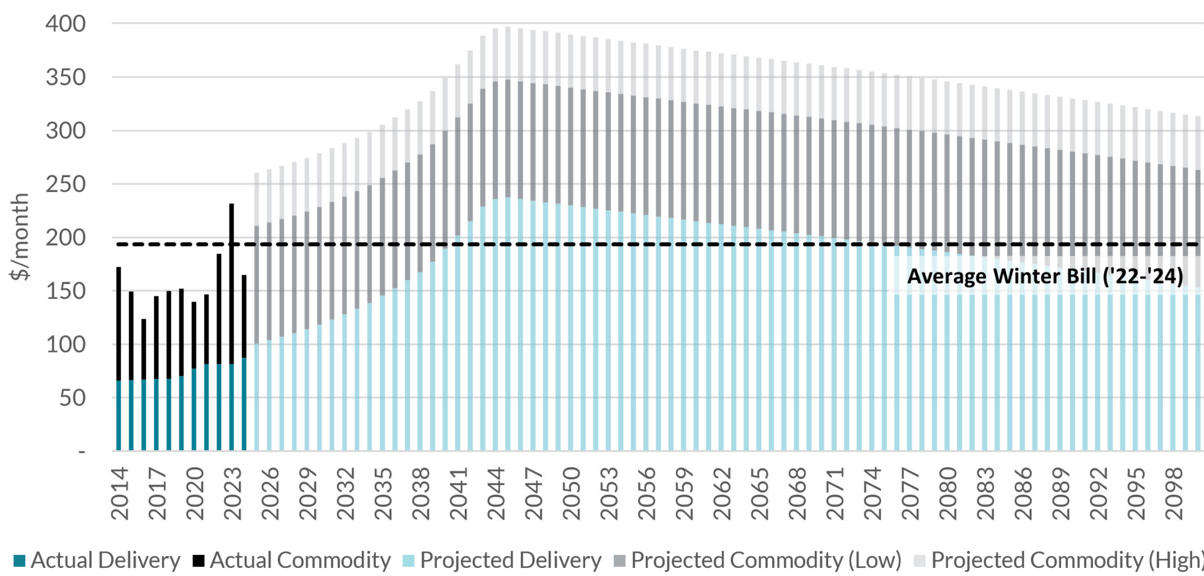
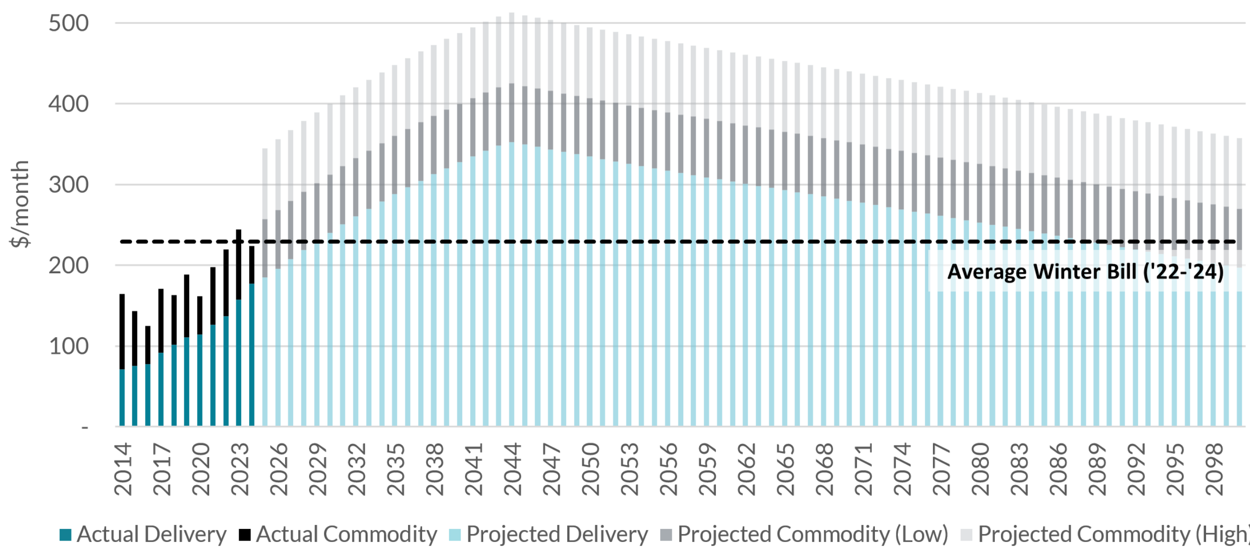


Figure 1.6: CMD Typical Winter Bill, 2014-2100



2022-2024 to $256, a 32 percent increase, by 2035 and $340, a 76 percent increase, by 2050. This too assumes commodity prices stay at the five-year averages. If gas prices experience another shock and go back to $1.00 per therm, the typical winter bill would increase by an additional $50 per month.

Figure 1.6 shows that the CMD typical residential customer's bill will grow from an average of $229 in 2022-2024 to $337, a 47 percent increase, by 2035 and $365, a 59 percent increase, by 2050. If gas prices experience another shock and go back to $1.00 per therm that would add an additional $88 per month to the typical winter bill.

As customer preferences change and as Maryland pursues its climate goals, gas utilities face the prospect of declining customer counts even as they continue making substantial system investments.

Potential gas customer migration would only further accelerate the projected increases in base rates and monthly residential bills.

The bill projections presented above represent a business-as-usual ("BAU") scenario that assumes customer counts remain stable over time. Highly efficient electric appliances are proving competitive with gas appliances,[2] however, and Maryland's climate goals include policies to promote building electrification, which will likely drive some customers to migrate away from gas service. As customer preferences change and as Maryland pursues its climate goals, gas utilities face the prospect of declining customer counts even as they continue making substantial system investments. Base rates would need to increase significantly to recover the same costs from fewer customers and sales.

We analyze the rate implications of potential customer migration through three reduction scenarios—10, 30, and 70 percent fewer customers—assuming current rate design remains the same.

2 Electric heat pumps are outselling gas furnaces and growing as a share of overall heating systems, while continuing to make efficiency gains. See https://www.washingtonpost.com/climate-solutions/2024/10/21/heat-pump-sales-slump-us-europe/; https://www.washingtonpost.com/climate-solutions/2024/11/14/cold-climate-heat-pump-winter/.

Figure 1.7 shows that the higher rates translate into significantly higher monthly winter bills for any remaining BGE customers. By 2035, the typical BGE winter bill could vary significantly depending on the customer migration scenario:

- Under the 10% reduction scenario, the winter bill could be $491 (high commodity), which is $36 or 7.5% higher than the BAU projection of $455.
- Under the 30% reduction scenario, the same winter bill reaches $595 – an additional $140 or a total bill 1.31 times the BAU amount.
- Under the 70% reduction scenario, the winter bill reaches $1,219 – an additional $764 or a total bill 2.7 times the BAU amount.

Figure 1.8 shows how the typical WGL customer's monthly winter bill might change due to customer migrations. The winter bill of the typical WGL customer varies widely by 2035 by migration scenario:

- Under the 10% reduction scenario the winter bill could be $324 (high commodity), which is $19 or 6.1% higher than the BAU projection of $306.
- Under the 30% reduction scenario, the same winter bill reaches $377 – an additional $72 or a 23.5% increase over the BAU winter bill.
- Under the 70% reduction scenario, the winter bill reaches $696 – an additional $391 or a total bill 1.28 times the BAU amount.

Figure 1.9 shows how the typical CMD customer's monthly winter bill might change due to customer migrations. The winter bill of the typical CMD customer could also vary widely in 2035 depending on the customer migration scenario:

- Under the 10% reduction scenario the winter bill could be $456 (high commodity), which is $32 or 7.6% higher than the BAU projection of $424.
- Under the 30% reduction scenario, the same winter bill reaches $549 – an additional $125 or a 29.3% increase over the BAU.
- Under the 70% reduction scenario, the winter bill reaches $1,102 – an additional $678 or a total bill 1.60 times the BAU amount.

Figure 1.7: BGE Typical Winter Bill with Declines in Consumption by Scenario and Year

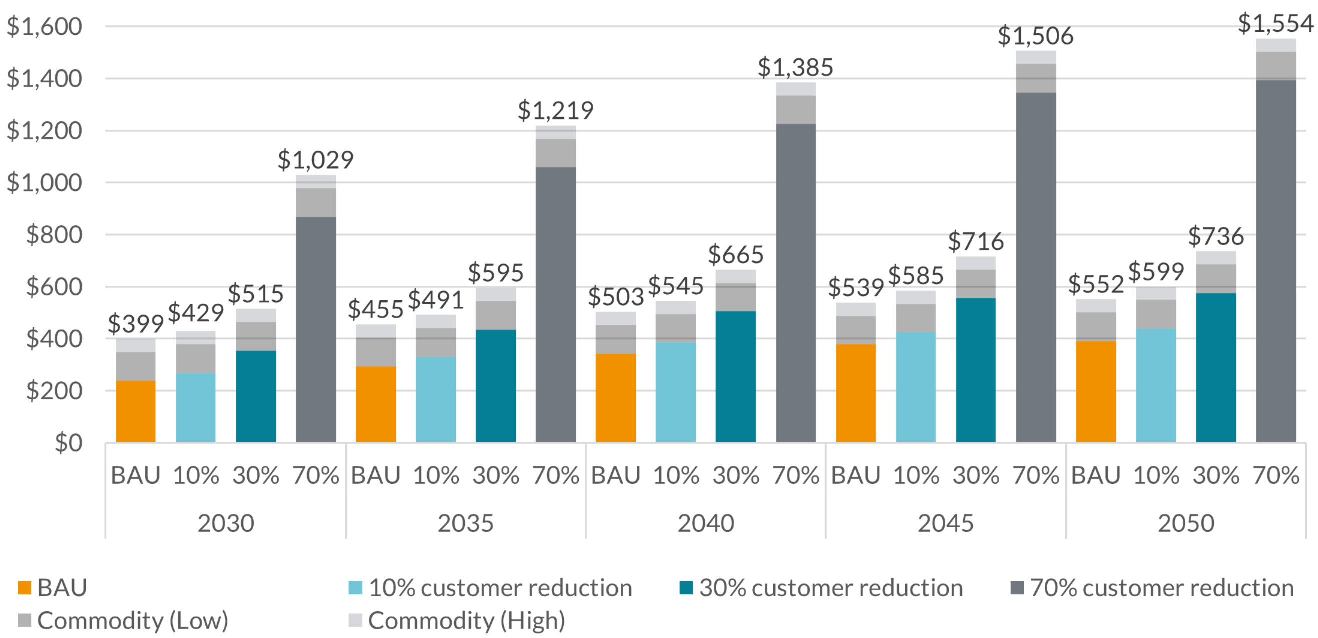


Figure 1.8: WGL Typical Winter Bill with Declines in Consumption by Scenario and Year

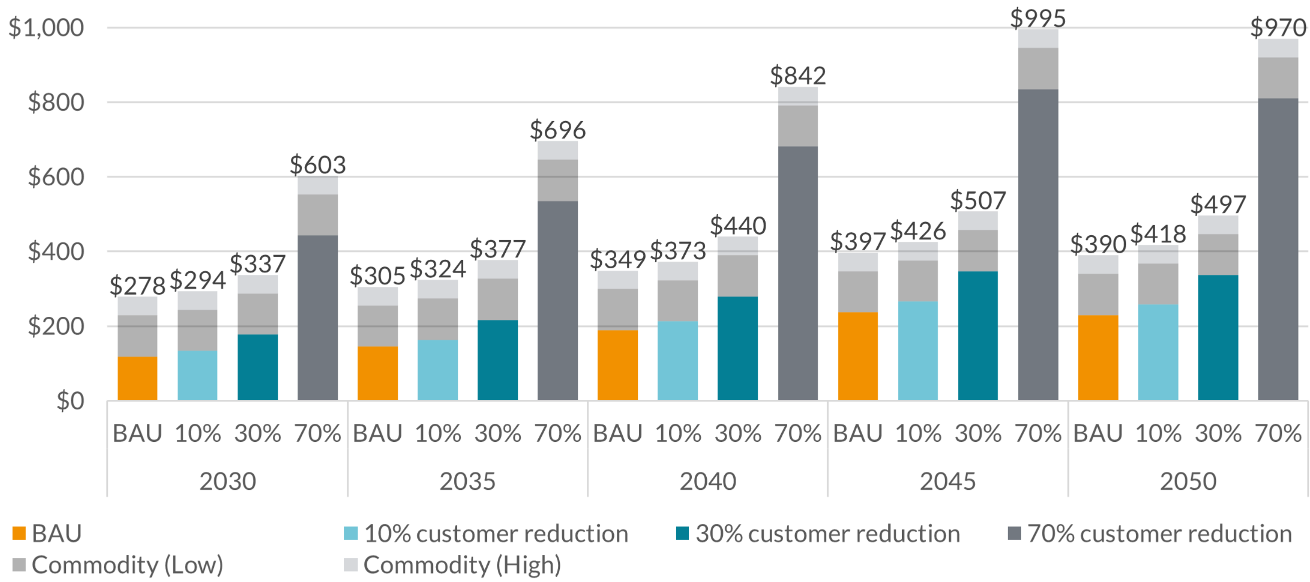
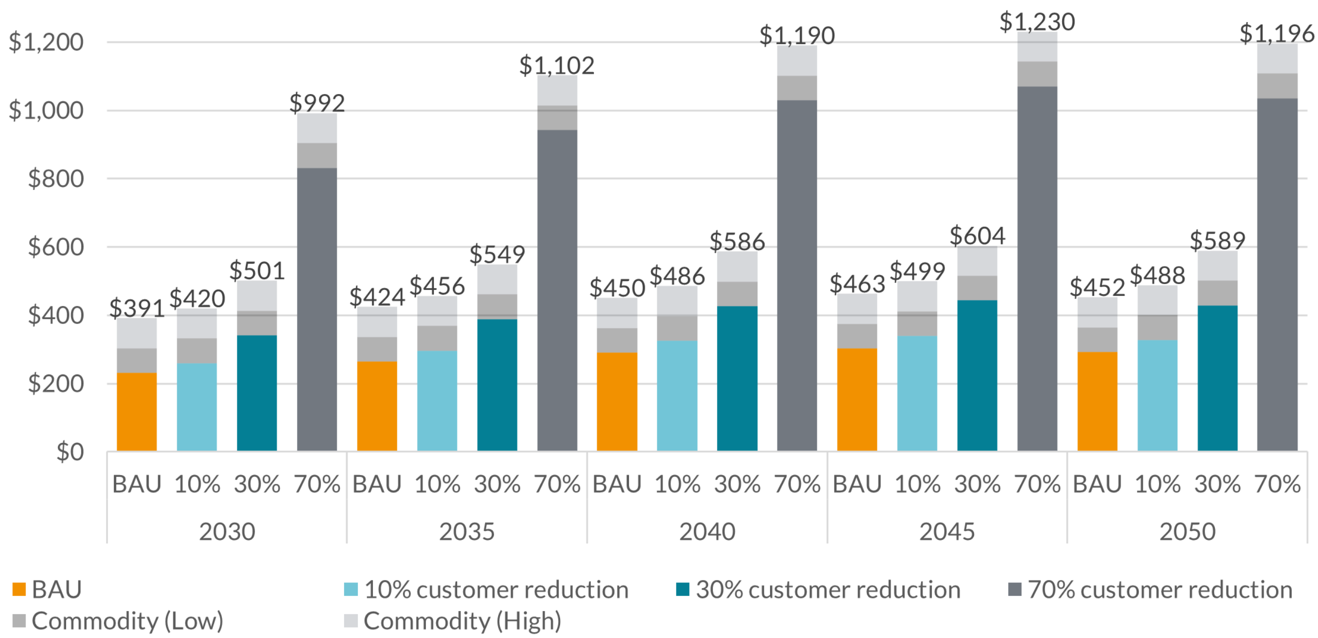


Figure 1.9: CMD Typical Winter Bill with Declines in Consumption by Scenario and Year



New subscription business models might provide companies better revenue protection…

One option to address the massive rate increases that would result from significant declines in gas consumption would be to change how utilities currently recover their annual revenue requirement based largely on volumetric charges. A change to a "subscription" model, as suggested by BGE in recent regulatory proceedings, would require customers who rely on the system (for all or certain appliances, or as a "backup" heating source, as BGE suggests) to pay a subscription fee that would cover the revenue requirement rather than using volumetric charges.

Table 1.3: Sample of Annual Subscription Fees by Scenario and Year

	10% reduction in customers			30% reduction in customers			70% reduction in customers		
	2030	2035	2050	2030	2035	2050	2030	2035	2050
BGE	$1,239	$1,503	$1,971	$1,593	$1,932	$2,534	$3,717	$4,508	$5,914
CMD	$1,357	$1,531	$1,679	$1,745	$1,969	$2,159	$4,071	$4,594	$5,038
WGL	$742	$891	$1,325	$954	$1,146	$1,703	$2,226	$2,673	$3,974

A subscription charge would, in practical effect, change the current method of recovering the utilities' annual revenue requirement from a relatively small monthly charge plus a much larger charge based on customer usage—the volumetric charge, or rate—to recover all costs through the monthly charge.

We estimate the annual subscription fee for the same customer reduction scenarios—10, 30, and 70 percent—as we apply to conventional volumetric rates to understand how changing the method of utility cost recovery might work in Maryland in the future. Table 1.3 provides a sample of the subscription fees estimated for the 10 percent and 70 percent customer reduction scenarios in 2030, 2035, and 2050.

For comparison purposes, current monthly customer charges are, annualized, $186.60, $195.00, and $158.28 for BGE, CMD, and WGL respectively. These amounts reflect what a customer currently would expect to pay by remaining on the gas system for a year without actually using any gas. As Table 1.9 shows, a subscription model of recovery would increase those costs significantly.

...but the level at which these charges would need to be set to fully recover system costs would be so high that few customers would be likely to pay for subscription service over time.

The prospects of the gas companies moving to a subscription model for all customers—or just customers who use limited gas—would materially alter how customers make electrification investment decisions. Today, a BGE customer deciding whether to completely electrify (with no gas backup) or pursue a hybrid-system might assume that they will only be responsible for paying the current monthly charge that amounts to $186.60 per year ($15.55 monthly fixed charge x 12) if no gas is used. If customers understand that they would instead be paying $1,000 to $5,000 per year by 2035, the economics of full electrification versus maintaining a gas connection for limited purposes—such as a hybrid heating system that uses gas on rare occasions as backup—change significantly.

Further, subscription fees would only provide access to the company's distribution systems. Customers would then have to pay for the gas commodity used. The subscription fee and gas commodity costs would also be on top of the increase in a customer's electric bill for electricity used to heat their home. Taken all together, the magnitude of the subscription fees we project with only modest (10 percent) customer departures ($891 to $1,522 by 2035) raise questions about the practicality of maintaining gas services for low levels of gas consumption.

SECTION TWO

RECENT GAS RATE TRENDS

Before examining future capital investments and their rate impacts, it is important to understand how gas rates have evolved in recent years. This section examines two key trends that provide context for our forward-looking analysis: the changing composition of customer bills and the relationship between delivery rates and commodity costs. These historical patterns reveal how capital investments are already affecting rates and demonstrate why customers have become increasingly exposed to both delivery rate increases and commodity price volatility.

2.1. Bill Composition

Prior to the increase of gas commodity prices from late 2020 to 2022, there had been a trend over the previous decade where the distribution portion of bills was increasing, while the commodity portion of the bill decreased or remained relatively constant. Below we use BGE's residential base and commodity rates to demonstrate this trend.

Figure 2.1 shows the annual bill for a BGE residential customer using 940 therms per year from 2006 through 2024. There are two important trends to identify in the figure. First, there is a downward trend in bills from 2008 to 2012. The drop in gas bills over these years is due to the combined effect of falling gas commodity prices and relatively slow growth in BGE's distribution rates. From 2008 to 2013, the average commodity price paid by BGE customers for gas fell from $1.02/therm to $0.58/therm (a drop in price of about 10 percent per year) while over the same period the base distribution bill for a residential customer grew from $397 to $489—an increase of about four percent per year.

The second trend is the accelerated rise of the base distribution bill. From 2013 to 2024, the base distribution bill has grown at a compound annual growth rate of 6.6 percent, increasing the amount paid annually by a residential gas customer using 940 therms per year from $489 in 2013 to $987 in 2024. Over this same time the gas commodity prices continued to trend downward—albeit at a less constant rate with commodity price increases in 2021 and 2022 being notable exceptions—such that the average price paid for gas by a BGE residential customer in 2024 ($0.46/therm) is 20 percent lower than the price paid in 2013 ($0.58/therm). The drop in commodity prices has allowed the overall annual bill (commodity plus delivery) to remain relatively constant from 2013 to 2024 because the decrease in gas commodity prices over this period offset increases in distribution costs.

The diverting trends of upward base rates and downward commodity rates have fundamentally altered the customer's business relationship with BGE. A notable flip occurred in 2015: gas customers began to pay more for gas delivery than for the gas commodity they used. Figure 2.2 shows the bills from Figure 2.1 broken down into percentage components.

