Chapter 2

Company Overview

Company Overview

Key Points

- Cascade serves diverse geographical territories across Washington and Oregon.
- Cascade's primary pipelines are Northwest Pipeline, Gas Transmission Northwest, and Enbridge, also known as Westcoast, with access to three other pipelines.
- Core customers represented 22% of total 2021 throughput, while non-core customers represented 78% of total throughput.
- Cascade is a subsidiary of Montana Dakota Utilities Resources Group, Inc. based in Bismarck, North Dakota.

Cascade Natural Gas Corporation (CNGC, Cascade, or the Company) has a rich history that began over 70 years ago when business leaders and public officials in the Pacific Northwest initiated a campaign to bring natural gas to the region to replace other more expensive fuels. In 1953, five small utilities serving fifteen communities merged to form Cascade. Over the years, Cascade continued to grow, merging with, and acquiring other natural gas providers. The Company stock first traded on the New York Stock Exchange in 1973. In 2007, Cascade merged with Montana Dakota Utilities (MDU) Resources Group, Inc. which is headquartered in Bismarck, North Dakota[1]. Cascade's headquarters moved from Seattle, Washington to Kennewick, Washington in 2010. Figure 2-1 provides an overview of Cascade service territory.

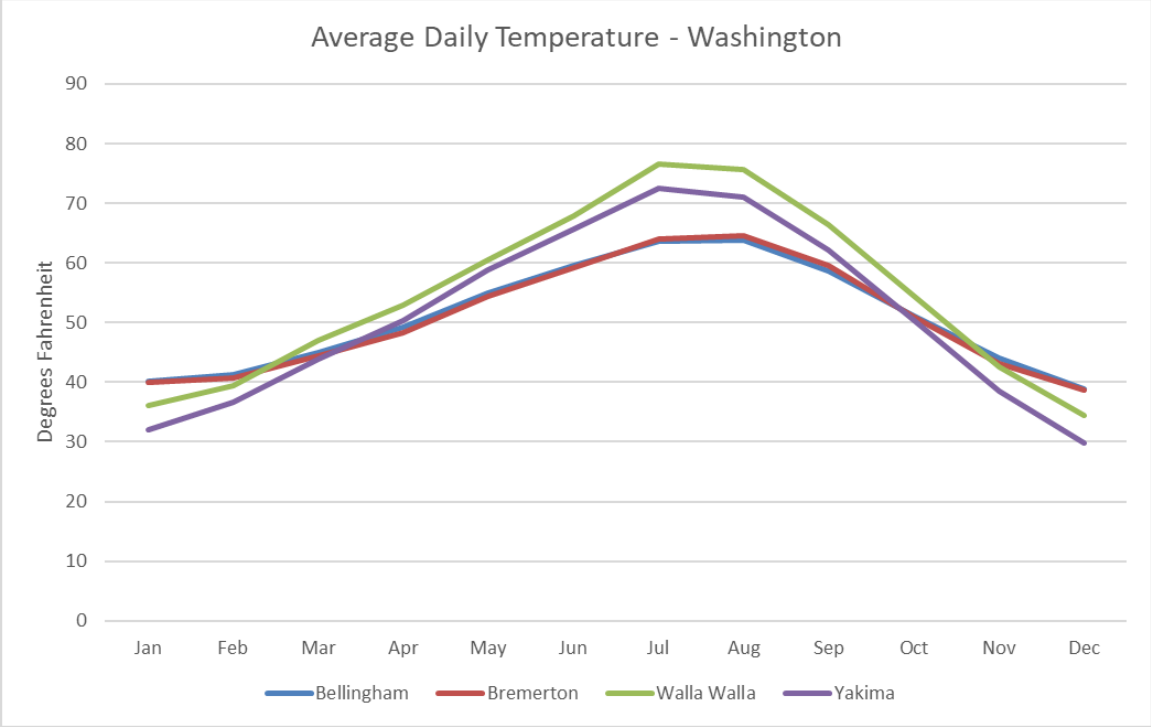
Figure 2-1: Cascade's Service Territory

[1] For more information about MDU, see https://www.mdu.com

Today, Cascade's service territory covers about 32,000 square miles and extends over 700 highway miles from end to end, encompassing a diverse economic base as well as varying climates. Cascade delivers natural gas service to more than 318,500 customers, with approximately 233,600 customers in Washington and 84,900 customers in Oregon. The Company's customers reside in total 95 communities, 67 in Washington and 28 in Oregon. Cascade's service area consists of communities across Washington as well as smaller, rural communities in central and eastern Oregon.

The climate of Cascade's service territory is almost as diverse as its geographical reach. The western Washington portion of the service territory, nicknamed the I-5 corridor, has a marine climate with occasionally significant snow events. In general, the climate in the western part of the service territory is mild with frequent cloud cover, winter rain, and warm summers. Cascade's eastern Washington service territory has a semi-arid climate with periods of arctic cold in the winter and heat waves in the summer. Figure 2-1 compares the average temperatures by month of the two regions. Oregon's service territory is in rural areas throughout northern central, central, and eastern Oregon. All regions of Oregon have semi-arid climates with periods of arctic cold in the winter and heat waves in the summer.

Figure 2-1: Average Temperature by Washington Region

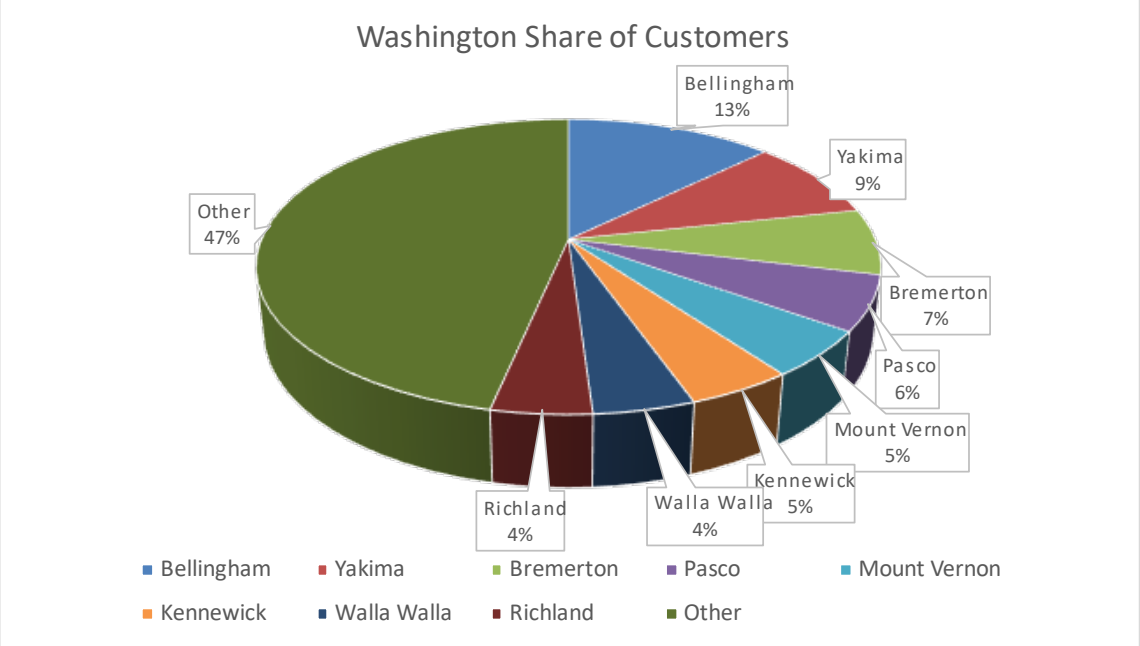


Below are some of the more populated towns within the regions Cascade provides distribution service:

- **Northwest** – Bellingham, Mt. Vernon, Oak Harbor/Anacortes, the Kitsap Peninsula, the Grays Harbor area and Kelso/Longview;
- **Central** – Sunnyside, Wenatchee/Moses Lake, Tri-Cities, Walla Walla and Yakima areas; and
- **Southern** – Bend and surrounding communities, Ontario, Baker City and the Pendleton/Hermiston areas.