Figure 2.1: BGE Annual Bill by Component for Customer using 940 therms/year, 2006-2024 ($/year)

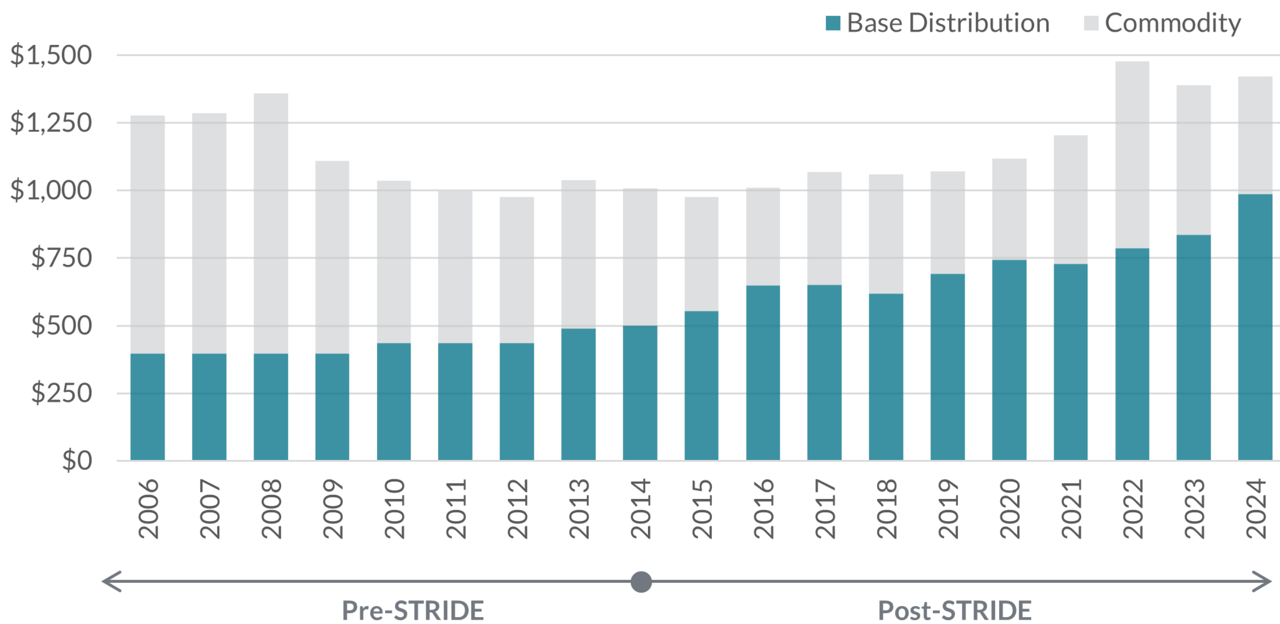
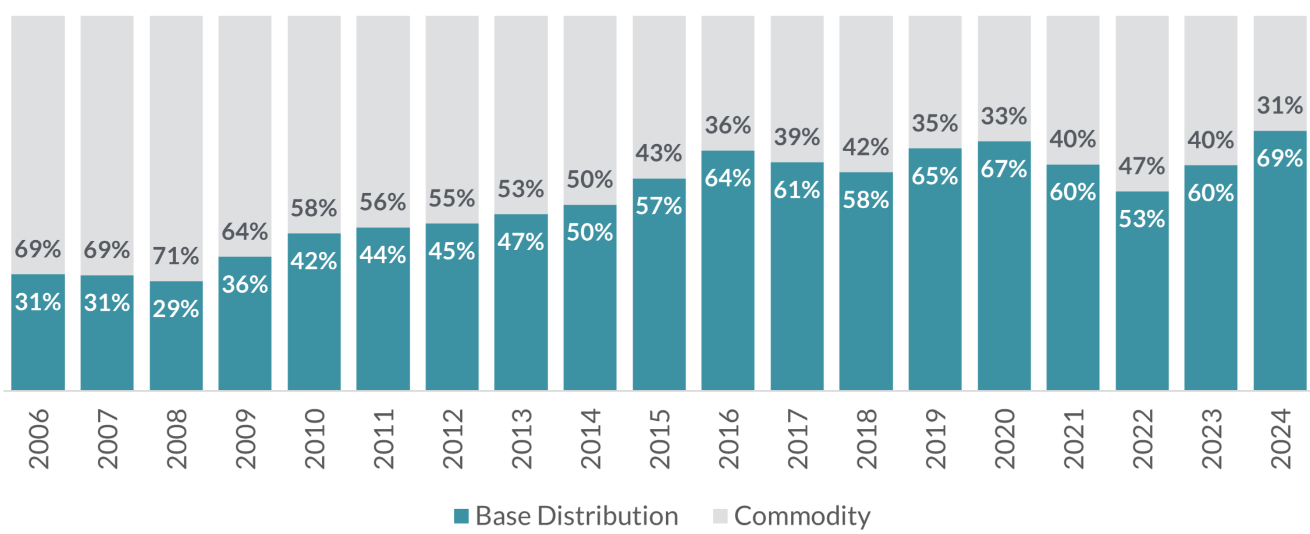


Figure 2.2: BGE Annual Bill by Component for Customer using 940 therms/year, 2006-2024 (%)



The increase in delivery rates has largely been driven by the capital expenditures, specifically the STRIDE expenditures, addressed in this report. From a customer's perspective, it can be viewed as a positive that improvements in gas extraction have reduced the commodity costs and enabled gas companies to replace leak-prone materials without substantial increases in the total customer bill. If delivery rates had not increased rapidly, however, customers would have paid significantly lower total bills over this period. Instead of customers saving money from the decrease in commodity costs, gas companies have increased base delivery rates and filled the gap.

2.2. Delivery Rates vs. Commodity Rates

The trend discussed in the previous sections is the result of a period of declining or low-cost gas commodity prices and continued upward pressure from gas utilities on delivery distribution rates. This subsection explores the relationship between the commodity price of gas and the overall costs of gas services.

Delivery charges appear in two separate components of customer rates—a volumetric charge and a demand (or fixed) charge. Steady increases in both the volumetric and fixed portion of delivery rates at the three gas companies from 2006 to 2024 are shown in Figure 2.3 and Figure 2.4.

Figure 2.3: Volumetric Delivery Rates ($/therm), 2006-2024

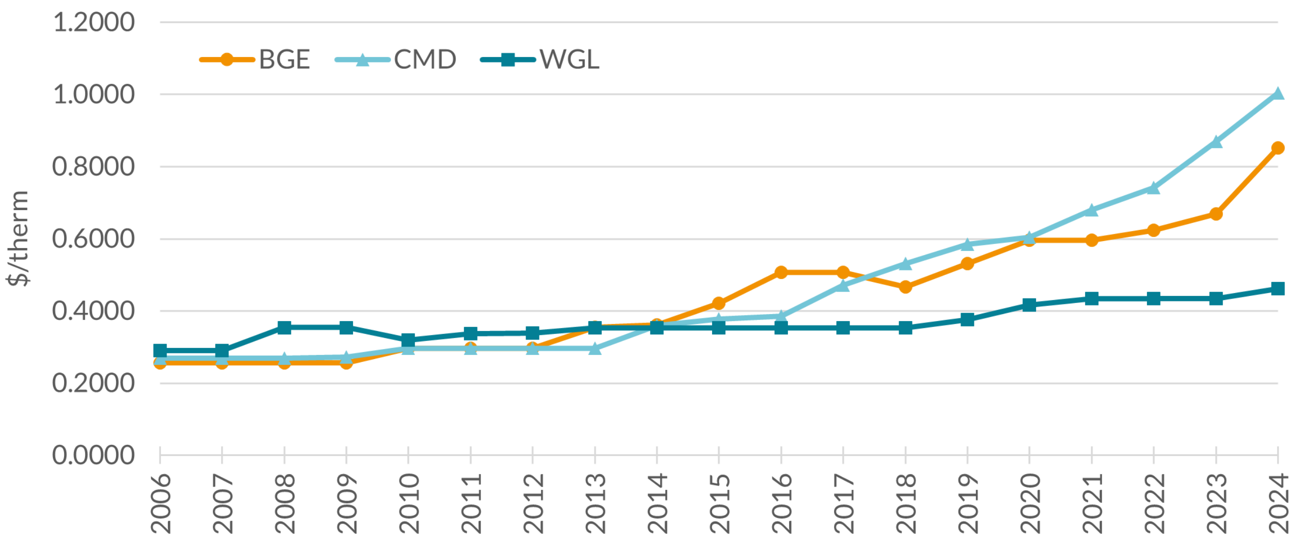
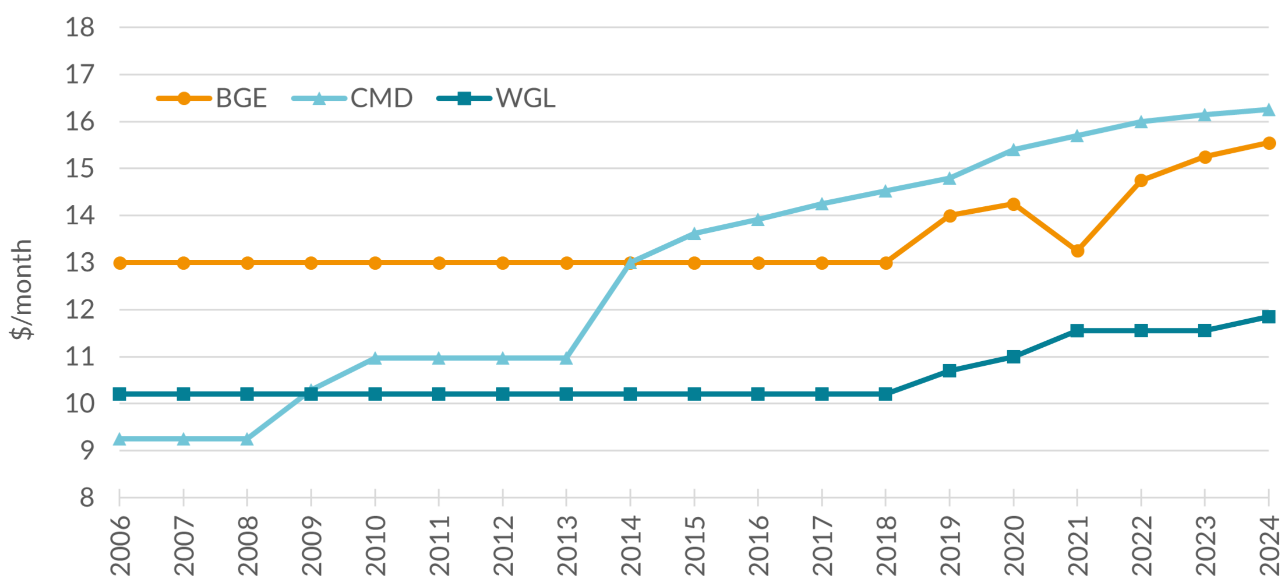


Figure 2.4: Monthly Fixed Customer Charges ($/month), 2006-2024



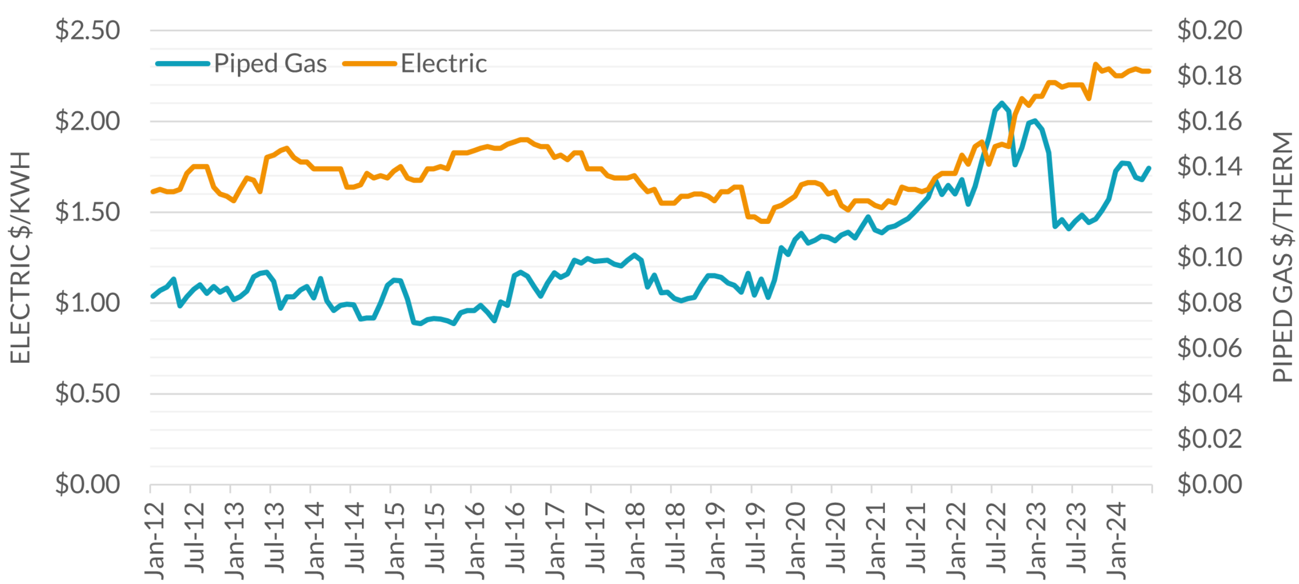
The steady increase in gas delivery fees had been masked by an unusually prolonged low-price commodity-cost period from 2013 until 2021. Prior to this period, gas prices had historically shown patterns with repeating short (1-2 year) cycles of peaks and troughs in prices. This pattern is evident in the Henry Hub Prices prior to 2013 shown in the figure below where prices routinely dropped but then returned to levels around the previous high mark.

This pattern contrasts with the eight-year period between 2014 and 2021 when prices fell and did not return close to the February 2014 level ($6/MMBtu) until April 2022. Although it may appear in 2024 that the gas commodity market has returned to pre-2021 levels, the volatility in prices in recent years shows that any assumption that prices will remain at their current levels is misplaced.

Figure 2.5 shows how the volatility of gas prices contrasts with electricity prices. This figure uses data on electricity and gas end-user prices tracked by the Bureau of Labor and Statistics. Evident in this figure is that between 2012 and 2024, there is greater variability in the price paid by customers for gas than electricity. Statistically, the volatility in prices residential customers paid for gas was around three times greater than the volatility in electricity prices over this period.[3]

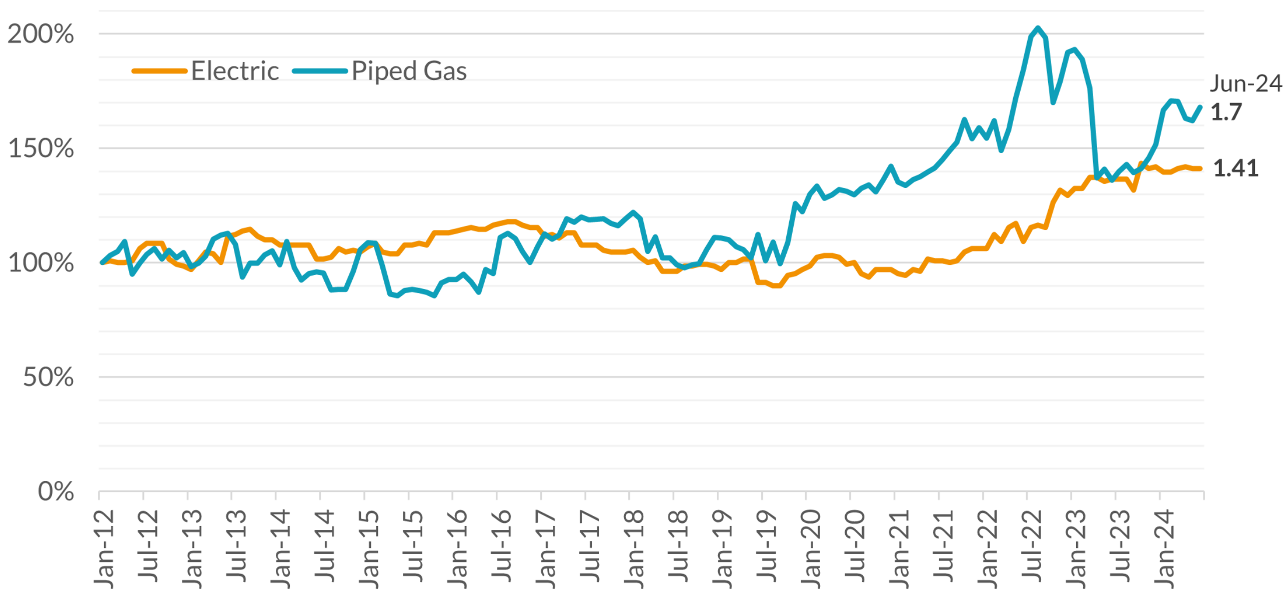
To better compare the changes in electricity and gas prices, we indexed the prices using a baseline. In Figure 2.6 below, the January 2012 prices for gas and electricity are used as baselines (January 2012 = 1) and then every subsequent monthly indicator represents the relationship between that month's price and the baseline price (monthly price / January 2012 price). Figure 2.6 illustrates that since 2019, natural gas prices have increased faster than electricity end-user prices. Electric prices are 41 percent higher in January 2024 than 12 years earlier, whereas gas prices are 71 percent higher.

Figure 2.5: BGE Residential Electricity and Gas Prices, January 2012-June 2024



3 Volatility was estimated by calculating the coefficient of variation (CV = standard deviation / mean) of gas and electricity prices over the evaluation period. The CV of gas prices was 23.2 percent and the CV of electricity prices was 11.8 percent.

Figure 2.6: Indexed BGE Electricity and Gas Prices, January 2012-June 2024
(index = January 2012)



The spike in commodity market prices in 2022 and the corresponding effect on electricity and gas prices further demonstrate the greater stability of electricity prices. Gas prices in 2022 rose 44 percent from December 2021 to August 2022 whereas peak electricity prices in December 2022 were only 25 percent higher than a year earlier. This result exemplifies how the rise in delivery charges over recent years has made gas customers more vulnerable to market volatility than electric customers.

SECTION THREE

STRIDE CAPITAL INVESTMENTS

In 2013, the Maryland General Assembly enacted section 4-210 of the Public Utilities Article, Annotated Code of Maryland (section 4-210 or STRIDE statute). The STRIDE statute authorized Maryland gas utility companies to file infrastructure investment plans and corresponding project cost-recovery schedules with the Commission for approval.

Eligible investments under STRIDE include infrastructure replacement or improvement projects that meet the following criteria:

- Made on or after June 1, 2013;
- Designed to improve public safety or infrastructure reliability;
- Does not increase the revenue of a gas company by connecting an improvement directly to new customers;
- Reduces or has the potential to reduce greenhouse gas emissions through a reduction in natural gas system leaks; and
- Is not included in the current rate base of the gas company as determined in the gas company's most recent base rate proceeding.[4]

Section 4-210 permits companies to begin recovering costs of approved STRIDE investments outside of a rate case through the STRIDE surcharge mechanism. Section 4-210 establishes the rate mechanism to be used to recover eligible costs as a "fixed annual surcharge on customer bills." This surcharge is capped at $2 per month for residential customers; for all non-residential customers, the surcharge cap is proportionate to each class's total distribution revenues as determined in the most recent base rate proceeding. When the Commission approves the investments in the utility's subsequent rate case and the previous STRIDE investments are allowed into rate base, the surcharge is reset to zero, subject to increasing again to recover the next round of STRIDE-eligible investments until the next base rate case. Thus, aside from the surcharge, customers are also paying for STRIDE investments through the per therm delivery rates they pay (the "base rates").

Absent the surcharge mechanism, companies would not be able to begin to recover the investment costs of completed projects until these costs are included in rate base in the next base rate proceeding. The time gap between when a project is completed (or "in service") and when it is reflected in base rates is known as "regulatory lag." Cost recovery schedules under the STRIDE statute are initially based on estimated project costs, which are "collectible at the same time the eligible infrastructure replacement is made"[5] and these costs are reconciled annually. This estimate and reconciliation approach effectively eliminates regulatory lag such that companies receive contemporaneous recovery of STRIDE costs as they are incurred. This elimination of "regulatory lag" is the main mechanism by which STRIDE accelerates the replacement of natural gas infrastructure.

4 *Md. Code Ann., Public Utilities Article § 4-210 (a)(3).*

5 *Md. Code Ann., Public Utilities Article § 4-210 (d)(3)(ii).*

Table 3.1: STRIDE Investment Plans of Maryland's Three Largest Gas Utilities (million $)

	BGE	WGL	CMD
Actual STRIDE 1 (2014-2018) spend	$522.7	$220.8	$66.2
Actual STRIDE 2 (2019-2023) spend	$781.9	$377.9	$104.8
Estimated STRIDE 3 (2024-2028) budget	$653.7	$330.1	$68.3
Estimated STRIDE 4 (2029-2033) budget	$722.0	$614.6	$0
Estimated STRIDE 5 (2034-2038) budget	$777.8	$1,099.5	$0
Estimated STRIDE 6 (2039-2043) budget	$837.9	$2,195.7	$0
All-time Total STRIDE 1 to STRIDE 6	**$4,295.9**	**$4,838.6**	**$171.0**
Future Total = STRIDE 3 to STRIDE 6	**$2,991.3**	**$4,239.9**	**$0**
Three-company All-time Total		**$9,305.5**	
Three-company Future Total		**$7,231.2**	

The statute requires that companies receive approval of their STRIDE plans on five-year cycles. BGE, WGL, and CMD all completed their second five-year plans in 2023. Each company has subsequently taken different paths starting in 2024 such that WGL is currently the only company with an approved five-year STRIDE program, the company's third. As will be discussed further below, BGE now completes infrastructure replacement activities as part of its MYRP rather than through an approved STRIDE plan. CMD does not currently have an approved STRIDE plan and has withdrawn both of its STRIDE 3 applications; the company's future plans are unknown.[6]

All three companies continue to complete replacement of STRIDE-eligible assets towards the goal of eventually retiring the entire population of each asset category. Because BGE's "STRIDE-like" investment activities are effectively continuations of the company's STRIDE plans this study update continues to treat these investment plans under the category of STRIDE. For comparative purposes, we have also continued to group the anticipated investments into five-year periods to demonstrate how many five-year STRIDE plan iterations are remaining. Information presented by each company up through July 2024 indicates that the replacement goals could require at least another 20 years. This means that beyond STRIDE 3 (2024-2028) the current replacement plans of the companies indicate there could be a need for STRIDE 4 (2029-2033), STRIDE 5 (2034-2038), and STRIDE 6 (2039-2043). Table 3.1 presents our estimates of the budgets required across each company's future STRIDE or STRIDE-equivalent replacement plan.

We next describe in more detail the STRIDE history and current replacement plans for each of Maryland's three major gas utilities that were used to develop the future investment plans in Table 3.1.

3.1. STRIDE History and Current Replacement Plans

3.1.1. BGE

BGE STRIDE History

BGE's STRIDE activities for STRIDE I and II were separated into two different sub-programs: Operation Pipeline and Service Replacement Program. The Operation Pipeline program consisted of projects focused on the replacement of cast iron main, bare steel main, bare steel services, and copper services. In 2016, BGE added the Service Replacement

6 CMD's most recent STRIDE 3 plan was filed on July 31, 2024 under CN 9751 and withdrawn on December 30, 2024.

Program to specifically address pre-1970 3/4"high pressure steel services. This program ended in 2023 at the end of STRIDE 2.