Figure 2-2 shows a breakdown of Cascade's Washington customer density by city. A map of Cascade's certificated service territory is provided as Figure 12-13 in Chapter 13, Glossary and Maps.

Figure 2-2: Customer Density by City in Washington



Pipeline and Basin Locations

Cascade purchases natural gas from a variety of suppliers and transports gas supplies to its distribution system using three natural gas pipeline companies. Northwest Pipeline LLC (NWP) provides access to British Columbia and domestic Rocky Mountain gas, Gas Transmission Northwest (GTN) provides access to Alberta and Malin gas, and Enbridge (Westcoast or WCT) provides British Columbia gas directly into the Company's distribution system. Cascade also holds upstream pipeline transportation contracts on TransCanada Pipeline's Foothills Pipeline (FHBC), NOVA Gas Transmission Ltd. (also known as NGTL), and Ruby Pipeline. More information about the pipelines and the supply basins is provided in Chapter 4,

Supply Side Resources. Maps of select pipelines are found in Chapter 13, Glossary and Maps.

Core vs Non-Core Service

Cascade offers core service, which is the procurement of gas supply from an upstream basin or pipeline interconnect, such as Sumas or AECO, that is then transported to Cascade's citygates. From the citygate, Cascade then delivers gas on its distribution system to the end-use customer. Although Cascade offers core service to all its customers, not all of them take advantage of this type of firm service.

In 1989, concurrent with the passage of the Natural Gas Wellhead Decontrol Act, Cascade began allowing its large volume customers to purchase their own gas supplies and gas transportation services upstream of Cascade's distribution system.[2] These customers, referred to as large volume transportation or non-core customers, procure their own supply and transportation through third parties such as marketers. Cascade is only responsible for the distribution of non-core gas supply from the upstream pipeline citygate to the point of delivery at the customer's site. The Company currently has approximately 242 large volume customers who engage in this type of non-core service.

Since the Company does not provide gas supply and upstream pipeline transportation capacity resources to non-core customers, the Company does not plan for non-core customers in the conventional upstream resource analysis of its Integrated Resource Plan (IRP). However, with the implementation of the Climate Commitment Act (CCA) in Washington and the Climate Protection Plan (CPP) in Oregon, non-core emissions are considered in Cascade's resource integration and compliance planning. Also, non-core demand is a consideration in Chapter 8, Distribution System Planning.

In 2024, Cascade's residential customers represented approximately 12% of the total natural gas delivered on Cascade's system, while commercial customers represented roughly 9%, and the core industrial customers accounted for around 1% of total gas throughput. The remaining non-core industrial customers represented the remaining balance of 78% of total throughput.

[2] *See* Natural Gas Wellhead Decontrol Act of 1989 amends the Natural Gas Policy Act of 1978 to declare that the price guidelines for the first sale of natural gas do not apply to: (1) expired, terminated, or post-enactment contracts executed after the date of enactment of this Act; and (2) certain renegotiated contracts. Decontrols as of May 15, 1991, natural gas produced from newly spudded wells. Repeals permanently wellhead price controls beginning on January 1, 1993.

Equity Considerations

In Order No. 09 issued in Docket UG-210755 (Final Order 09), which approved Cascade's 2021 general rate case, the Washington Utilities Commission (WUTC) clarified its expectation that Cascade incorporate an equity lens in its daily operations. The WUTC defined the following four tenets of energy justice which are different aspects of an equity lens: (1) distributional justice, (2) procedural justice, (3) recognition justice, and (4) restorative justice. Cascade describes each tenet below:

1) Recognition Justice refers to understanding and acknowledging historical and ongoing inequalities.
2) Procedural Justice means that the Company should seek to collaborate transparently with a broad range of constituents within its service territory when it makes a decision that will impact customers directly or indirectly.
3) Distributional justice refers to the distribution of benefits and burdens across populations with the goal of ensuring that marginalized and vulnerable populations do not receive an inordinate share of the burdens or are not denied access to benefits.
4) Restorative Justice is using regulatory outcomes, such as tariff or rate case filings, for rate discounts or new programs to address or change inequities identified through the distributive justice process or the data collection process.

Cascade believes each tenet is a step in a systematic process toward righting a wrong.

Upon absorbing the contents of Final Order 09, Cascade realized it needed a paradigm shift. Applying an equity lens in all aspects of its business requires a top-down approach. To do this, Cascade identified an executive sponsor for equity, who provided equity training to all Cascade executives. The Company then hired a program manager who was tasked to be a central owner for equity related issues, questions, and Company integration. This program manager led the process of identifying vulnerable communities in the Company's service territory, and then soliciting representation from these communities for the Company's Equity Advisory Group (EAG).

The EAG is comprised of seven members who provide representation from the following six community groups:

1. Highly Impacted Communities, Marginalized Populations, Low-Income Representation,
2. Named Community Resource: Public Health Advocate,
3. Named Community Resource: Sustainable Living Center,
4. Named Community Resource: Public Mental Health and Social Services Advocate,

5. Named Community Resource: Education Service District 105, and
6. Yakama Nation Tribes; Black, Indigenous, and People of Color (BIPOC) Community

The EAG, which began meeting December 13, 2024, defines its purpose in its charter in the following way:

> The EAG is designed to inform the development of the Company's energy equity processes and provide guidance on other company activities relevant, but not limited to, community engagement, energy efficiency, regulatory obligations, bill payment assistance programs, resource planning, decarbonization, expanding access and removal of barriers for underserved and overburdened customers.

Since its first monthly meeting in December 2023, the EAG has discussed an array of topics, including the following:

- Cascade provided an overview of the Commission's proceeding in Docket A-230217, wherein the Commission intends to develop a policy statement to address the application of equity and justice in Commission processes and decisions. Cascade encouraged EAG members to respond to the Commission's Notice of Opportunity to File Written Comments, issued September 29, 2024.

- Cascade provided an overview of the general rate case process and notified members that it would be filing a multiyear rate plan the first quarter of 2024. The Company told members it would continue to provide updates on the filing and the process.

- Cascade presented an overview of the CARES program, implemented October 1, 2023. CARES offers qualifying low-income customers with bill discounts and, if needed, arrearage relief through financial grants. This program and outreach for this program are discussed in detail in Daniel L. Tillis's testimony (Exh. DLT-1T).

- Commission Staff provided an overview of the general rate case process and explained how to track a docket, intervene in a proceeding, and submit comments.

- Cascade provided an overview of the Washington Incentive Program (WIP), which offers weatherization services and high efficiency appliance upgrades at no direct cost to qualifying low-income customers within the Company's Washington service territory.

- The committee members discussed best practices for informing hard-to-reach customers, which included discussions about improving non-English translations and accommodating customers with no internet or social media access.

- Cascade provided an overview of its Integrated Resource Process and asked for input on how the EAG would like to be involved.

- The Company provided an overview of the Climate Commitment Act and the Company's compliance requirements.

Cascade believes the EAG provides a safe and welcoming space to under-represented communities in its service territory. These representatives have provided useful, actionable feedback. As a result of the EAG's recommendation to address linguistic isolation, Cascade upgraded its translation services subscription so that online and written communications are now available in a more readable Spanish translation as well as in Chinese, Hmong, Indonesian, Japanese, Korean, Vietnamese, Romanian, Russian, Somali, Swahili, Ukrainian, and French. Cascade also responded to the EAG's feedback on its Cascade Arrearage Relief and Energy Savings (CARES) program, where the EAG advised the Company to create a clear and transparent webpage detailing CARES eligibility requirements. Cascade presented the new CARES website content to the EAG, and it was well received.

Cascade plans to continue engaging the EAG in conversations about Company programs, services, and upcoming business decisions to understand the impact each action has on the burdens and benefits experienced by the members' communities.