BGE STRIDE Status

Starting in 2024, BGE has transitioned away from completing its Operation Pipeline activities under the STRIDE statute. It is currently pursuing equivalent pipe replacement work through its second MYRP (MYRP 2) that was filed in Case No. (CN) 9692 in 2023. Within these plans, BGE proposed to replace 53 miles/year over the three-year MYRP 2 period. The Order released by the PSC in December 2023 ultimately approved a reduced replacement rate of 42.6 miles per year over the MYRP period.

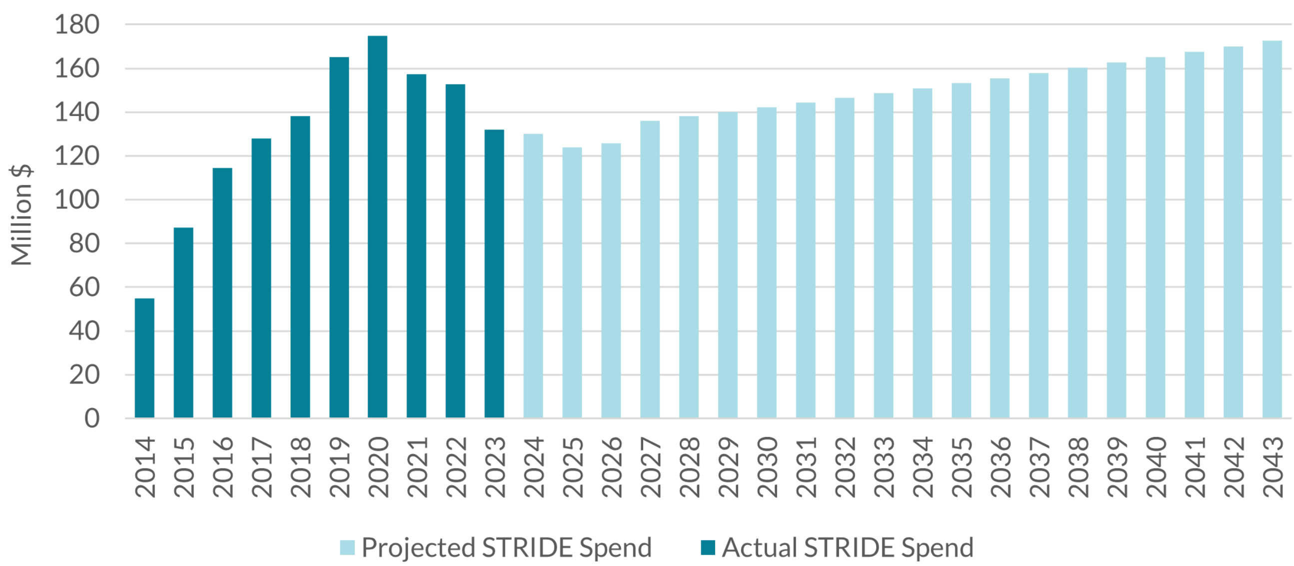
BGE STRIDE Projections

For 2024, BGE plans to spend $130.04 million to retire 68 miles of main. The retired main is higher than the 42.6-mile MYRP 2 average approved by the Commission due to a carryover of several projects from 2023 that will be completed in 2024. The projections for all other future BGE STRIDE activities in this report incorporate the 42.6 mile replacement rate set by the Commission for the MYRP 2 and a cost per mile derived from BGE's 2024 MYRP project list. The Operation Pipeline projects presented in the 2024 MRYP project list includes 26 new projects that target to retire 71.7 miles of main across both 2024 and 2025 at an estimated cost of $205.4 million. The average $2.864 million per mile unit cost of these 26 projects is used as the basis for the projections starting in 2025 and then increased annually by 1.5 percent, which is the growth that BGE applies to its replacement budgets in the MRYP 2 filing. BGE's future spending on the STRIDE-replacement activities is estimated assuming the 42.6 mile pace continues until all remaining miles of bare steel and cast iron main are retired – which is projected to be 2043.

Figure 3.1 shows the projected STRIDE expenditures (2024–2043) along with STRIDE expenditures already incurred (2014-2023).

The 2024 MRYP project list includes 26 new projects that target to retire 71.7 mile of main across both 2024 and 2025 at an estimated cost of $205.4 million.

Figure 3.1: BGE STRIDE Investment Actual/Projections



3.1.2. WGL

WGL STRIDE History

WGL filed an initial application for approval to implement its STRIDE 1 plan in November 2013. This plan included a proposal to focus on the replacement of seven distribution asset categories across four programs: bare and unprotected steel services, pre-1975 plastic services, copper services, vintage mechanically coupled (VMC) steel services, bare and unprotected steel mains, VMC steel mains, and cast iron mains. Then, one year later in March 2015, WGL submitted a request to amend its approved STRIDE 1 plan. This request included proposals to add three more distribution asset categories (meter sets, shallow main, and steel pressure gauge lines) and four transmission asset categories. The plans for STRIDE 1 were presented as the first five years of WGL's overall 22-year STRIDE plans to replace all assets targeted for replacement.

WGL's STRIDE 2 plan included the same distribution asset categories pursued under STRIDE 1 along with the addition of a fifth transmission program that targeted to replace transmission pipeline components to enable the use of In-Line Inspection tools.

WGL STRIDE STATUS

In 2023, WGL submitted plans for its third five-year STRIDE plan in CN 9708. The proposed WGL STRIDE 3 program included the same distribution and transmission programs from STRIDE 2. The plans for STRIDE 3 also included a proposal to add an additional distribution program that all low-pressure main and service replacements would be pursued under.[7] WGL targeted to replace 79.6 miles over the five-year STRIDE 3 period. The proposed budget for STRIDE 3 was $495 million: $89.4 million for 2024; $92.9 million for 2025; $99.7 million for 2026; $102.8 million for 2027; and $110.2 million for 2028. This budget included $483.1 million in planned distribution program spend and $11.9 million in transmission program spend. As part of these plans, WGL also extended its STRIDE program timeline from the original 22 years to 30 years. This change moves the end of WGL's STRIDE program from 2035 to 2043.

The PSC approved WGL's STRIDE 3 plan in December 2023 but stipulated that the budget for the five-year plan needed to be reduced by one-third (33.3%).

WGL STRIDE PROJECTIONS

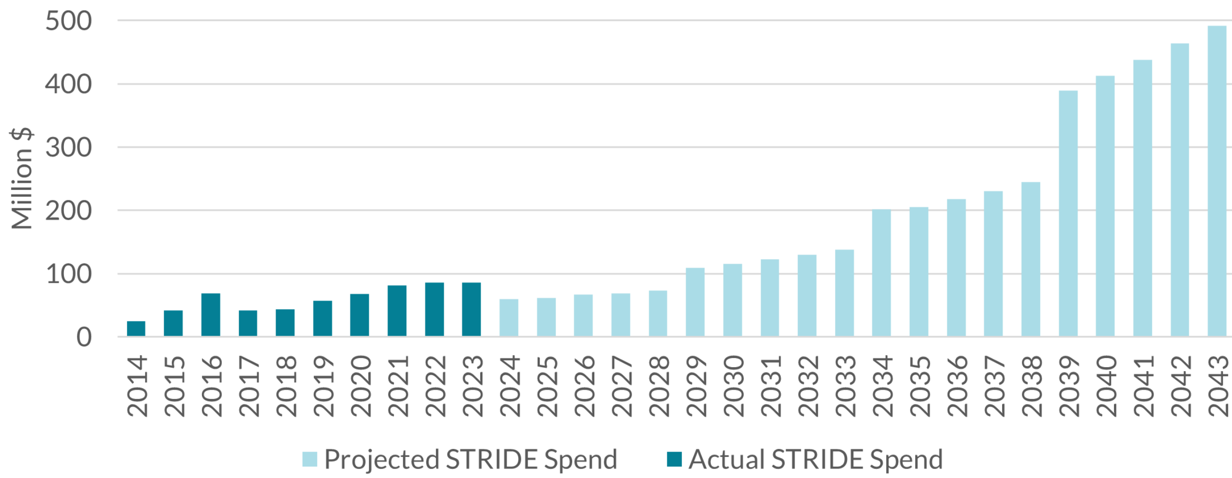
WGL's approved STRIDE 3 plan is used as the starting point of the STRIDE projections and then from 2029 to 2043 we set the number of mains and services replaced such that all targeted materials are replaced within the timeframe indicated by WGL in its STRIDE 3 filing. The approach to forecasting WGL's STRIDE capital expenditures from 2024 through 2043 can be summarized as follows:

- STRIDE capital spend over the five-year period from 2024 through 2028 are the STRIDE 3 budgets for distribution and transmission as submitted in the CN 9708 initial filing reduced by 33%. The miles of main assumed to be replaced over the STRIDE 3 period is correspondingly reduced by one-third from the approximately 15.9 miles per year in WGL's proposed STRIDE 3 plan to 10.6 miles per year.
- Annual STRIDE spend for distribution main replacements and affected services under Distribution Programs 2, 3, 4, 5C, and 6 for 2029

WGL extended its STRIDE program timeline from the original 22 years to 30 years, moving the end of WGL's STRIDE program from 2035 to 2043.

7 Low-pressure system replacements were already being pursued through the other distribution replacement projects. The addition of this program was proposed to more explicitly separate this work out from other STRIDE activities.

Figure 3.2: WGL STRIDE Investment Actual/Projections



to 2043 were estimated by first assuming annual main replacements of 17.5 miles for STRIDE 4 (2029-2033); 28 miles for STRIDE 5 (2034-2038); and 45 miles for STRIDE 6 (2039-2043).[8] Next, the annual replacement cost per mile for these replacements from 2029 to 2100 was assumed to be the $4,313,823 budgeted cost per mile for main replacement in the final year of STRIDE 3 (2028), grown by six percent each year.[9] Finally, the spend for each year was derived by multiplying the assumed miles replaced by the annual replacement unit costs.

- STRIDE spend for the independent service programs (1A, 1B, 1C, and 3) and other distribution programs (5A and 5C) from 2029 through 2043 was set at the budget for each program in 2028, the final year of STRIDE 3, growing by six percent each year until the year that WGL has indicated the program will end.

- WGL has not identified its plans for future STRIDE transmission investments beyond 2028. For STRIDE 4 (2029-2033) the 33% in transmission projects removed from the STRIDE 3 plans ($3.98 million) are spread across the five years. After 2033, no transmission costs are included in the projections.

Figure 3.2 shows WGL's projected STRIDE expenditures (2024–2043) along with STRIDE expenditures already incurred (2014-2023).

3.1.3. CMD

CMD STRIDE History

The STRIDE 2 plan that CMD implemented through the end of 2023 was effectively the same as the original STRIDE 1 plan approved by the PSC in CN 9332. CMD's STRIDE 1 plan approved in CN 9332 targeted to replace all bare steel, wrought-iron, or cast iron main per year by the end of 2026. The STRIDE 2 plan that was approved through a settlement agreement in CN 9479 stipulated that CMD would replace eight miles per year of the same three main materials from 2019 through 2023 for a budgeted cost of $84.6 million over the five years.

8 These replacement rates were developed based on an estimate that at the end of STRIDE 3 the remaining miles of main to be replaced over the final 15 planned years for WGL's STRIDE program would be approximately 427.5 miles, which would require an average of 28.5 miles to be replaced per year.

9 This six-percent growth rate in unit costs is the same rate used by WGL in its STRIDE 3 plan.

As part of its STRIDE 2 activities, CMD completed the replacement of all remaining cast and wrought-iron mains on CMD's distribution system in 2020. This milestone meant that the remaining three years of STRIDE 2 targeted replacement of only eight miles of bare steel main per year. Over the remaining three years CMD was unable to put together lists of projects that included eight miles of bare steel main and fit within the agreed upon budget for the year. The company has indicated this result was due to the remaining bare steel on the system being located sporadically and in between other older main materials, such as older plastic and coated steel pipes, which were not prioritized for replacement through STRIDE. The company replaces these other materials at the same time it replaces the STRIDE-targeted bare steel.

The replacement of these other materials adds to the overall cost to replace each mile of bare steel main. For CMD to both achieve the mileage replacement and incur costs close to the budget agreed to in the settlement agreement, the company has put forward supplemental non-STRIDE replacement projects from 2020 through 2023 to address any gap between the eight miles target and the miles of bare steel main prioritized for replacement through STRIDE.

CMD STRIDE Status

CMD has submitted and subsequently withdrawn two proposals for five-year STRIDE 3 plans. First, in CN 9709 in 2023, CMD proposed to continue replacing bare steel mains and add two new priority materials: coated steel mains installed prior to 1971 and plastic mains installed prior to 1982. CMD proposed to replace a combined eight miles per year—40 miles total—from 2024 through 2028 at a five-year budget of $101.7 million.

CMD withdrew its original STRIDE 3 application following the release of a proposed order by the Public Utility Law Judge (PULJ) overseeing CN 9709. The PULJ's proposed order only approved the addition of pre-1982 plastic and required any STRIDE project to consist of no more than 10 percent of the other main materials (e.g. coated steel) that it had been replacing at high levels in the final years of STRIDE 2.

Then, in July 2024, CMD filed a revised five-year STRIDE 3 plan covering the period 2025 through 2029. This plan, filed in CN 9751, removed the pre-1971 coated steel mains that the PULJ had proposed striking from its original STRIDE 3 proposal. Instead, the revised STRIDE 3 plan also focused on expanding the scope of the company's STRIDE replacement activities to include replacing several infrastructure components beyond mains and services. These expanded activities included:

- Replacement of bare steel and pre-1982 plastic mains
- Replacement of all service lines (both those associated with main replacements and standalone)
- In-line inspections of transmission lines
- Replacements of regulatory stations and points of delivery
- New and replacement telemetry equipment.

For this scope of activities, the company requested approval of a budget of up to $17 million annually, which would have totaled $85 million over the five-year period.

On December 30, 2024, CMD submitted a letter notifying the PSC that it was withdrawing its revised STRIDE 3 application. This withdrawal too followed a Proposed Order from the PULJ overseeing the case.[10] The Proposed Order paralleled the one released in CN 9709 in that it only approved the addition of pre-1982 plastic mains and stipulated that for a project to be eligible, the miles of other main materials replaced in conjunction with bare steel and pre-1982 plastic main work would need to be limited

10 Case No. 9751, Proposed Order of Public Utility Law Judge Burke (December 23, 2024).

to a maximum of 10 percent of the overall project main replacement scope. In addition, while CMD had indicated it would develop the annual project lists around a goal of maximizing risk reduction rather than a specific mileage target, the PULJ directed the company to submit project lists that targeted to replace eight miles of main.[11] According to CMD's withdrawal letter, it would "not be able to compile projects" that met the Proposed Order's combined limitations - including the cap on other materials – and the eight-mile requirement.

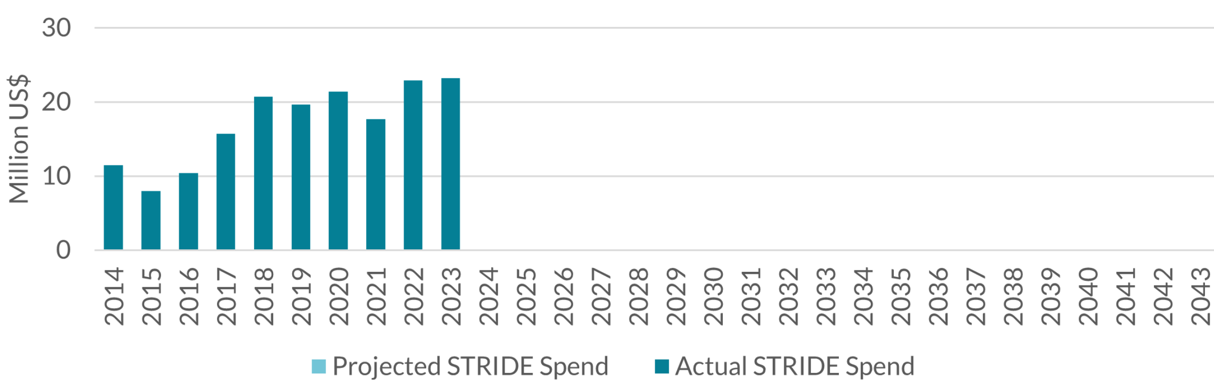
CMD STRIDE Projections

The future of CMD's STRIDE program is unclear, given the company's second STRIDE 3 plan withdrawal. CMD's December 30, 2024 letter does not indicate whether the company intends to file another STRIDE application or how it plans to address its remaining leak-prone infrastructure going forward. The company's investment activities in 2024, however, provide some insight into how CMD may proceed without an approved STRIDE plan.

In CMD's 2024 base rate filing, CN 9754, the company indicated that its budget for its Age & Condition program — the category of capital work that its STRIDE activities fall under — fell from $35.35 million in 2023 to $10.68 million in 2024.[12] The company's capital planning witness in the case explicitly stated the reduction in spend was "a direct result of not having a STRIDE program in place."[13] The $10.68 million spent in 2024 represents a 70 percent reduction from 2023 and a 37 percent reduction from the $17 million annual budget that had been proposed in the company's revised five-year STRIDE 3 plan. We assume this level of expenditure is more indicative of CMD's budget for "normal" replacements and does not represent a budget aimed at continuing the accelerated level of replacements pursued through STRIDE. Accordingly, we do not include any future spending for CMD STRIDE activities in our projections and instead treat the $10.68 million amount as non-STRIDE capital spend. This will be addressed in further detail when the assumptions for CMD's future non-STRIDE capital spending are discussed in Section 4.1.3.

Note that while we have not included future STRIDE investments in our projections, CMD's historic STRIDE expenditures still impact the results in this report since these investments will still be recovered from customers for decades to come. Figure 3.3 shows CMD's STRIDE expenditures made from (2014-2023).

Figure 3.3: CMD STRIDE Investment Actual/Projections



11 Case No. 9751, PULJ Proposed Order at 57.

12 Case No. 9754, Direct Testimony of CMD witness Raymond A. Brumley at p. 10: 18-22. 24 September 2024.

13 *Id.*

3.2. Recovery of STRIDE Costs

This study highlights the long-term implications of the investment decisions gas companies are making today, though our base projections do not account for any reductions in gas use due to electrification. As discussed in 6.2, such reductions will exacerbate the projected bill impacts because the same utility fixed costs must be recovered over fewer sales.

While the cash outlays from the companies happen now, the payments made by customers through base rates to compensate companies for these investments will be ongoing for decades. This is particularly relevant to the investments companies have made under STRIDE and will continue to make through STRIDE or other STRIDE-equivalent programs.

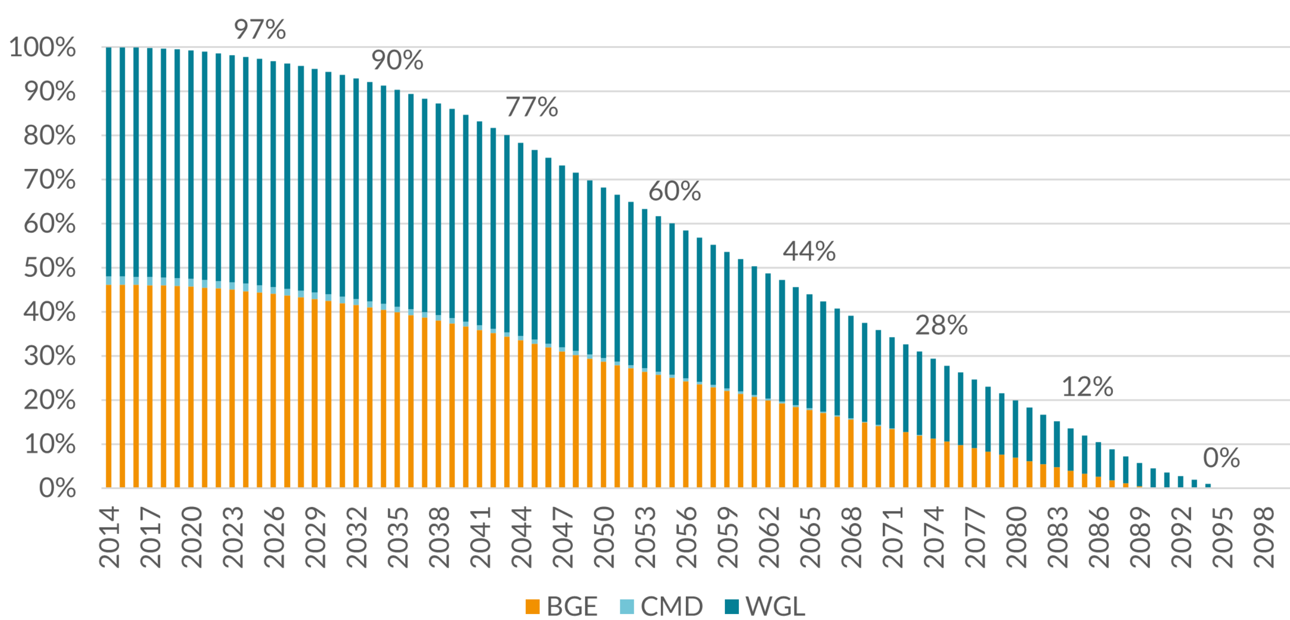
Figure 3.4 below shows the remaining STRIDE costs to be paid by customers from the start of STRIDE in 2014 until all STRIDE costs are recovered in 2095. An investment is "recovered" through rates until it is fully depreciated. Under rate-of-return regulation, utilities receive a "return on" the undepreciated value of an investment, in the form of a return on equity, and a "return of" the investment, in the form of depreciation expenses. Accordingly, we use cumulative STRIDE depreciation to represent the amounts "recovered" through rates.

The purpose of this exercise is to review the overall rate recovery progress, *i.e.*, progress toward the recovery of all completed and planned STRIDE costs. We defined the "unrecovered" portion of STRIDE in each year as the sum of the undepreciated completed plant and any remaining STRIDE investment not yet completed. The results show that at the end of 2023, only 3 percent of the $9.3 billion in the anticipated all-time STRIDE investments has been recovered and that STRIDE cost recovery will run through 2094.

3.3. Impact of STRIDE on Maintenance Costs

One of STRIDE's expected benefits should be a reduction in companies' operating costs due to avoided costly leak repairs that no longer need to be addressed. Companies agree that there will be avoided leak repairs, but they contend this result will not have a corresponding drop in leak repair expenses. BGE has historically made this case in its

Figure 3.4: Percentage of STRIDE Cost Recovery Remaining



STRIDE annual audits, where the company notes, "Management does not believe that the STRIDE improvements will result in significant operations and maintenance (O&M) cost savings; however, the infrastructure improvements are expected to decrease the number of leak repairs that would have otherwise occurred without these improvements."[14] On the other hand, OPC has maintained that if the arguments in favor of STRIDE are that newer, leak-prone pipes will result in lower leaks, then over time there should be a decrease in leak repair expenses.

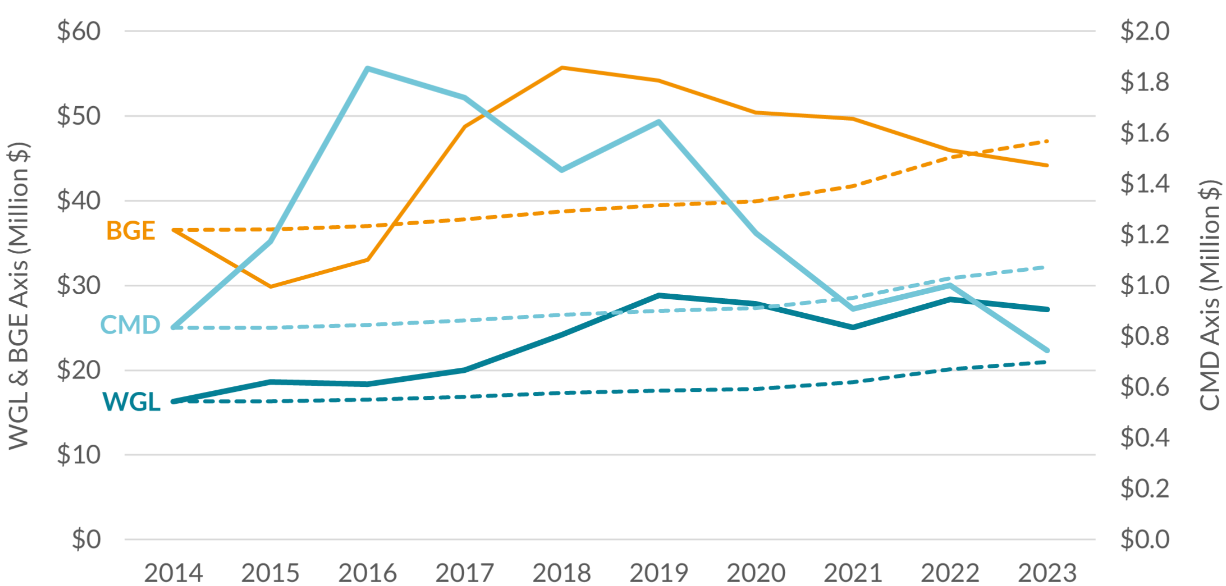
To assess whether STRIDE has resulted in operating cost reductions, we evaluated the trend in annual maintenance expenditures on main and services since the programs began.

Specifically, we gathered data from each company's annual reports on two Federal Energy Regulatory Commission (FERC) operating cost accounts, Account 887 Mains and Account 892 Services. FERC defines those accounts as follows:

- Account 887 Mains: This account shall include the cost of labor, materials used, and expenses incurred in the maintenance of distribution mains.
- Account 892 Services: This account shall include the cost of labor, materials used, and expenses incurred in the maintenance of services.

The annual amounts BGE, CMD, and WGL spend on main and service maintenance are shown as the solid lines in the figure below. For comparative purposes, the corresponding dotted lines for each company show how maintenance and service costs would have increased from the 2014 baseline to 2023 if costs only grew at the rate of inflation. Years when the solid line for a company is above the corresponding dotted line represent years when maintenance costs were higher than the 2014 baseline levels. BGE and WGL continue to show limited changes in operating costs. A change from the 2022 study version of this figure that depicted costs from 2014 to 2020 is that CMD's combined main and service maintenance costs since 2021 have remained below 2014 levels.

Figure 3.5: Historic Main + Service Maintenance Operating Costs



Includes maintance costs in Accounts 887 (Mains) and 892 (Services). Data taken from Annual Reports submitted to MD PSC. WGL Account 887 is 42.0% and Account 892 is 41.5% of total company costs. These are estimates of MD's portion of company-wide total based on the allocation of same accounts as presented in CN 9704.

14 Maillog #214914, Annual STRIDE Plan Agreed-Upon Procedures Report, April 28, 2017, Appendix 3, Management Footnote to Schedule E.

SECTION FOUR

NON-STRIDE CAPITAL PROJECTIONS

We separately analyzed the gas utilities' capital investments made outside of STRIDE (i.e., "non-STRIDE" investments). Unlike STRIDE expenditures for which utilities must file five-year plans, no statute or PSC action requires gas utilities to publicly disclose their long-term capital expenditure plans outside of a rate case.

This analysis thus began by first attempting to understand the amounts of investments each utility has made outside of STRIDE in recent years. The projections for future non-STRIDE investments are based on the recent historical trend. We gathered the most recent data on plant additions available for each company. For WGL and CMD, this includes the three most recent annual reports submitted to the Maryland PSC for 2021 to 2023. For BGE, this includes the capital plans submitted in its MYRP 2 for 2024-2026. These numbers were then tied to the annual STRIDE investments made in the same year to arrive at an estimate for non-STRIDE investments. Specifically, for each company, we identified the amount of non-STRIDE investments made as the difference between total plant additions and the STRIDE additions. This is represented by the following formula:

Non-STRIDE Additions = Total Utility Plant Additions – STRIDE Additions

Once we identified the historical non-STRIDE additions, the next step was to decide what should be used as the assumed rate of future non-STRIDE additions. We decided to use a straight-line assumption for estimating non-STRIDE investments. Straight-line assumptions are likely more realistic but are notably conservative, given that we do not add to the amount each year to account for inflation.

Table 4.1 below summarizes the non-STRIDE investment projections for each company.

The subsections below describe any unique assumptions that needed to be made for each company and then present the estimate of the non-STRIDE investment amount used in the capital projections.

Table 4.1: Non-STRIDE Investments of Maryland's Three Largest Gas Utilities, 2024-2100 (million $)

	BGE	WGL	CMD
Non-STRIDE Year 1	376.25	100.25	12.43
Non-STRIDE Year 2	426.38	117.68	12.86
Non-STRIDE Year 3	464.53	105.72	15.73
Three-year Average	422.39	107.88	13.67
Estimated Non-STRIDE spend: 2024-2100	**32,523.88**	**8,307.13**	**1,052.93**

4.1. Unique Assumptions by Company

4.1.1. BGE

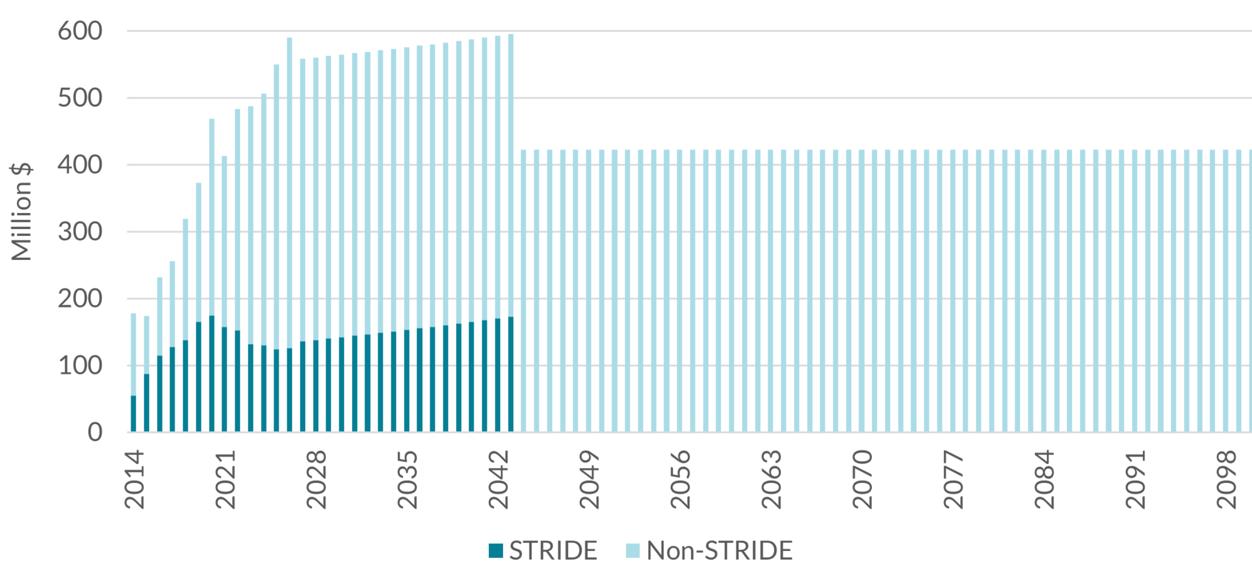
BGE is currently operating under its MYRP 2 from 2024 to 2026. While the PSC made some modifications to the company's proposed three-year capital plan in the CN 9692 Order, the company has only so far submitted its 2024 project list and has not provided an updated three-year plan reflecting the Commission's Order, like it had done in CN 9645. Absent an updated three-year plan, an estimate for non-STRIDE investments was derived by using the capital plan submitted by BGE as part of its MYRP 2 request with adjustments based on BGE's 2024 project list submitted after the CN 9692 Order. Table 4.2 presents the derivation of the non-STRIDE capital investment assumption that is used annually in the BGE capital projections.

The combined investment projections for BGE, starting after the MYRP in 2024, represent the STRIDE projections through 2043 plus a base level of $422.39 million that we maintain for the entire evaluation period. Figure 4.1 shows the results of our capital investment projections for BGE through 2100.

Table 4.2: BGE non-STRIDE Investment Projections

Line	Description	Source	Projection
1	MYRP 2 – Year 1 (2024) budget in filing	CN 9692, MYRP filing	$577.84 million
2	MYRP 2 – Year 1 (2024) project list budgets	MYRP 2 Year 1 Proj. List	$506.29 million
3	MYRP 2 budget pursed (% of budget in filing)	Line 2 / Line 1	87.6%
4	MYRP 2 Proposed Capital Budgets (2024-2026)	Line 1 – Line 2	$1,879.5 million
5	MYRP 2 Approved Capital Budgets (2024-2026)	Line 4 x Line 3	$1,646.8 million
6	Projected STRIDE Additions (2024-2026)	Study projections	$379.6 million
7	Project Non-STRIDE Additions (2024-2026)	Line 5 – Line 6	$1,267.2 million
4	**Average Non-STRIDE Additions**	**Line 7 / 3**	**$422.39 million**

Figure 4.1: BGE Annual Capital Investment Actual/Projections



4.1.2. WGL

The derivation of non-STRIDE investments for WGL required two notable steps. First, WGL uses its FERC Form 2 as the basis of its annual report. The problem this reporting approach creates is that the FERC Form 2 encompasses WGL's operations in Maryland, Virginia, and the District of Columbia, which means that much of the information in WGL's annual report is an aggregate of its three jurisdictions. While there are Maryland specific entries that identify the number of customers and revenue earned within the Maryland division, there is no disaggregation of utility plant or operating expenses by division. This meant that we needed to make assumptions about what amount of utility plant and the utility plant additions were associated with WGL's Maryland division.[15] Second, because WGL is not operating under a MYRP, our projections begin in 2024, the year after the most recently filed annual report.

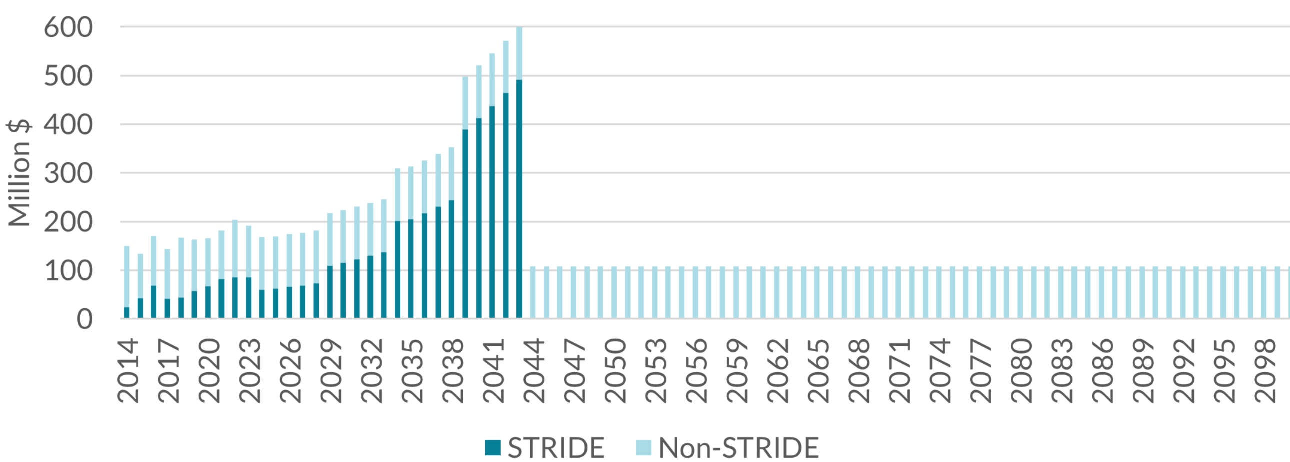
We used WGL's allocated cost of service study submitted in its 2020 base rate case (CN 9651) to identify a jurisdictional plant allocation factor to use for assigning a portion of plant additions to Maryland. Table 4.3 presents the derivation of the non-STRIDE capital investment assumption that is used in the WGL capital projections.

The combined investment projections for WGL, starting in 2024, represent the STRIDE projections through 2043 plus a base level of $107.9 million that we maintain for the entire evaluation period. Figure 4.2 shows the results of our capital investment projections for WGL through 2100.

Table 4.3: WGL Non-STRIDE Investment Projections

Line	Description	Note	Projection
1	Total WGL Plant Additions (2021-2023)	Annual Reports	$1,522.4 million
2	MD Plant Allocator	CN 9704 filing	37.9%
3	Estimated MD Plant Additions	Line 1 * Line 2	$576.9 million
4	STRIDE Plant Addition (2021-2023)	STRIDE filings	$253.3 million
5	Non-STRIDE Plant Additions (2021-2023)	Line 1 – Line 2	$323.7
6	**Average Non-STRIDE Additions**	**Line 3 / 3**	**$107.9 million**

Figure 4.2: WGL Capital Investment Actual/Projections



15 This decision to use an approximation for the WGL plant in service numbers means that even the historical numbers on revenue requirement and total investments for WGL are estimates.

4.1.3. CMD

Like we did for WGL, to identify CMD's non-STRIDE investment amounts we began by looking at its historical investment amounts in the three most recent annual reports. Table 4.4 presents the derivation of the base level non-STRIDE capital investment assumption that is used in the CMD capital projections.

As discussed in Section 3.1.3, CMD is not currently operating a STRIDE program or any other accelerated infrastructure replacement program. In CN 9754, the company indicated that it cut its 2024 Age & Condition Program budget to $10.68 million—from approximately $35 million in 2023—due explicitly to the absence of an approved STRIDE plan. We assume that this budget effectively represents the normal (i.e. non-accelerated) level that CMD will spend going forward on infrastructure replacement activities. We have accordingly included $10.68 million per year in investments on top of the $13.7 million base line from 2025 to 2043. The choice to end these investments in 2043 is a conservative one made to align with the end of BGE and WGL's accelerated replacement activities; it would also have been reasonable to assume this budget would run in perpetuity. The combined investment projections for CMD, starting in 2024, represent the $10.68 million in replacement activities through 2043 plus the base level of $13.7 million that we maintain for the entire evaluation period. Figure 4.3 shows the results of our capital investment projections for CMD through 2100.

4.2. Investments in Distribution System Expansion

This report has focused on gas utility capital expenditures. One aspect of the gas distribution companies' capital spending strategies is their plans for new business and capacity expansion. These categories represent investments to grow the gas delivery business beyond its current size. Below we

Table 4.4: CMD Non-STRIDE Investment Projections

Line	Description	Note	2044-2100 Projection
1	Plant Additions (2019-2021)	Annual Report	$104.8 million
2	STRIDE Plant Addition (2018-2020)	STRIDE filings	$63.8 million
3	Non-STRIDE Plant Additions (2018-2020)	Line 1 – Line 2	$41.0
4	**Average Non-STRIDE Additions**	**Line 3 / 3**	**$13.7 million**

Figure 4.3: CMD Capital Investment Actual/Projections

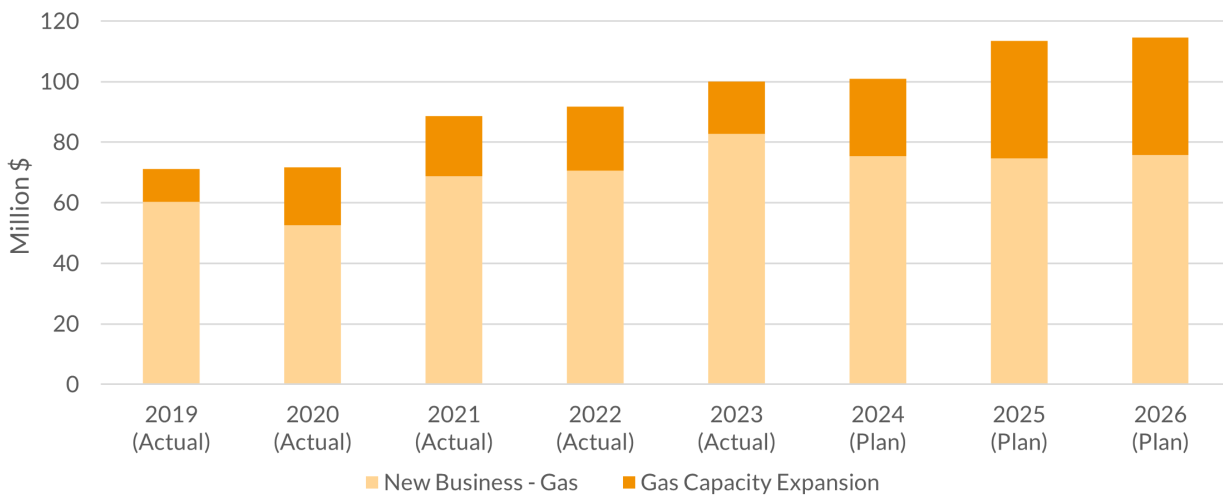
discuss trends in investment increases in distribution system expansion. This section summarizes our analysis of capacity expansion and new business for BGE and WGL. Data on new business investments and capacity expansion are not publicly available for CMD.

4.2.1. BGE

BGE provided information on its new business and capacity expansion plans, as well as historical information, as part of the MYRP proceedings in PSC Case Nos. 9645 and 9692. As part of its capital spending over the first MYRP, BGE spent an average of $93.4 million from 2021 through 2023 on new customer conversions and capacity expansion projects. This average is a slight drop in what has been increasing levels of actual and planned investment in system expansion. As shown in Figure 4.4, the investments pursued through MYRP in 2021 and 2023 on system expansion investment (new business and capacity expansion) represented increases of around $20 million per year over the historical amounts made in 2019 and 2020.

For the ongoing MYRP 2 period, BGE submitted plans to spend 18 percent ($332 million) of its $1.9 billion capital budget on capacity expansion and new business projects.[16] These plans follow a similar pattern to the MYRP 1 period when BGE made $280 million in investments in capacity expansion and new business projects—which represented 21 percent of the $1.3 billion in total capital investments made by BGE from 2021 through 2023.

Figure 4.4: Capital Expenditure on Capacity Expansion and New Business for Gas by BGE (2019-2026)



Capital spending by category: BGE example

The initial edition of this report showed how BGE's MYRP 1 capital plans for 2021 through 2023 were distributed across different capital categories.

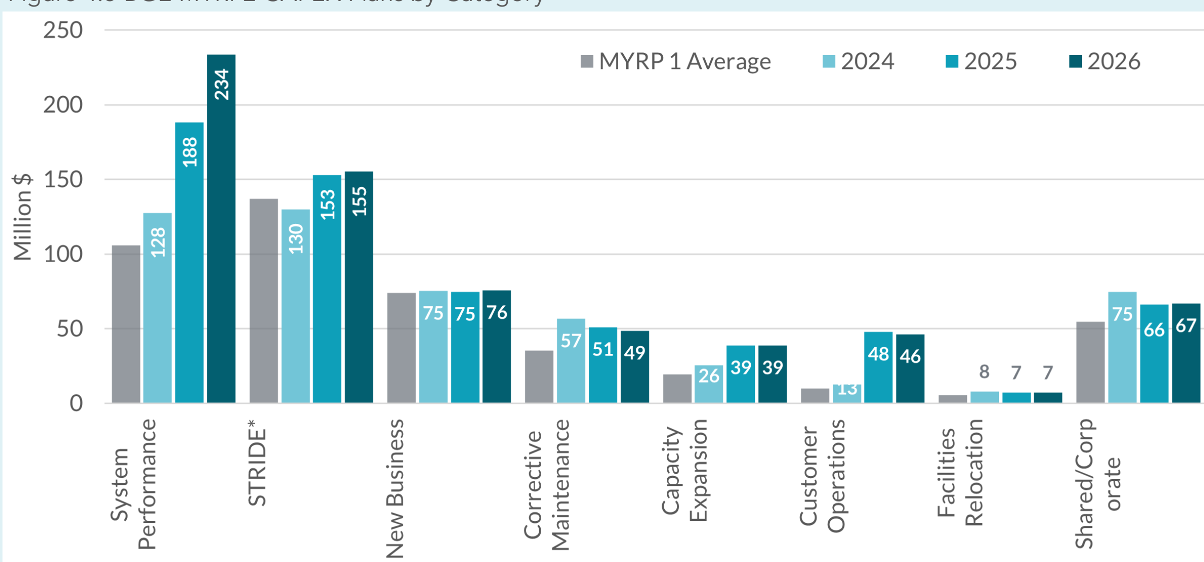
We updated the same analysis in this report to reflect BGE's subsequent three-year MYRP 2 capital plan that the company is currently implementing. We completed the annual investments by capital category shown in Figure 1.3 by using the revised 2024 project list and the company's plans submitted in the initial

16 The MYRP 2 budgets for 2024 are taken from BGE's revised 2024 MYRP 2 Project List submitted in CN 9692 on February 12, 2024, and the 2025 and 2026 budgets are from BGE's initial MRYP 2 filing. For reference, BGE's revised 2024 project list budget for capacity expansion and new business ($100.42 million) is nearly identical to the 2024 budget for these categories in the initial plan ($104.1 million).