Beyond working with the EAG, Cascade has programs that directly serve energy justice communities at no direct cost to income qualified customers. These programs are Cascade's Weatherization Incentive Program (WIP) and CARES. Community Action Agencies that administer WIP offer customers whole-home weatherization services which include a home energy audit, the installation of up to thirteen high efficiency measures, and health and safety home repairs necessary for the efficacy of the installed energy efficiency measures.

Cascade's bill assistance program, CARES, offers income-qualified customers with five tiers of generous bill discounts and, if needed, five tiers of arrearage forgiveness grants. This program, and its corresponding cost recovery mechanism, were approved in Order 01 issued in Docket UG-230551. Under CARES, Washington customers may call either a Community Action Agency or Cascade and self-attest to having a qualifying income. Co-administration and the ability for customers to qualify for program benefits through self-attestation have removed barriers experienced under the prior assistance program and have increased program participation significantly.

Customers are made aware of CARES through various communication channels, including bill inserts, postcards, emails, social media posts, Google Ads, 3rd party website banner ads, streaming audio and video ads, outbound and recurring phone calls to select customers, and door tags. To address linguistic preferences, all CARES program communications are provided in English and Spanish, and based on feedback from its Community Action Agencies, Cascade translated CARES flyers and paper applications into Tagalog, Burmese, Filipino, Punjabi, Chinese, Vietnamese, Ukrainian, Arabic, and Russian. Cascade is also overseeing a pilot that engages Community Based Organizations (CBOs) for CARES program outreach. Final Order 09, which requires a three-year pilot, describes CBO engagement as the use of "trusted messengers" for hard-to-reach customers.

An equity lens must include consideration of environmental impacts upon communities. Cascade Natural Gas, along with its three sister companies, provides the Environmental Community Opportunity (ECO) Fund to support projects that enhance environmental education and stewardship in the communities that Cascade serves. Environmental education projects may include grants for specific teacher training, books or equipment for classroom use, field trips, or special project support in the natural or physical sciences. Community environmental stewardship projects may include such things as nature trail development, wildlife area enhancement, recycling and community cleanup promotion, or the development of "living laboratories" for the use of students and the general public. The Company is particularly interested in reaching traditionally underserved communities through such resources.

Cascade recognizes that to integrate equity into its daily operations, it must identify vulnerable populations and understand the specific inequities these communities face. In 2023 Cascade began mapping the Washington Department of Health's highly impacted community (HIC) rankings per census tract in Cascade's service territory and correlating the HIC data with billing data, such as customer-level information on arrearages, disconnections for non-payment, and participation in income-qualified programs. Through this process, Cascade expects it will be able to better identify and engage with customers who need protections, including CARES services, and further identify inequities in distributional justice and seek restorative justice through corrective measures that mitigate inequitable outcomes.

Much of Cascade's initial work towards valuing equity has been on the frontlines of meeting customers where they are, providing meaningful bill payment assistance, communicating clearly, and reducing linguistic barriers. While this is an important step that will continually need to be reviewed to ensure practices stay current to customers' needs, Cascade recognizes that it needs to go further; it needs to apply an equity lens farther back into its workstream. To do this, Cascade has been developing a distributional equity analysis (DEA) to gauge the impacts a Company decision, such as a new or modified pipeline, may have on

vulnerable communities. To date, the Company has a draft DEA that it has introduced to its EAG. Further conversations are needed to better develop the DEA with leadership. Once approved by the EAG, Cascade plans to adopt the use of DEA scoring for all projects exceeding a set dollar amount. Mitigating measures, including whether to proceed with a plan, seek community involvement or adapt the plan to something else such as a non-pipeline alternative, will be considered based on the DEA score.