MYRP 2 filing for 2025 and 2026.[17] Figure 4.5 also includes the average three-year spend by category across the first MYRP (red bars) to allow for comparison between historical MYRP spend and BGE's MYRP 2 plans. The 2023 MYRP averages show how BGE's plans for its MYRP 2 continue to increase the rates of investment across all categories.

Notably, while the spending on each CAPEX category continues to rise, the allocation of spending across the categories has not changed significantly from the MYRP 1 to MYRP 2. The figure shows that STRIDE (24 percent) and System Performance (31 percent) continue to be the major focus of BGE's capital investment activities.[18] System Performance includes projects that BGE states are designed to maintain or improve the safety and reliability of BGE's gas distribution system primarily through replacement or upgrading of existing assets.[19] New Business again represents the third highest spending category at (10 percent). Shared/Corporate expenses (a combined 12 percent), which includes categories such as real estate and information technology, remains higher than categories such as corrective maintenance (8 percent) and capacity expansion (6 percent), which directly address safety and reliability problems.

Figure 4.5 BGE MYRP2 CAPEX Plans by Category



This level of information was only available for BGE because it is the only gas utility that has submitted multi-year rate plans with the Maryland Public Service Commission.

17 Ideally this analysis would have reflected BGE's updated capital plans in response to the Commission's Order in CN 9692. However, in contrast to its first MYRP in CN 9645, BGE did not submit an update to its three-year MYRP 2 plan as part of its compliance filing in CN 9692. The company has only submitted a revised 2024 projects list.

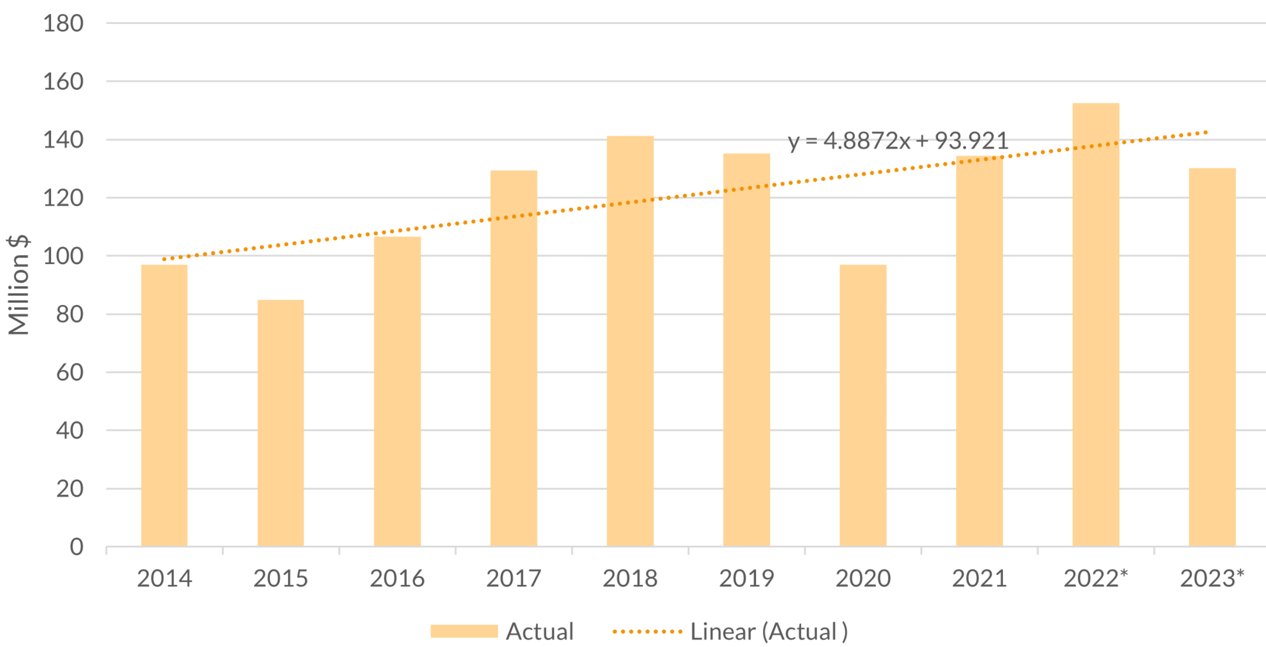
18 BGE's initial MYRP 2 plans included STRIDE replacements under the System Performance category. The STRIDE amounts here are based on information provided by the company on its STRIDE-like replacement plans in CN 9692. System Performance represents the budget submitted in the MYRP 2 net of the STRIDE budget estimates.

19 The general goals of these investments are to reduce risks including leaks, customer interruptions, over-pressurization, excavation damage, and other hazards. PSC Case No. 9692, BGE EXHIBIT DCW-1G at page 3 (ML#301409, file attachment 6).

4.2.2. WGL

WGL reports its historic expenditures on new business in its annual financial reports. A footnote in these reports notes that the "new business" category also includes "certain projects that support the existing distribution system." We interpret "new business" investments that "support the existing distribution system" to mean expansion of existing system capacity (which BGE's compliance filing calls "capacity expansion").[20,21] The information on WGL's expenditures on new business was not available for Maryland alone. Instead, like the information available for total capital investments, the amounts for new business investments are presented in aggregate for all three service jurisdictions. This company-wide information, presented for 2014 to 2023 in Figure 4.5 still provides insight into WGL's investment efforts being made to expand its gas distribution business across its three services areas.

Figure 4.6: WGL Companywide New Business and Expansion CAPEX, 2014-2023



20 https://www.washingtongas.com/-/media/fef2d94e14f34d84893d45264e9a942a.pdf

21 After the first version of this report was released in October 2022, WGL made a change in the way it presents its annual capital expenditures in its annual financial reports. Prior to 2022, the Capital Expenditures table included the categories of: new business, replacements, and other utility. The replacements category was further broken down into Accelerated Pipe Replacement Plans (APRPs) and Other. Starting with the 2022 Annual Report, WGL began to include a "System betterment" category instead of the replacement category. The new system betterment category included the same APRP spending along with a new-sub category called "Expansion and other replacements." With this change, the company now shifts expenditures that had previously been tracked under new business to this new "Expansion and other replacements category." This change is evident by comparing the 2021 figures in the 2021 Annual Report to the 2021 figures in the 2022 Annual Report. New business expenditures for 2021 in the 2021 Annual Report were listed at $134.4 million and then in the 2022 Annual Report this number reported for 2021 New business expenditures dropped by $54.4 million to $80.0 million. At the same time, the new "Expansion and other replacements" category is recorded as $153.1 million; which is equivalent to the sum of the $98.7 million in "Other replacements" reported for 2021 in the 2021 Annual Report and the $54.1 million reduction in "New business."

Figure 4.6 shows an overall upward trend in spending in the new business category in the decade between 2014 and 2024. WGL increased its company-wide capital spending on new business from $97 million in 2014 to $134.4 million in 2021, with a slight dip in expenditures in 2020 ($96.9 million), likely due to COVID-19 limitations on entry into customer premises. Over the last two years, the company has spent around $152 million (2022) and $130 million (2023) on new business and expansion projects.

In terms of share of total capital expenditures, spending in this category in 2022 and 2023 represented 27 percent of all capital expenditures. There does not appear to be any significant change in WGL's approach to gas expansion and new business activities.[22] The 27 percent share of spend for 2022 and 2023 is approximately the same as the share that new business made up of total capital expenditures from 2014 to 2017 (28 percent).

As stated above, these figures for WGL are company-wide, for service territories in Maryland, Virginia, and the District of Columbia. In rate cases, a cost allocator based on each of WGL's service territory's gas plant-in-service is used to allocate certain shared investment and operating costs. The most recent cost allocator for plant-in-service shows that Maryland's share of gas distribution plant-in-service is 36.8 percent.[23] Applying this percentage to WGL's 2022-23 spending means that WGL's estimated Maryland spending on new customers and capacity expansion for 2022 and 2023 is about $54.5 million each year.

22 Due to the change in how WGL reported its new business expenditures, the update in this report required developing an estimate of the amount of expansion expenditures that had previously been reflected under "new business" and are now being reported with "Other replacements." To do this, we calculated the compound annual growth rate in the expenditures reported by WGL for the "Other replacement" category in annual reports from 2012 to 2021 (5.3%) and then assumed that these expenditures would continue to grow at the same rate from the 2021 levels ($98.7 million) to $103.6 million in 2022 and $106.5 million in 2023. Our corresponding estimates for the 2022 and 2023 expansion expenditures—$59.6 million for 2022 and $8.7 million for 2023—were found by subtracting the Other replacement estimates from the actual amount of "Expansion and other replacements" expenditures reported by WGL in the 2022 and 2023 Annual Reports.

23 Distribution plant allocation factors were taken from a WGL Case No. 9704 filing: Exh. RET-6, Att. 9 at page 10.

SECTION FIVE

ANNUAL REVENUE REQUIREMENT PROJECTIONS

This section both describes the approach we took to estimating the revenue requirements related to our capital investment projections and discusses some of the results of this analysis. We begin, in Section 5.1, with an overview of our revenue requirement modeling approach used to project annual revenue requirements. The remaining four parts of this section include a summary of the annual STRIDE revenue requirements calculated using the revenue requirement model (5.2), a summary of the total STRIDE and non-STRIDE capital revenue requirements calculated using the model (5.3), an explanation of how the operating cost component of the annual revenue requirement was calculated (5.4), and the results of the annual revenue requirement projections for each company (5.5).

5.1. Revenue Requirement Model

To understand the impact of our capital investment projections on rates, we first developed a revenue requirement model that estimated the capital-related components of the annual revenue requirement. The revenue requirement for the capital investment components included:

- Return on Rate Base
- Depreciation
- Property Taxes
- Gross up for income taxes, bad debt, franchise taxes, and PSC assessment.

To calculate the annual revenue requirement in future years, we needed to develop certain assumptions on depreciation, retirements, cost of capital, property taxes, and the gross-conversion factor. We relied on a mix of filings in the company's most recent base rate cases and annual reports to develop the assumptions. Table 5.1 presents the various assumptions used to calculate the capital-related revenue requirements for each company.

These assumptions are based on the best information we were able to identify that is publicly available. The assumptions may not represent what the company's own internal records show today, and actual numbers will differ from those generated using our assumptions. The analysis is solely intended to show the general impact that current capital investment trends will have on future revenue requirements and therefore utility customer rates; it does not identify the precise future revenue requirements that will be developed through the regulatory process.

5.2. STRIDE CAPEX Revenue Requirement

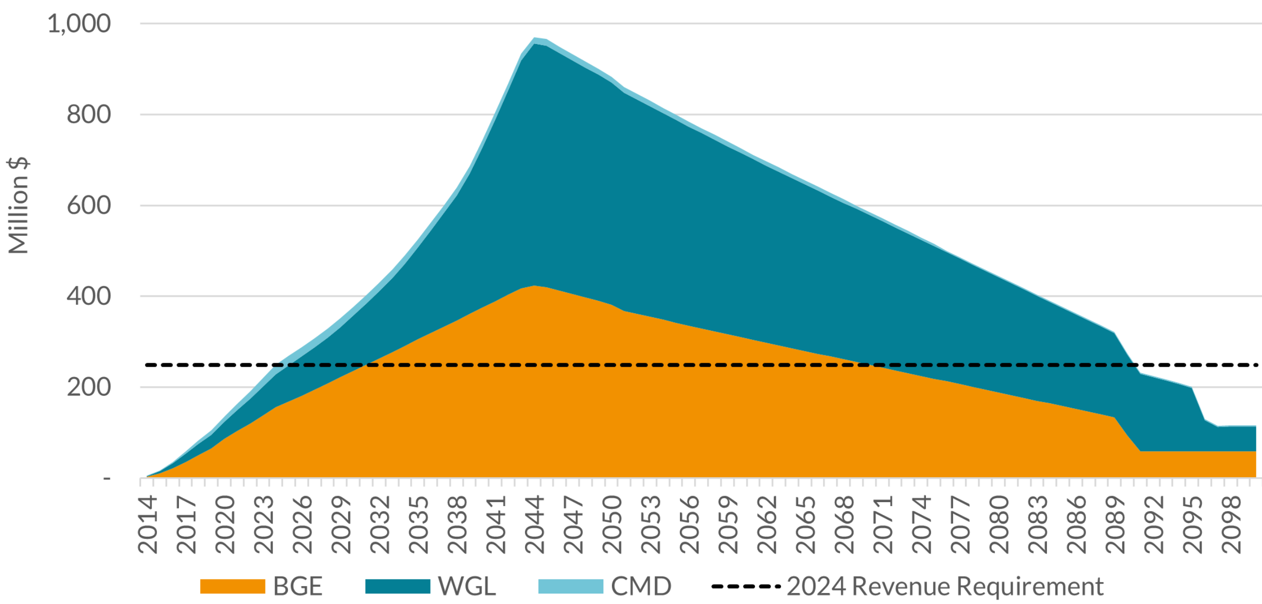
The pyramid figure below was made using the annual revenue requirement approach described in the previous section. What makes this figure informative is that it provides context for where we currently are in the overall STRIDE plans. As identified by the arrow and dotted line, the combined 2024 revenue requirement

Table 5.1: CAPEX Revenue Requirement Assumptions

	BGE	WGL	CMD
Depreciation Rates	1.65% (mains)* 1.91% (services)* 3.62% (non-STRIDE)**	1.65% (distribution)* 1.91% (transmission)* 1.88% (non-STRIDE)**	1.78% (STRIDE)* 2.92%(non-STRIDE)**
Retirement Rate (% of plant-in-service)	0.82%	0.99%	1.62%
Weighted Average Cost of Capital (WACC)*	6.74%	7.04%	7.20%
Gross-Conversion Factor*	1.4166	1.4277	1.4213
Effective Property Tax Rate (% of plant-in-service)*	1.37%	1.08%	1.40%
Tax Treatment of STRIDE Plant Additions	Tax Repairs: 80% MACRS: 20%	Tax Repairs: 80% MACRS: 20%	Tax Repairs: 80% MACRS: 20%
Tax Treatment of Non-STRIDE Plant Additions	100% MACRS	100% MACRS	100% MACRS

**Assumptions are taken from the most recent base rate case. **Assumptions are three-year averages from 2021-2023 annual reports or other annual filing such as BGE's annual multi-year rate plan reconciliation.*

Figure 5.1: STRIDE Annual Revenue Requirement Pyramid



of approximately $249 million across the three STRIDE programs represents a fraction, 25 percent, of the $970 million peak in annual STRIDE revenue requirements that we project for 2044. In other words, if STRIDE plans continue as currently constituted, then Maryland customers will eventually be paying more than three times for STRIDE investments than they are paying today. For context, the peak we project today is almost double the $524 million peak projected in the first edition of this study in 2022. This growth is due to a combination of the rising cost of the replacement projects, particularly for WGL.

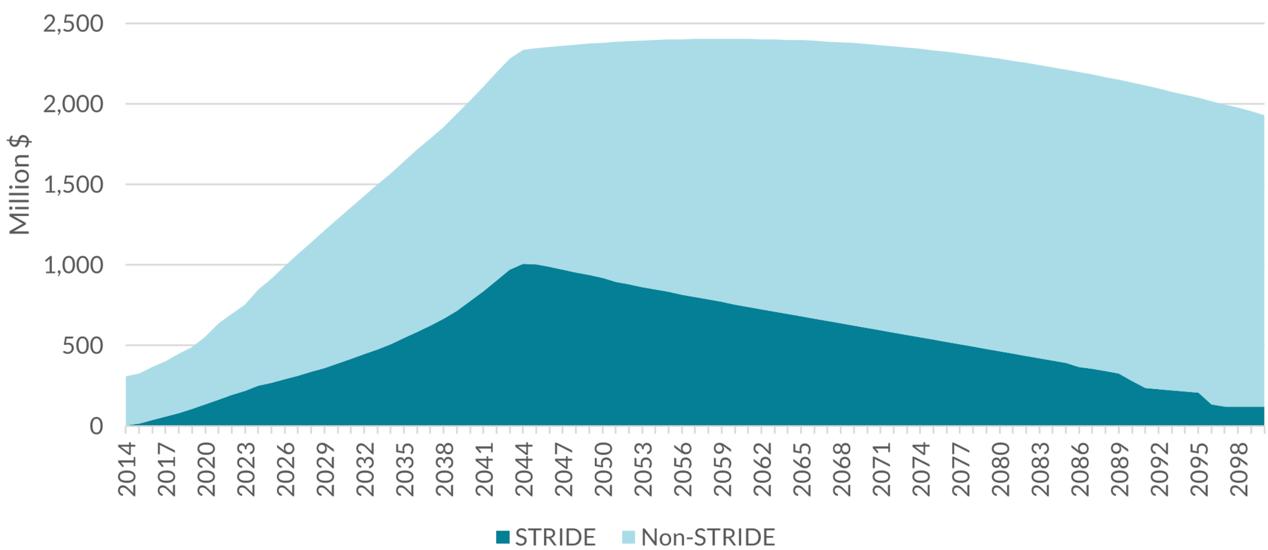
5.3. Non-STRIDE CAPEX Revenue Requirement

The STRIDE revenue requirement in Figure 5.1 represents only a fraction of the capital-related annual revenue requirements customers will need to pay to cover for capital investments over the next 80 years. The STRIDE and non-STRIDE capital additions we project through 2100 would result in a combined annual capital revenue requirement for the three utilities exceeding $2.33 billion dollars by 2044 or 2.8 times the combined $849 million in capital revenue requirements customers are paying through rates in 2024. Put another way, customers today are responsible for paying less than half of the capital costs that customers will be responsible for in 2044. Figure 5.2 provides both a comparison of the combined non-STRIDE (aqua) and STRIDE (teal) annual capital revenue requirements across the combined three companies and shows how the amounts customers will be asked to pay towards capital investments will evolve over time.

5.3.1. Operating Costs Revenue Requirement

Until now, this revenue requirement section has only considered capital-related components. To develop rate projections, we needed to develop assumptions for the level of operating costs (OPEX) included in the annual revenue requirement. Operating cost estimates for the projection period were derived from the results of each company's 2023 base rate proceeding. The non-capital operating expenses embedded in the approved base rates were derived by first calculating the capital expenditure related revenues requirements (return on plant, depreciation and amortization expenses, income taxes, property taxes) and subtracting these amounts from the approved base rate revenue in the companies' most recent base rate filings.[24] This process is shown in Table 5.2. We should emphasize here that we adopt the same operating cost assumptions for every year in the evaluation period; there is no markup for inflation. This approach is consistent with our choice not to grow the non-STRIDE capital investment amounts over time. What this means is that the revenue requirements are in nominal 2022 dollars.[25]

Figure 5.2: Combined Three-Company STRIDE and Non-STRIDE Annual Revenue Requirement



24 BGE's expenses were calculated on the revenue approved for Year 3 (2026) of the MYRP 2.

25 STRIDE investment assumptions do inherently include inflation to the degree that the companies' cost projections include inflation.

Table 5.2: Non-CAPEX Operating Cost Revenue Requirement Assumptions

Line	Item	Note	BG CN 9692 (YR 3- Order)	WGL CN 9704 (Order)	CMD CN 9701 (Request)
1	Base Revenue		862,512,734	385,085,000	53,940,007
2	Net Plant in Rates	Note (a)	3,785,417,000	1,321,959,569	223,198,999
3	Approved Rate of Return		6.74%	7.04%	7.874%
4	Return on Net Plant	Line 3 x 4	255,137,106	93,065,954	17,574,689
5	Depreciation & Amortization	Note (b)	195,363,000	51,256,528	9,854,760
6	Income Taxes	Note (c)	96,861,109	35,331,872	6,672,114
7	Property Taxes	Note (d)	74,943,052	26,765,680	4,692,909
8	**CAPEX RR in Rates**	**Sum Line 4-7**	**622,304,266**	**206,420,033**	**38,794,472**
9	Net OPEX RR in Rates	Line 1 – 8	240,208,468	178,664,967	15,145,535
10	Adjustment for settlement	Note (e)			(716,183)
11	**OPEX Assumption**	**Line 9 x 10**	**240,208,468**	**178,664,967**	**14,429,352**

Notes:

a. Utility Plant – Acc. Depreciation & Amortization – Acc. Deferred Income Taxes. Amounts reflect each companies' final request in respective case with any adjustments made in Order applied.

b. Depreciation and amortization for BGE and WGL reflect proposed test year amounts after PSC adjustments are applied.

c. Income taxes are taxes on return on Net Plant (Line 4) estimated at the combined Federal (21%) and Maryland (8.25%) rate of 27.5175%: Line 4 / (1-27.5175%) – Line 4.

d. Property taxes are amounts proposed by companies in the pro forma test year.

e. CMD's 2023 base rate case ended in a settlement agreement. The agreed-upon $5.2 million increase represented a 4.7% reduction in revenues from what the Company had requested. The estimated Net OPEX revenue requirement estimated from the base rate request is accordingly reduced by 4.7% to reflect this result.

Customers today are responsible for paying less than half of the capital costs that customers will be responsible for in 2044.

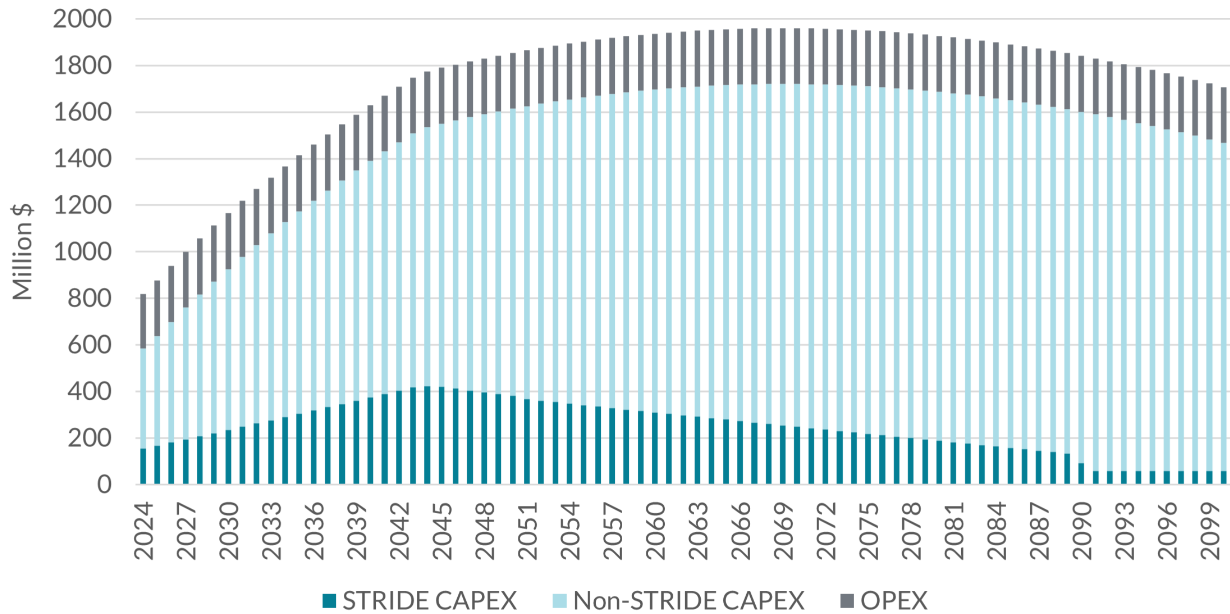
5.4. Annual Revenue Requirement Results

The combination of our STRIDE and non-STRIDE capital revenue requirements and operating expenses represents our annual revenue requirement projections for each company.

BGE Revenue Requirement Projections

Figure 5.3 presents the results of the BGE annual revenue requirement projections. The BGE revenue

Figure 5.3: BGE Annual Revenue Requirement Projections



requirement is projected to peak in 2069 when it reaches $1.961 billion or 2.2 times the revenue requirement of the third year of its current MYRP 2 approved in CN 9692.[26] As will be evident from the figures presented for the other two companies, BGE's revenue requirement projections are unique in that the peak is not linked to the end of STRIDE in 2043 but instead takes places more than 20 years later. This result is due to the fact that while BGE's Operation Pipeline investments are significant – an average of $150 million from 2024-2043— the projected investments outside of STRIDE ($422 million/year) continue to drive growth in revenue requirements for over 20 years even without STRIDE investments.

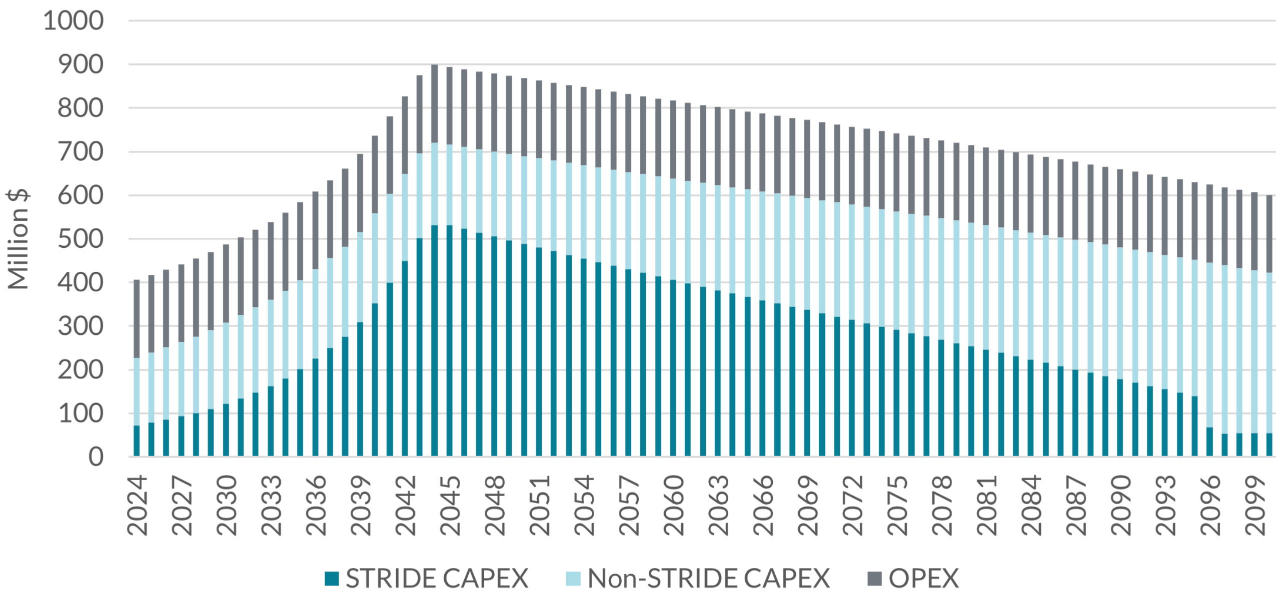
WGL Revenue Requirement Projections

Figure 5.4 presents the results of the WGL annual revenue requirement projections. The projections shown here represent a significant change from the 2022 study in which non-STRIDE investments drove a continued growth in revenue requirements through 2100, and the revenue requirement reached $663 million. Now, the revised cost estimates WGL presented in its STRIDE 3 proceeding have almost quadrupled our projected all-time STRIDE costs from $1.3 billion in the 2022 study to $4.84 billion in this update. The corresponding impact on revenue requirements is that the peak is now driven by STRIDE spend. Based on recent information, this update projects that WGL's $900 million annual revenue requirement peak will occur in 2044—the year after its STRIDE program is anticipated to end. Should WGL's investments follow our assumptions, then $900 million in revenue requirements to be collected through base rates in 2044 would be 2.3 times the $385 million being collected through the base rates approved in CN 9704.[27]

26 BGE's approved revenue requirement for Year 3 of MYRP 2 is $885.8 million with $862.5 million to be collected through base rates and another $23.3 million in anticipated other revenues.

27 WGL's approved revenue requirement in CN 9704 is $393.2 million with $385.1 million to be collected through base rates and another $8.1 million in anticipated other operating revenues. (Schedule C to WGL's Revised Tariff Filing submitted on April 10, 2024.)

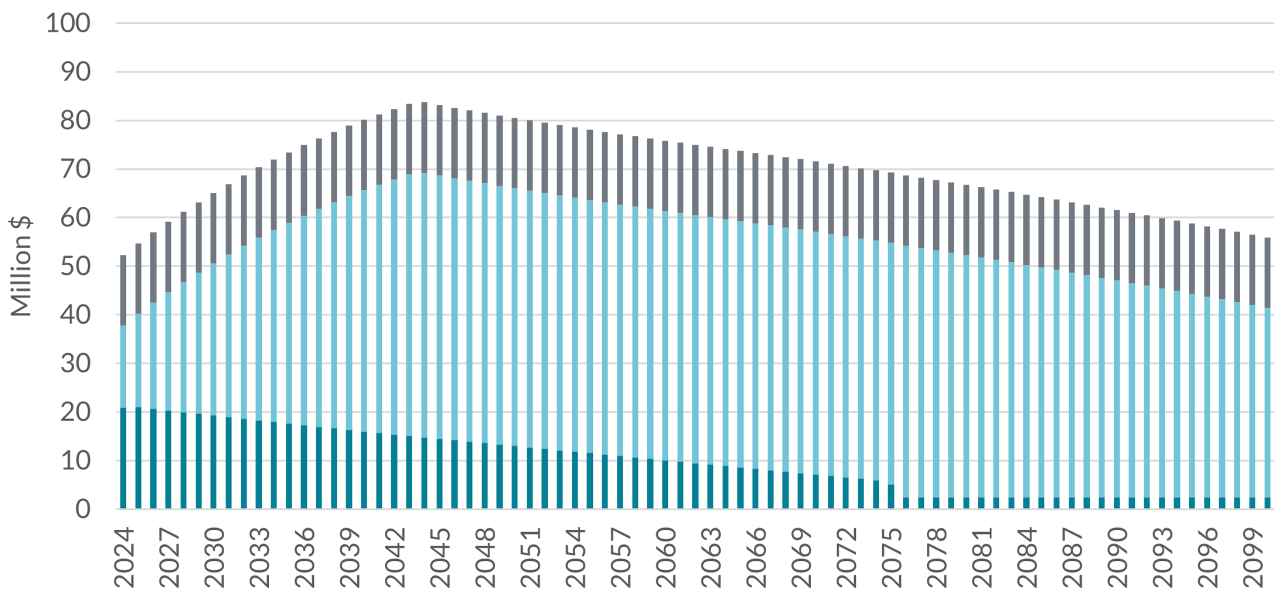
Figure 5.4: WGL Annual Revenue Requirement Projections



CMD Revenue Requirement Projections

Figure 5.5 presents the results of the CMD revenue requirement projections. CMD's revenue requirements peak at $84 million in 2044, the year after we assume the annual non-STRIDE "normal" leak-prone infrastructure replacement activities would end. This $84 million peak is 1.6 times higher than the $51.4 million CMD is collecting in revenues through base rates in 2024 as part of the settlement agreement in CN 9701.[28]

Figure 5.5: CMD Annual Revenue Requirement Projections

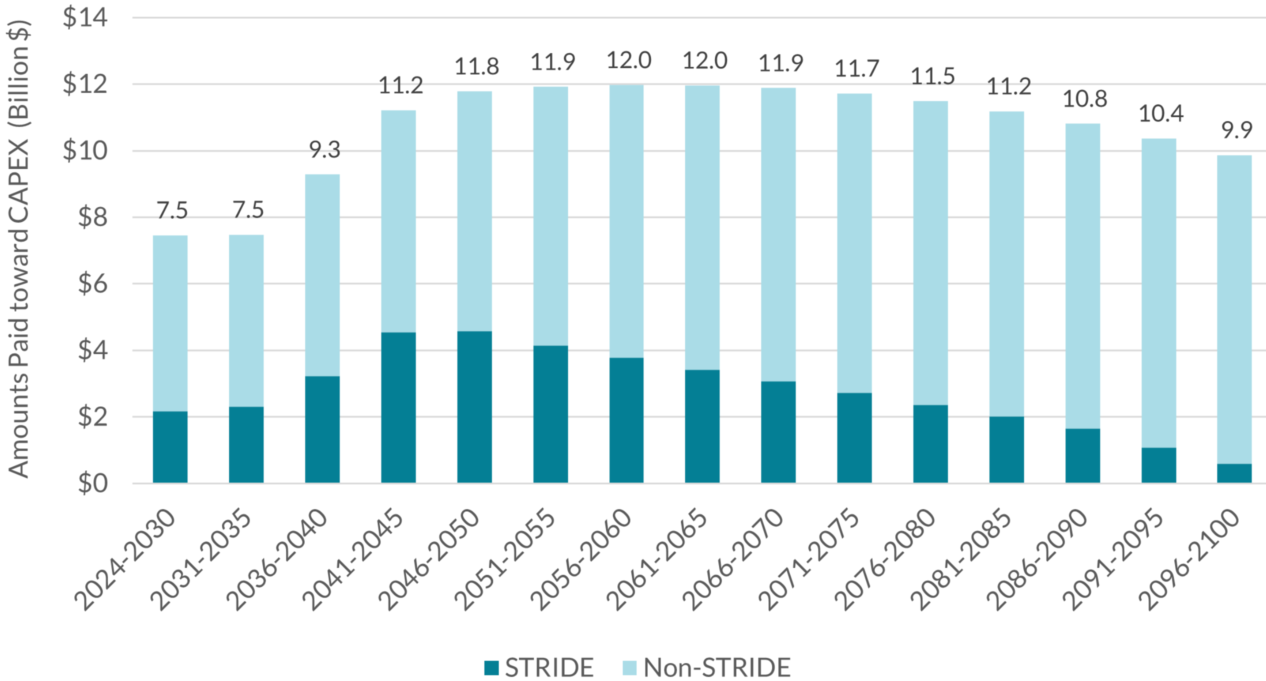


28 $51.4 million = $46.2 million in revenue at current rates in CN 9701 + $5.2 million revenue increase.

Customer Payments toward CAPEX

The figures above represent the annual amounts that we estimate Maryland's gas customers will be expected to pay from 2024 through 2100. As illustrated in Figure 5.6, total revenues to be collected from BGE, WGL, and CMD customers over this 77-year period across all three companies are estimated to be $160.8 billion. From 2024-2045, Maryland gas customers will be asked to spend $35.5 billion total.

Figure 5.6: Projected Gas Customer Payments Toward CAPEX (billion $), 2024-2100



SECTION SIX

RATE IMPACTS

This section examines how the projected revenue requirements from Section 5 translate into customer rates and bills under different scenarios. We first analyze rate impacts under BAU conditions that assume a stable customer base. We then explore alternative scenarios that examine how rates could be affected by potential declines in the residential customer base due to customer migration.

6.1. Business-as-Usual Scenario Rate Impacts

For the BAU scenario, the billing determinants for customer-months and usage are based on the compliance filing implementing the rates approved in these base rate cases. This scenario assumes these customer numbers and sales levels remain constant over the evaluation period.

The BAU scenario assumptions are presented in Table 6.1.

Gas prices can be volatile and are vulnerable to external market shocks.

For each year, we allocate a revenue requirement to the residential heating class and then design rates to recover this amount. Rate design follows a three-step process:

- First, the STRIDE surcharge is set as a fixed monthly surcharge to recover the "new" or incremental STRIDE revenue requirement for the year. This distinction is possible because the STRIDE and non-STRIDE capital revenue requirements are calculated separately. Put another way, the target STRIDE revenue for any given year (Year n) is the difference between the cumulative STRIDE revenue requirement for Year n minus the cumulative STRIDE revenue requirement for the previous year (Year n-1). This approach is meant to mimic the "rolling" in of STRIDE into base rates over time. Because both

Table 6.1: BAU Scenario Rate Design and Bill Determinant Assumptions

	BGE (CN 9692)	WGL (CN 9704)	CMD (CN 9706)
Customer Class	Schedule D (Residential)	Residential Heating/Cooling	RS (Residential Service)
Residential Revenue Allocation (% of base revenues)	63.70%	64.87%	57.84%
Customer-months	8,048,232	5,671,250	369,819
Sales (therms)	443,089,314	362,304,289	23,390,128
Starting Fixed Charge	$16.15	$11.85	$16.25

BGE and CMD do not, as of July 2024, have a STRIDE surcharge in place, this step is performed only for WGL. Revenue requirements for STRIDE investments made by BGE and CMD are instead collected through base rates.

- Next, a Fixed Charge is set. The Fixed Charge starts at the current level (or 2026 level for BGE) and is then increased by one percent each year.
- Finally, all remaining revenue requirement assigned to the residential classes is collected through the volumetric charge.

We follow the above approach to estimate volumetric and fixed charges for residential customers from 2024 to 2100. To present these results, in the subsections below, we show the monthly bill for a typical customer during the winter months. Our typical customer uses 160 therms per month in January or February.[29] The next three subsections (6.1.1 to 6.1.3) provide the results of this typical customer bill under the BAU scenario for each company. Then, in Section 6.1.4, we compare the results of the three companies.

6.1.1. BGE

The bill for the typical BGE customer includes both the cost of delivery (fixed base charge, volumetric base charge) and commodity. Before calculating the typical bill, we needed to develop an assumption for the commodity portion of the bill.

The commodity price we use in the BGE bill analysis is based on the average commodity price charged to BGE's residential customers in the three proceeding Februarys (2022-2024). For reference, because gas prices can be volatile and are vulnerable to external market shocks, we also show what the future BGE bill would be with higher commodity prices. The high commodity charge assumption of $1.0 per therm is approximately the average commodity charge across all three companies in the July to December 2022 period when energy commodity prices experienced a shock following Russia's invasion of Ukraine in March 2022. The commodity price assumptions are shown in Table 6.2.

The estimated winter bill for a BGE customer from 2025 to 2100 is presented in Figure 6.1. Our projections show that if BGE continues investing in capital at the projected levels, the typical winter bill for a customer using 160 therms/month will grow from an average of $240 per month in 2022-2024 to $402 per month in 2035, a 67 percent increase, and $498 per month by 2050, a 107 percent increase. These estimates assume winter commodity prices stay around the five-year averages. If gas prices experience another shock like in 2022, then the typical residential customer's winter bill would increase by an additional $51 per month.

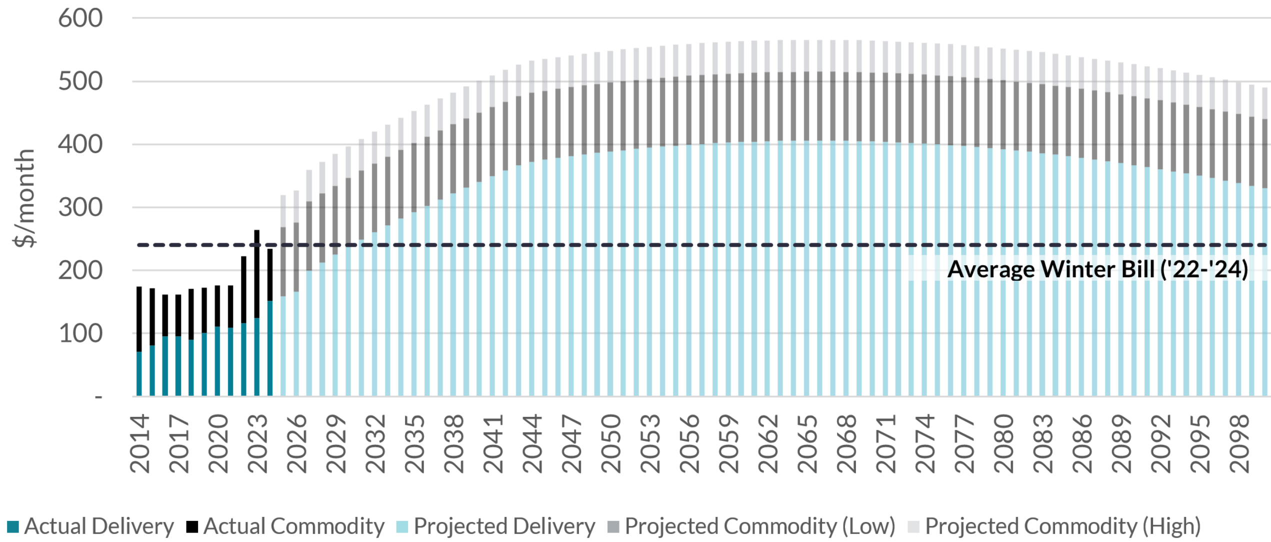
These bill projections are sizable jumps from the 2022 edition of this report in which the projections for the typical BGE winter bill in 2035 was $299 and in 2050 was $364. The updated projections represent

Table 6.2: BGE Commodity Price Assumptions

Scenario	Definition	Price ($/therm)
Base Commodity	3-year BGE February Commodity Average	0.6840
High Commodity	Average commodity charge of BGE, CMD, and WGL from June 2022-December 2022	1.0000

29 This assumption was established in the first edition of this report based on the average residential gas usage per customer in Maryland for January and February from 2018 to 2022. According to the Energy Information Agency (EIA), residential gas consumption in Maryland in the months of January and February averaged 155.6 million therms for these two months from 2018 to 2022. For the approximately 965,000 residential gas customers in Maryland, this resulted in an average of 161.17 therms per customer in these two winter months. We rounded this result to 160 therms for our bill impact analysis.

Figure 6.1: BGE Typical Winter Bill, 2014-2100



increases of $104 (+34%) in the 2035 winter bill and $134 (+37%) in the 2050 winter bill.

As noted above, the projections do *not* account for any migration of gas customers to electricity as a result of independent migration or electrification policies, nor do they account for any potential reductions in gas consumption.

6.1.2. WGL

The commodity prices we use in the WGL bill analysis are based on the average commodity price charged to WGL's residential customers in the three proceeding Februarys (2022-2024). We also include for reference a high commodity charge bill to show how the bill could change if a commodity shock occurs again, like in 2022. These commodity price assumptions are shown in Table 6.3.

The estimated winter bill for a WGL customer from 2022 to 2100 is presented in Figure 6.3. Our projections show that if WGL continues investing in capital at the projected levels, the typical winter bill for a customer using 160 therms/month will grow from an average of $194 per month in 2022-2024 to $256 per month by 2035, a 32 percent increase, and $340 per month by 2050, a 76 percent increase. If gas prices experience another shock like in 2022, then the typical residential customer's winter bill would increase by an additional $50 per month.