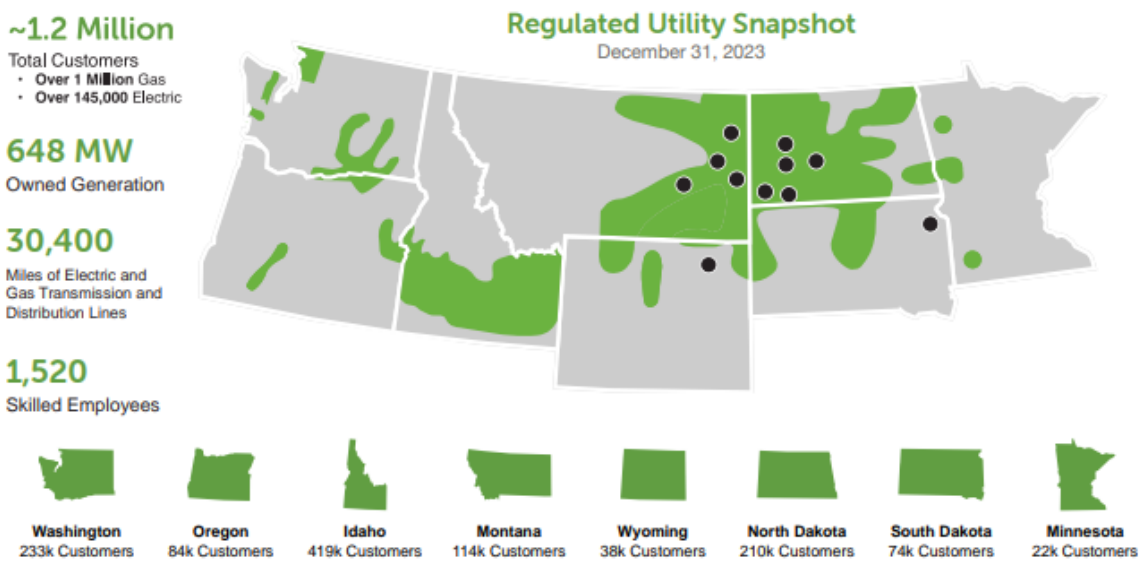
Overall, Cascade understands that making equity an integrated part of its daily operations must occur iteratively and through collaboration. Cascade has more work to do, but the Company has laid useful groundwork that will aid in implementing restorative justice. With the collaboration from the EAG. the CARES Advisory Group, and the Technical Working Group, Cascade has the forums to discuss issues and concerns, and the space for underrepresented customer groups to engage. Cascade looks forward to improving its understanding of the inequities it may inadvertently impose on vulnerable communities and seeing better ways to proceed in the future, including implementing mitigating measures where possible.

Cascade will monitor equity considerations in other regional Integrated Resource Plans (IRPs) and follow guidance from the Commission and its Equity Advisory Group (EAG). This will support the Company's efforts to incorporate increased equity considerations in the 2025 IRP.

Company Organization

In 2007, Cascade became a subsidiary of MDU Resources Group, Inc., a multidimensional regulated energy delivery and construction materials and services business, operating across the country and traded on the New York Stock Exchange under the symbol MDU. Cascade, with headquarters in Kennewick, Washington, is part of its utility group of subsidiaries. MDU Resources Group's utility companies, when combined, serve approximately 1.2 million customers. Cascade distributes natural gas in Oregon and Washington. Great Plains Natural Gas Co. distributes natural gas in western Minnesota and southeastern North Dakota. Intermountain Gas Company distributes natural gas in southern Idaho. Montana-Dakota Utilities Co. generates, transmits and distributes electricity and distributes natural gas in Montana, North Dakota, South Dakota and Wyoming. Figure 2-3 provides a geographical representation of the various services/territories served by MDU Resources.