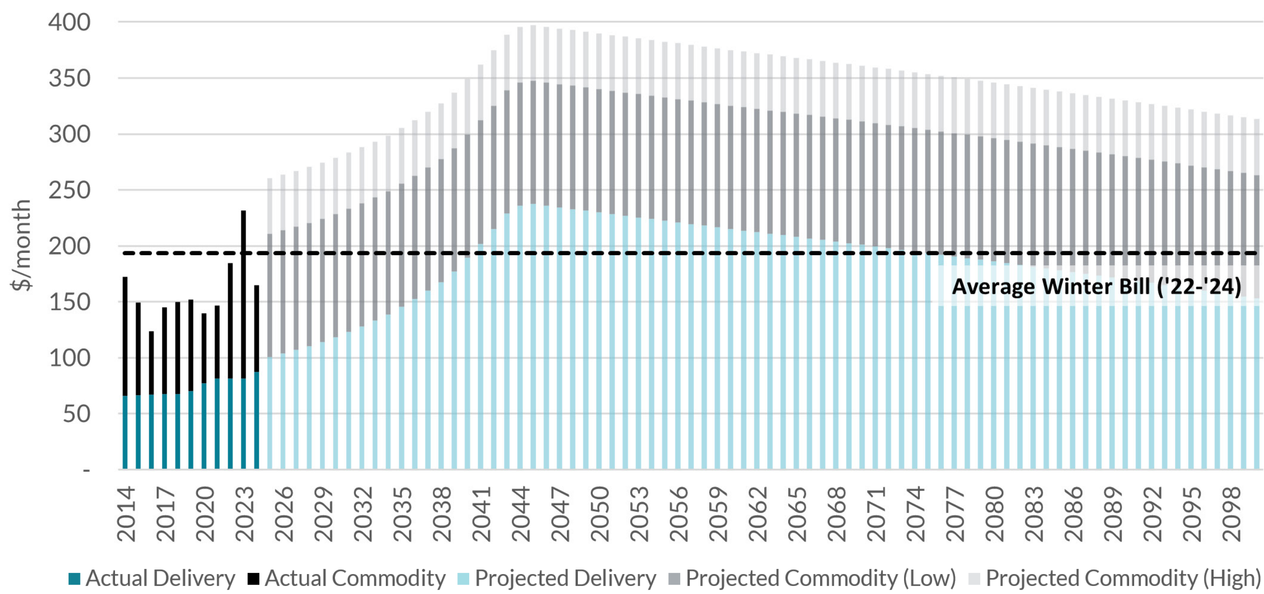
Like we saw for BGE, these bill projections for WGL also represent increases from those in the 2022 edition of this report in which the projection for the typical WGL winter bill in 2035 was $224 and in 2050 was $230. The updated projections represent increases of $31 (+14%) in the 2035 winter bill and $110 (+48%) in the 2050 winter bill.

As noted above, the projections do *not* account for any migration of gas customers to electricity as a result of independent migration or electrification policies, nor do they account for any potential reductions in gas consumption.

Table 6.3: WGL Commodity Price Assumptions

Scenario	Definition	Price ($/therm)
Base Commodity	3-year WGL February Commodity Average	0.6887
High Commodity	Average commodity charge of BGE, CMD, and WGL from June 2022-December 2022	1.0000

Figure 6.2: WGL Typical Winter Bill, 2014-2100



6.1.3. CMD

The commodity prices we use in the CMD bill analysis are based on the average commodity price charged to CMD's residential customers in the three proceeding Februarys (2022-2024). These commodity price assumptions are shown in Table 6.4.

The estimated winter bill for a CMD customer from 2022 to 2100 is presented in Figure 6.3. Our projections show that if CMD continues investing in capital at the projected levels, the typical winter bill for a customer using 160 therms/month will grow from an average of $229 in 2022-2024 to $337 per month by 2035, a 47 percent increase, and $365 per month by 2050, a 59 percent increase. If gas prices experience another shock like in 2022, then the typical residential customer's winter bill would increase by an additional $88 per month.

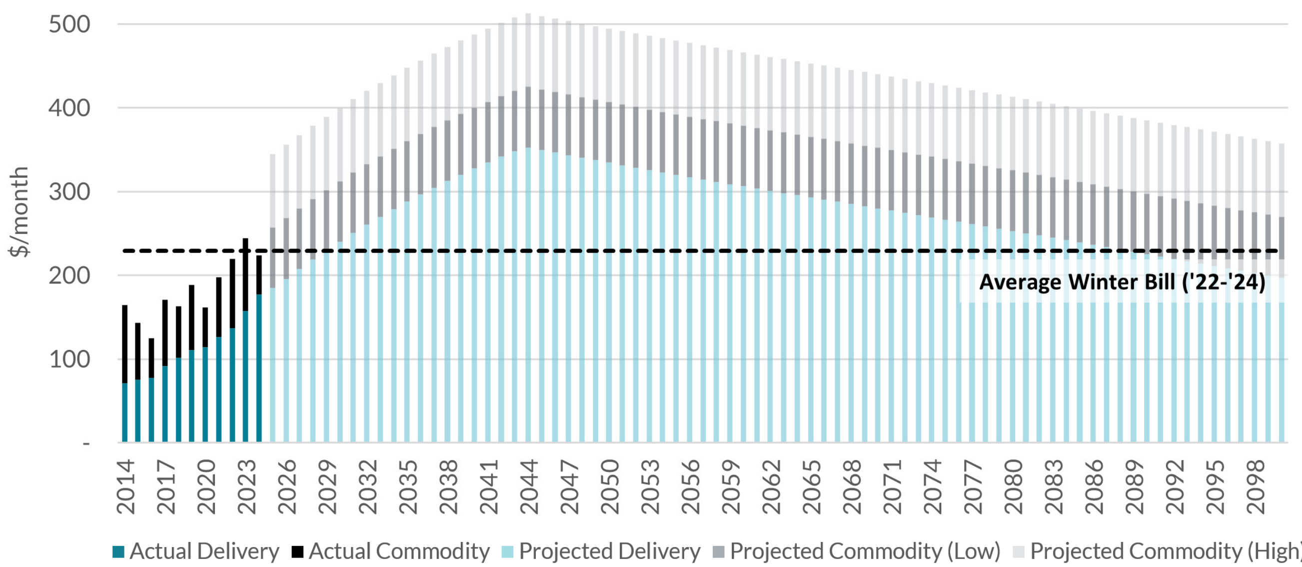
These bill projections for CMD are also increases well above the projections in the 2022 edition of this report in which the typical CMD winter bill in 2035 was $270 and in 2050 was $276. The updated projections represent increases of $67 (+25%) in the 2035 winter bill and $89 (+32%) in the 2050 winter bill.

As noted above, the projections do *not* account for any migration of gas customers to electricity as a result of independent migration or electrification policies, nor do they account for any potential reductions in gas consumption.

Table 6.4: CMD Commodity Price Assumptions

Scenario	Definition	Price ($/therm)
Base Commodity	3-year CMD February Commodity Average	0.4516
High Commodity	Average commodity charge of BGE, CMD, and WGL from June 2022-December 2022.	1.0000

Figure 6.3: CMD Typical Winter Bill, 2014-2100



6.1.4. Bill Impact Summary and Comparison

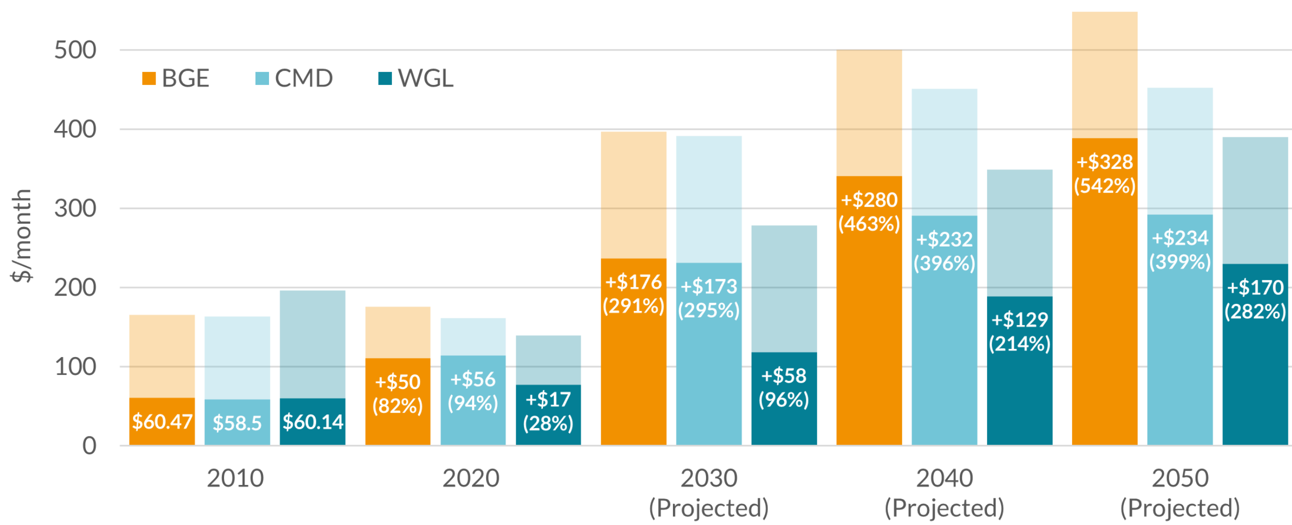
The gas bills we project for each company would continue the rapid rise in gas delivery rates that customers in Maryland have experienced since 2010. The rate at which bills have risen and are projected to rise in the coming years varies by company. Figure 6.4 compares the delivery portion of the winter bill (customer bill without commodity costs) for the same typical customer using 160 therms per month for select historic years (2010 and 2020) and projected years (2030, 2040, and 2050).

The labels in figure 6.4 provide the monthly distribution bill in 2010 on the far-left side of the horizontal access. For the other years on the horizontal axis to the right, the labels show the incremental dollar and percentage increases in the bill above the 2010 baseline level. The delivery bill for a customer using 160 therms at all three companies in 2010 starts at roughly the same $60 per month. By 2020, however, the delivery portion of the bill for a residential customer that used 160 therms diverged such that the CMD customer bill was $55.13 (94%) higher, the BGE customer bill was $50.15 (82%) higher, and the WGL customer bill was $16.84 (28%) higher. For context, over this same 2010 to 2020 period the cumulative inflation was 18.4 percent.[30] This result infers that the bill increases from 2010 to 2020 are not merely the product of inflation but of higher increases in expenditure on capital. Likewise, the projected delivery bills for 2030, 2040, and 2050 assume operating costs remain constant such that the hundreds of dollars in increases in delivery costs projected for these years are entirely the product of anticipated capital expenditures.

It should be reiterated here that the dollar figures being discussed only include the base rate or delivery portion of customer bills. Our projections show that by 2050 customers would be paying an additional $170 to $328 more than they did in 2010 just for the cost of delivery. The cost of gas would add upwards of another $160 to the bill, pushing the total for BGE and CMD towards $500 by 2040.

30 CPI-U at first half of 2010 was 217.535 and CPI-U at first half of 2020 was 257.557. (257.557/217.545 – 1) *100 = 18.4%. <https://data.bls.gov/timeseries/CUUR0000SA0?years_option=all_years>

Figure 6.4: Comparison of Customer Winter Bills for Delivery Only
(actual and projected—excluding commodity costs (shaded))



6.2. Alternative Rate Scenarios

This section examines how rates could be affected by potential declines in the residential customer base through two different rate approaches. First, we analyze how the current rate design structure would need to adjust to maintain revenue requirements with fewer customers. Then, we explore a subscription approach to recovering the utilities' annual revenue requirement, under which remaining customers pay a fixed monthly fee, reflecting a concept suggested by BGE in its recent rate case.[31]

For both approaches, we examine three reduced gas consumption scenarios based on reductions in customers of 10, 30, and 70 percent. Each scenario maintains the same projected revenue requirements calculated in Section 5 but redistributes these costs across a smaller customer base. We assume volumetric sales decline proportionally with customer count, reflecting that departing customers fully eliminate their gas usage.

These scenarios are designed to isolate the relationship between reduced gas consumption and rates. The analysis maintains revenue requirements at the same levels as the BAU and does not incorporate potential cost reductions that might occur with a declining customer base, such as reduced operating costs or modified capital requirements. While a more comprehensive analysis of system transformation might consider these factors, these scenarios provide insight into the potential rate pressure that could emerge from customer attrition and declining consumption under different rate recovery frameworks.

6.2.1. Alternative Residential Rates

Under the current rate design structure, we maintain the same fixed charge trajectory as in the BAU scenario but adjust volumetric rates to recover the remaining revenue requirement. For each company, we examine how volumetric rates and total bills would change under different customer reduction scenarios to maintain the same revenue requirement.

31 Application of Baltimore Gas & Electric for Electric and Gas Multi-Year Plan, Case No. 9692, Sept. 5, 2023 Hearing Tr. at 1090.

BGE

Under scenarios with fewer residential customers, BGE's volumetric rates would increase significantly to recover the same revenue requirement. Figure 6.5 shows how the volumetric rate path differs across customer reduction scenarios. Under the 10 percent reduction scenario, the volumetric rate increases to $1.5785/therm by 2030, rising to $2.6214/therm by 2050. More dramatic customer departures lead to steeper rate increases, with the 70 percent reduction scenario resulting in volumetric rates of $5.3294/therm by 2030 and $8.5891/therm by 2050.

Figure 6.5: BGE Volumetric Rate Projections by Customer Reduction Scenario, 2030-2050

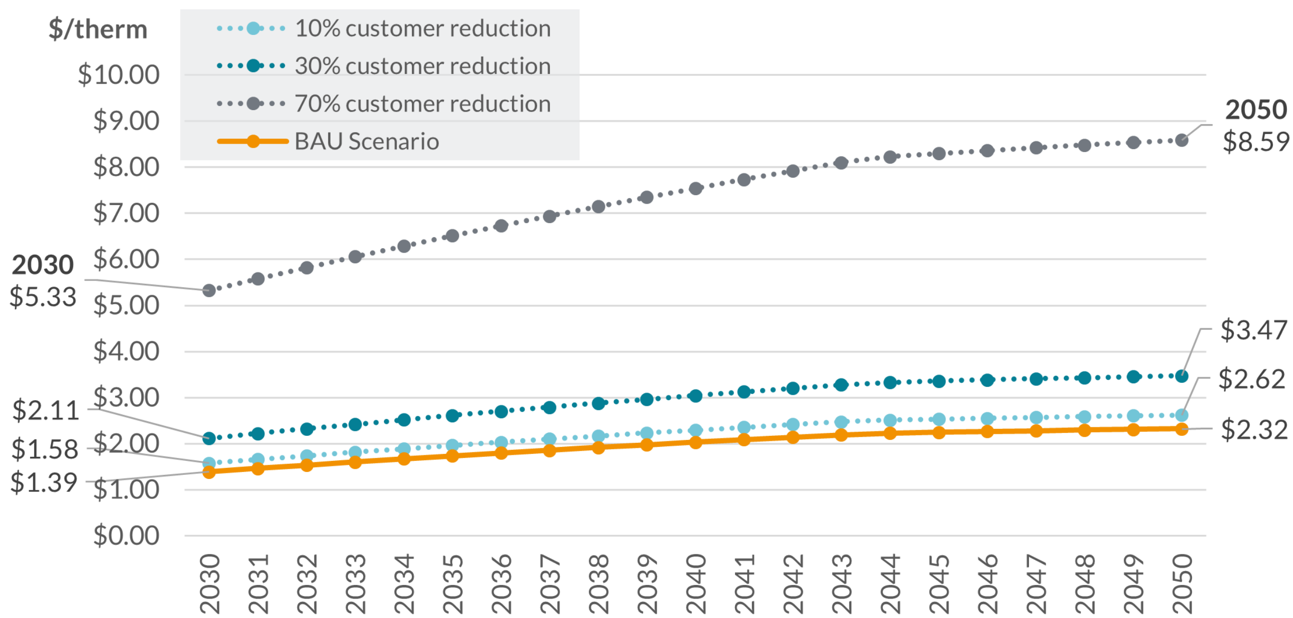
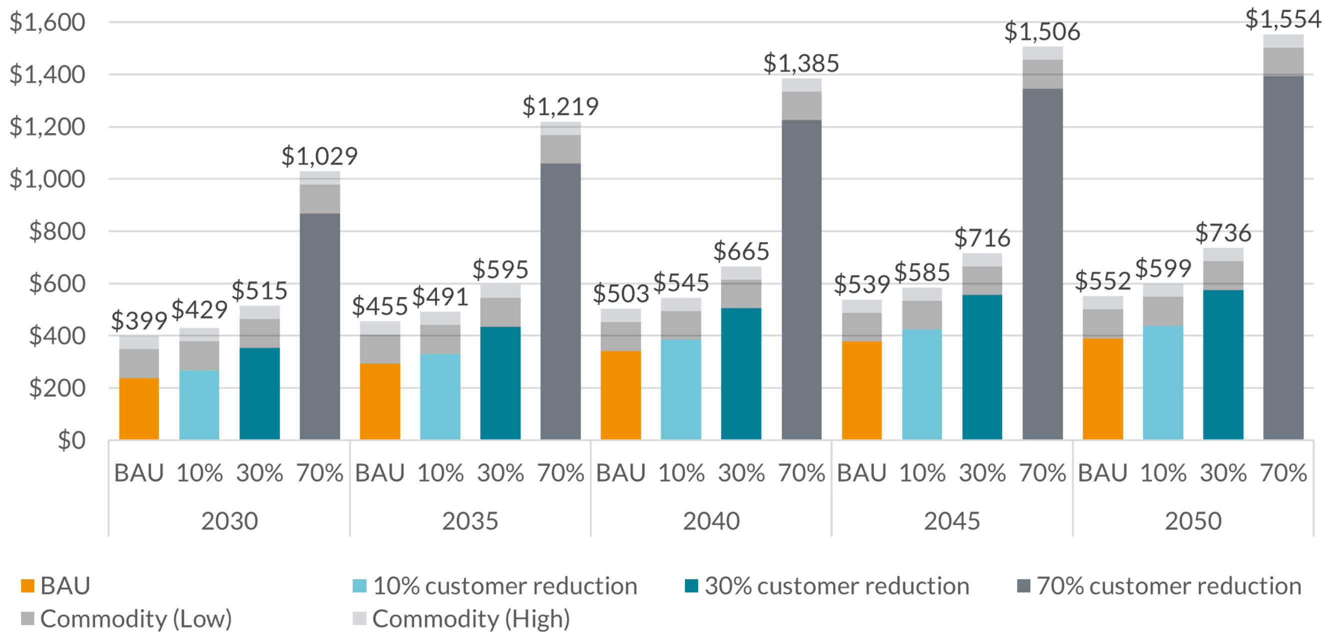


Figure 6.6: BGE Typical Winter Monthly Bills by Scenario and Year



These higher volumetric rates translate into significantly higher winter bills for remaining customers. Figure 6.6 compares typical winter bills (160 therms/month) across scenarios for select years.

Evident in the figure is that by 2035, the typical BGE winter monthly bill could vary significantly depending on the customer migration scenario:

- Under the 10% reduction scenario the winter bill could be $491 (high commodity), which is $36 or 8.0% higher than the BAU projection of $455.
- Under the 30% reduction scenario, the same winter bill reaches $595—an additional $140 or a total bill 1.31 times the BAU amount.
- Under the 70% reduction scenario, the winter bill reaches $1,219—an additional $767 or a total bill 2.7 times the BAU amount.

WGL

The impact of reduced gas consumption on WGL's volumetric rates follows similar patterns to BGE, though from a different starting point. Figure 6.7 shows the volumetric rate trajectories across scenarios. Under the 10 percent reduction scenario, rates increase to $0.7477/therm by 2030, reaching $1.5310/therm by 2050. In the 70 percent reduction scenario, rates climb more steeply to $2.6760/therm by 2030 and $4.9868/therm by 2050.

These higher volumetric rates likewise would translate into significantly higher winter bills for remaining WGL customers. Figure 6.12 compares typical winter bills (160 therms/month) across scenarios for select years.

As with BGE, by 2035, the winter bill of the typical WGL customer could vary widely by migration scenario:

- Under the 10% reduction scenario the winter bill could be $324 (high commodity), which is $19 or 6.1% higher than the BAU projection of $306.
- Under the 30% reduction scenario, the same winter bill reaches $377—an additional $72 or a 23.5% increase over the BAU winter bill.
- Under the 70% reduction scenario, the winter bill reaches $696—an additional $391 or a total bill 1.28 times the BAU amount.

Figure 6.7: WGL Volumetric Rate Projections by Customer Reduction Scenario, 2030-2050

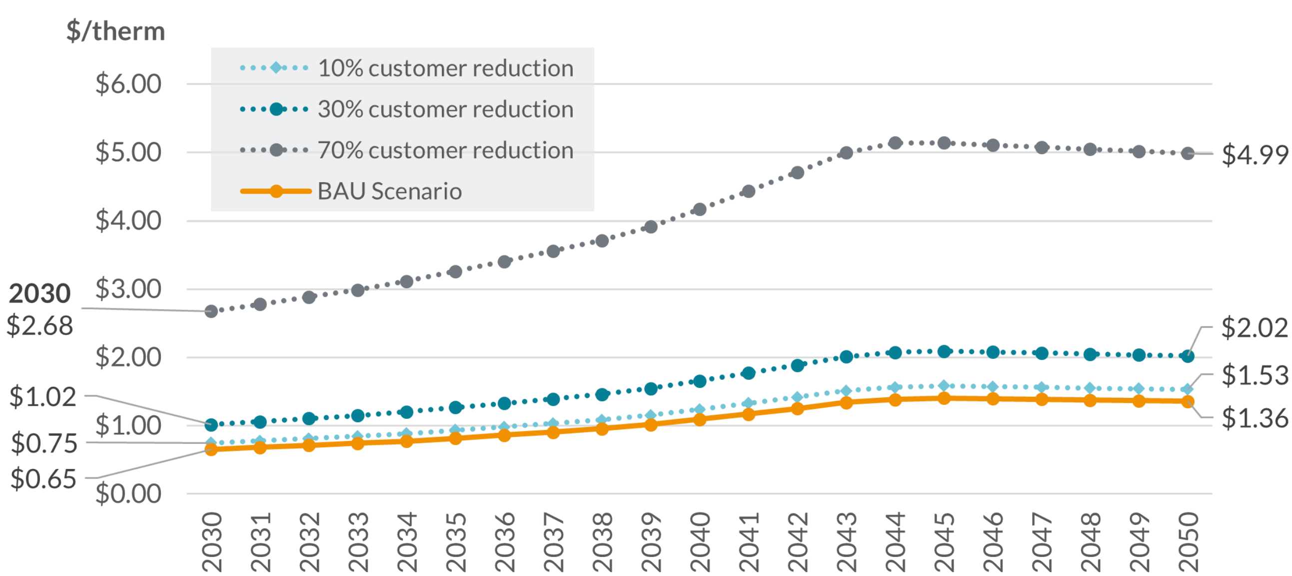
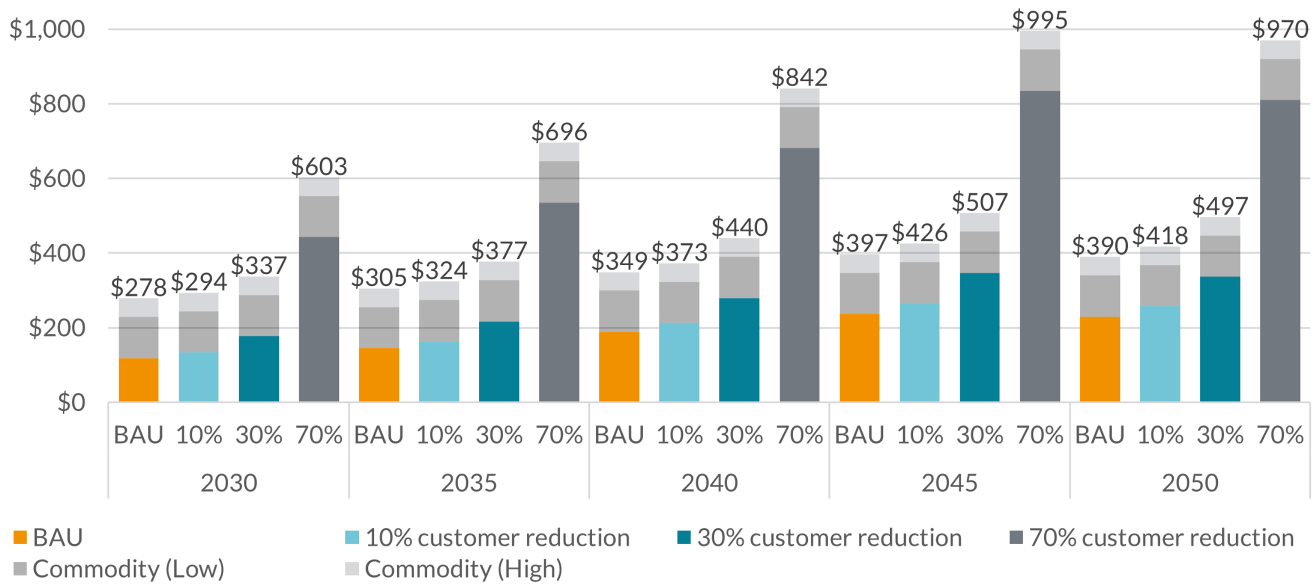


Figure 6.8: WGL Typical Winter Monthly Bills by Scenario and Year



CMD

CMD's smaller customer base makes it particularly sensitive to reduced consumption due to customers leaving its gas system. Figure 6.9 shows how volumetric rates would need to increase across scenarios. Under the 10% reduction scenario, rates rise to $1.5150/therm by 2030 and $1.9401/therm by 2050. The 70 percent reduction scenario leads to rates of $5.0905/therm by 2030 and $6.3657/therm by 2050.

These higher volumetric rates translate into significantly higher winter monthly bills for remaining CMD customers. Figure 6.10 compares typical winter bills (160 therms/month) across scenarios for select years.

Figure 6.9: CMD Volumetric Rate Projections by Customer Reduction Scenario, 2030-2050

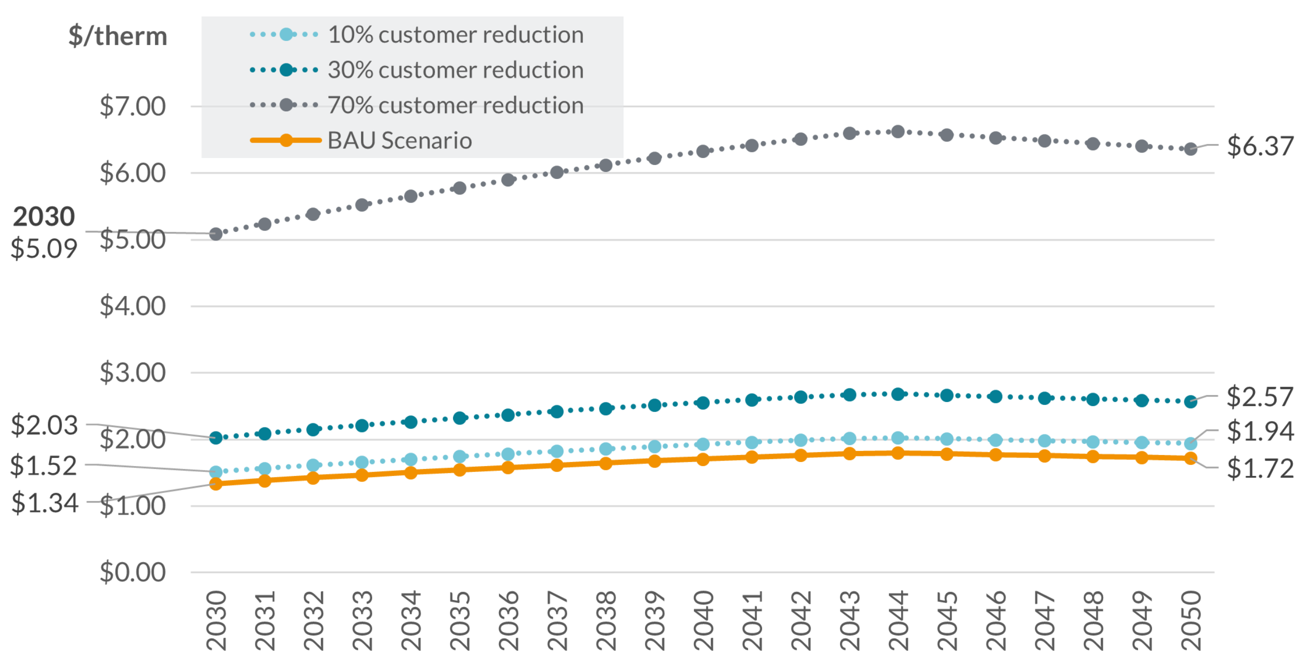
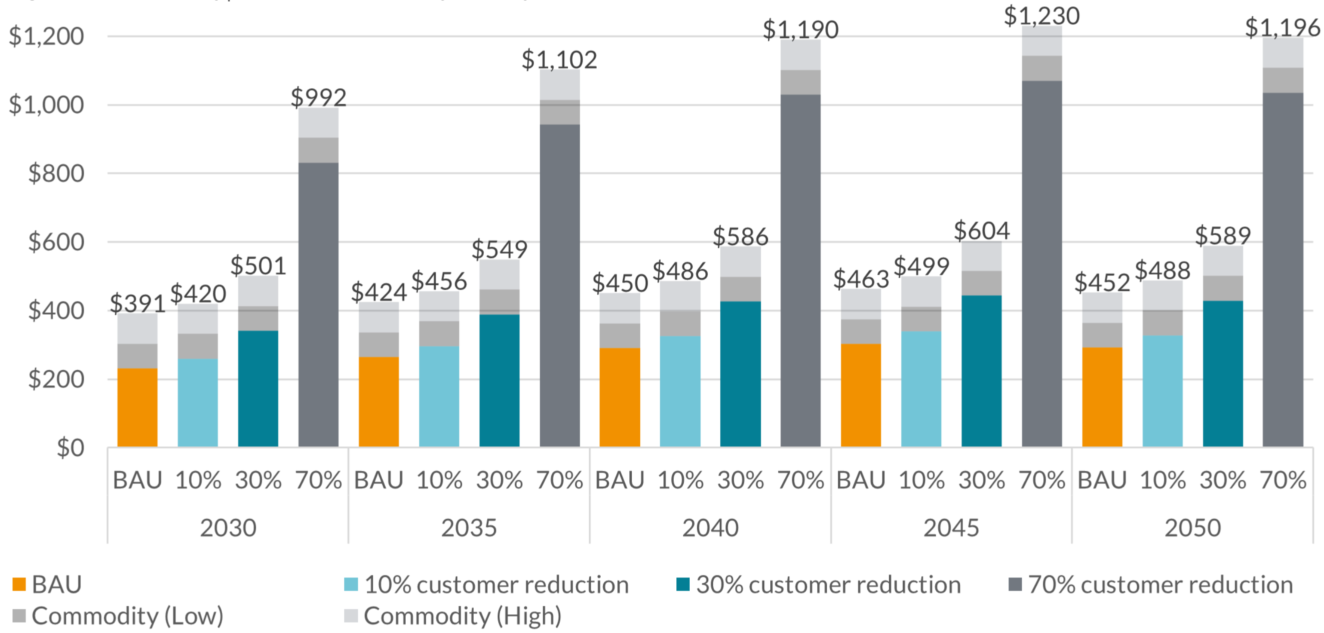


Figure 6.10: CMD Typical Winter Monthly Bills by Scenario and Year



By 2035 the typical CMD winter bill could vary widely depending on the customer migration scenario:

- Under the 10% reduction scenario the winter bill could be $457 (high commodity), which is $32 or 7.6% higher than the BAU projection of $424.
- Under the 30% reduction scenario, the same winter bill reaches $549—an additional $125 or a 29.3% increase over the BAU.
- Under the 70% reduction scenario, the winter bill reaches $1,102—an additional $678 or a total bill 1.60 times the BAU amount.

6.2.2. "Subscription" Model

In BGE's 2023 MYRP 2 proceeding (CN 9692), a BGE witness acknowledged that standard volumetric rate recovery becomes problematic when gas sales decline and customers maintain gas service primarily as backup heating. As the witness testified, such a customer might use the gas system only 10 days per year, making volume-based charges impractical for recovering fixed system costs. He suggested the possibility of transitioning to "more of a subscription service" where customers "sign up for backup heating service" for extreme weather days.[32] Essentially, the idea is that customers would pay a standard monthly or annual charge for gas service regardless of how much gas they use, just as customers of streaming video services pay the same amount each month whether they watch 30 movies or none.

To vet this concept, we analyze a subscription model where customers who maintain gas service as a backup pay a fixed monthly fee that covers their share of system costs. This fee is calculated by dividing each year's residential revenue requirement by the number of remaining customers. Unlike the current rate design with its significant volumetric component, this model provides more stable cost recovery by fully linking revenues to the customer base rather than usage levels.

We analyze this model under the same three customer reduction scenarios (10, 30, and 70 percent) for each company below.

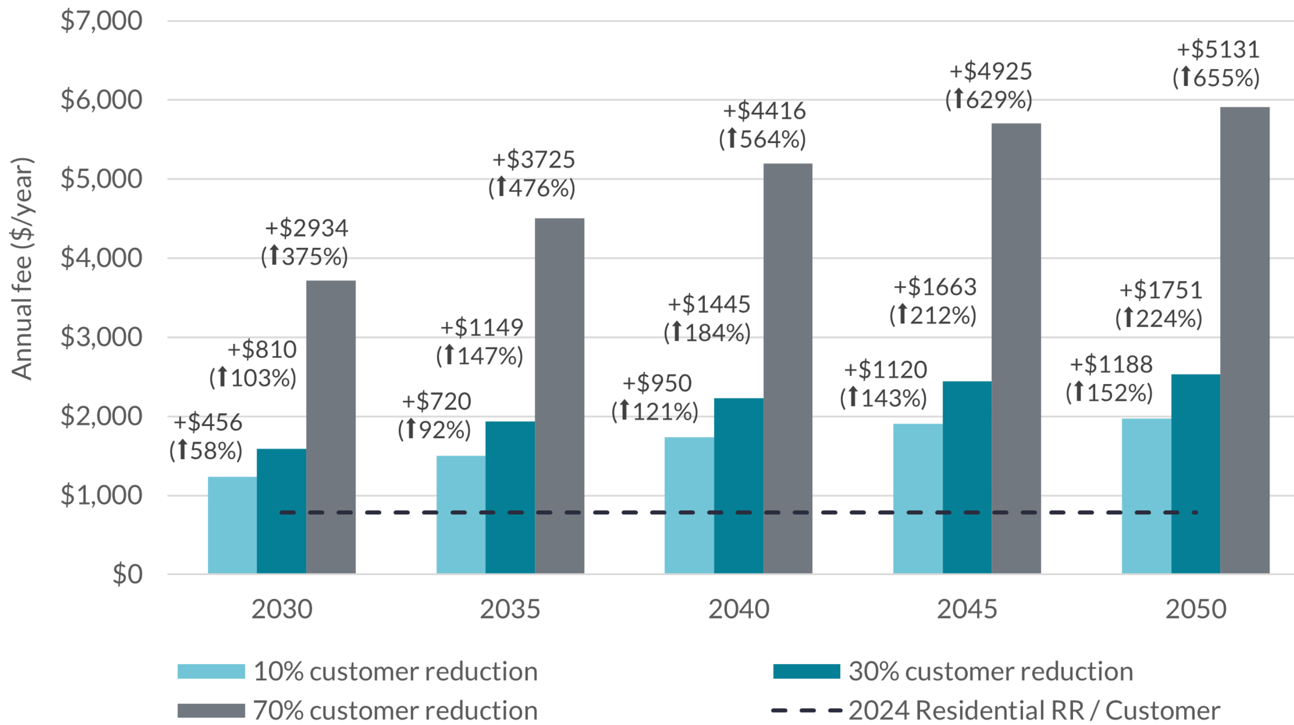
32 Public Service Commission of Maryland, Case No. 9692, Proceedings - September 5, 2023, Transcript at 1089 to 1091.

BGE

Under a subscription model, BGE's current annual fee would be $783 per year (2024 residential base revenue / residential customers). In the future, the annual fee would increase based on the revenue requirement trajectory and customer reduction scenario. Figure 6.11 shows the annual subscription fee for each scenario in select years.

By 2035, the subscription fee would range from $1,353 (10% scenario) to $4,508 per year (70% scenario). The fees would be $720 to $3,725 greater than what a subscription fee would be in 2024. Then by 2050, the subscription fee would range from $1,774 (10% scenario) to $5,914 per year. The 2050 subscription fees would be $1,188 to $5,131 more per year than a 2024 subscription fee of $783.

Figure 6.11: BGE Subscription Fee by Scenario, 2030-2050

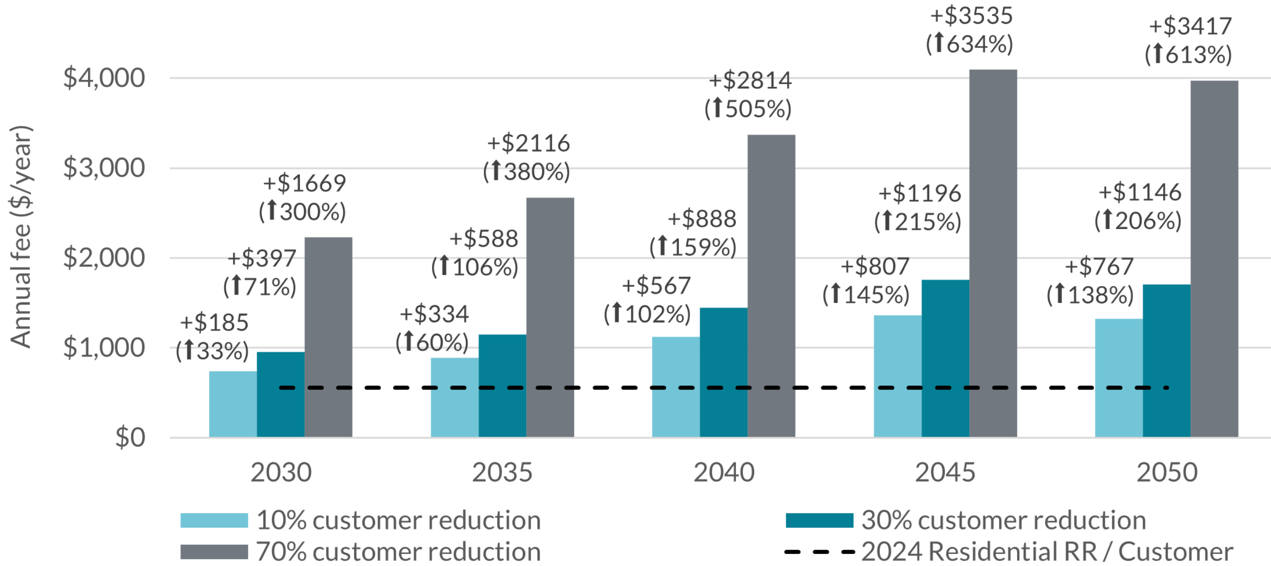


WGL

Under a subscription model, WGL's current annual fee would be $557 per year (2024 residential base revenue / residential customers). In the future, the annual fee would increase based on the revenue requirement trajectory and customer reduction scenario. Figure 6.12 shows the annual subscription fee for each scenario in select years.

By 2035, the subscription fee would range from $891 (10% scenario) to $2,673 per year. The fees would be $334 to $2,116 greater than what a subscription fee would be in 2024. Then by 2050, the subscription fee would range from $1,192 (10% scenario) to $3,974 per year. The 2050 subscription fees would be $767 to $3,417 more per year than a 2024 subscription fee of $557.

Figure 6.12: WGL Subscription Fee by Scenario, 2030-2050

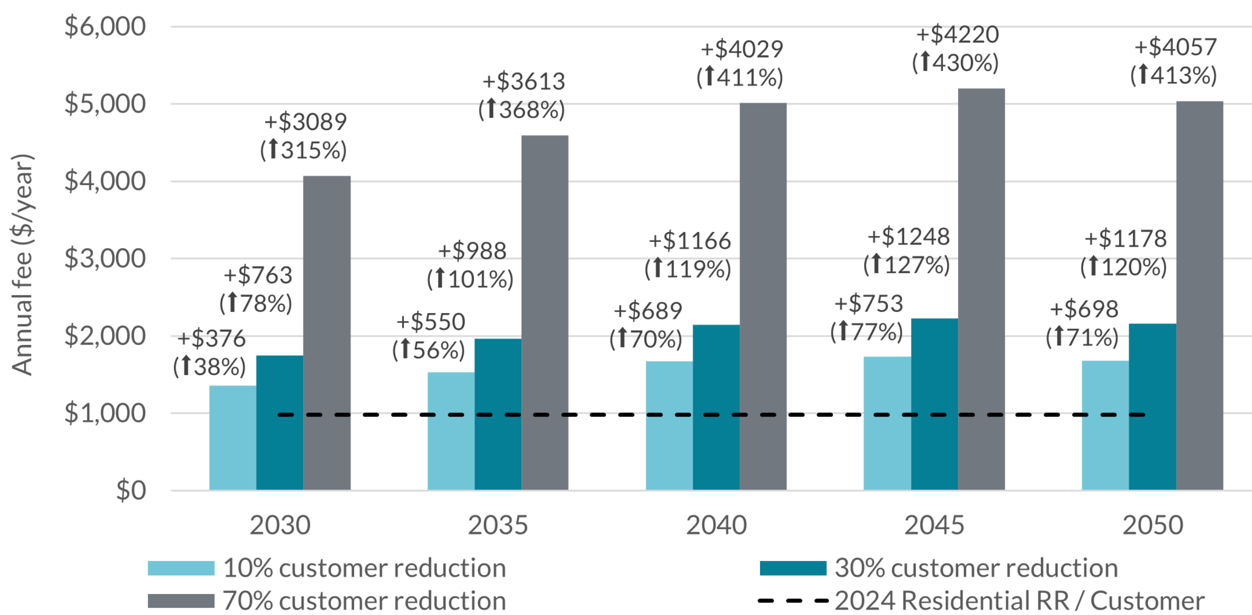


CMD

Under a subscription model, CMD's current annual fee would be $981 per year (2024 residential base revenue / residential customers). In the future, the annual fee would increase based on the revenue requirement trajectory and customer reduction scenario. Figure 6.13 shows the annual subscription fee for each scenario in select years.

By 2035, the subscription fee would range from $1,357 (10% scenario) to $4,071 per year. The fees would be $376 to $3,089 greater than what a subscription fee would be in 2024. Then by 2050, the subscription fee would range from $1,679 (10% scenario) to $5,038 per year. The 2050 subscription fees would be $698 to $4,057 more per year than a 2024 subscription fee of $981.

Figure 6.13: CMD Subscription Fee by Scenario, 2030-2050



APPENDIX A

GLOSSARY AND ACRONYMS

GLOSSARY

Term	Definition
Commodity rate	The unit rate charged for each unit of gas actually purchased under a contract. *Source: New York State Public Service Commission. "Glossary of Terms Used by Utilities and Their Regulators." Available at: https://www.dps. ny.gov/glossary.html.*
Depreciation	The loss in service value not restored by current maintenance and incurred in connection with the consumption or prospective retirement of property in the course of service from causes against which the carrier is not protected by insurance, and the effect of which can be forecast with a reasonable approach to accuracy. *Source: "18 CFR Ch. I, Pt. 352." Code of Federal Regulations. Available from: https://www.ferc. gov/sites/default/files/2020-06/18cfr352.pdf. Accessed 6 July 2022.*
Rate Base	The net investment of a utility in property that is used to serve the public; this includes the original cost net of depreciation, adjusted by working capital, deferred taxes, and various regulatory assets—the term is often misused to describe the utility revenue requirement. *Source: Lazar, J. (2016). Electricity Regulation in the US: A Guide. Second Edition. Montpelier, VT: The Regulatory Assistance Project. Retrieved from https://www.raponline.org/knowledge-center/electricity-regulation-in-the-us-a-guide-2/.*
Return on Equity	The rate of earnings realized by a utility on its shareholders' assets, calculated by dividing the earnings available for dividends by the equity portion of the rate base.
Revenue Requirement	The annual revenues that the utility is entitled to collect (as modified by adjustment clauses). It is the sum of operation and maintenance expenses, depreciation, taxes, and a return on rate base. In most contexts, revenue requirement and cost of service are synonymous.
Stranded Assets	Assets that have suffered from unanticipated or premature write-downs, devaluation or conversion to liabilities.

ACRONYMS

BGE	Baltimore Gas and Electric
CAPEX	Capital Expenditures
CMD	Columbia Gas of Maryland
CN	Case Number
OPC	Office of People's Counsel
MACRS	Modified Accelerated Cost Recovery System
MYRP	Multi-Year Rate Plan
PHMSA	Pipeline and Hazardous Materials Safety Administration
PSC	Public Service Commission
STRIDE	Strategic Infrastructure Development and Enhancement (Public Utilities Article, Ann. Code of Md., § 4-210)
VMC	Vintage mechanically coupled
WACC	Weighted Average Cost of Capital
WGL	Washington Gas Light

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