Figure 2-3: MDU Resources Services and Territory



Chapter 3

Demand Forecast

Overview

Key Points

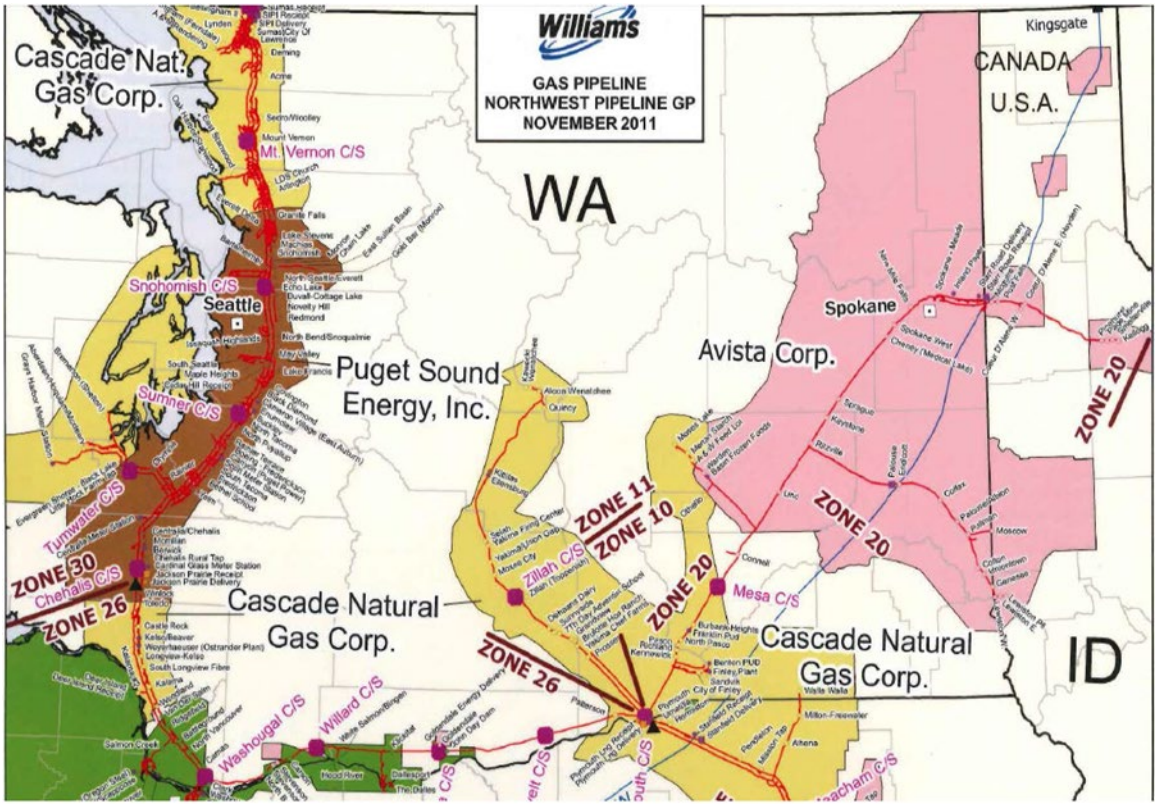
- Cascade extended its forecast analyses of demand areas, HDDs, and wind from 20 years to 26 years to better align with emissions modeling.
- Peak day is analyzed stochastically using 10,000 Monte Carlo simulated draws for each weather zone.
- Cascade adjusted the price regressor to a retail rate regressor in the customer and use per customer forecasts.
- The Company utilizes dynamic regression modeling techniques for customer and annual demand forecasts.
- Cascade's reference case forecast assumes flat customer counts.
- High and low scenarios are included and alternative forecasting assumptions were considered.
- Uncertainties in the future, such as economic and long-term weather conditions, as well as future legislation, may cause differences from the Company's forecast.

Each year Cascade develops a minimum 20-year forecast of customers, therm sales, and peak requirements for use in short-term (annual budgeting) and long-term (distribution and integrated resource planning) planning processes. Cascade is extending its forecast out to 2050 in order to better align with carbon compliance goals. Sources of this forecast include historic data, market intelligence (i.e., building code changes), and regional economic data from Woods & Poole. This forecast is a robust portfolio of estimates created by expanding a single best-estimate forecast, which includes various potential economic, demographic, and marketplace eventualities, into scenarios such as a reference case, low, and high growth. The scenarios are used for distribution system enhancement planning and as inputs in optimization models to determine the reasonable least cost, least risk mix of supply and energy efficiency resources, revenue budgeting, and load forecasts associated with the purchased gas cost process.

Demand Areas

For the 2025 IRP's planning horizon, 2025-2050, Cascade is forecasting at the pipeline zonal level and the rate class level. Historically, Cascade's forecast was at the citygate level rather than the pipeline zonal level. A map of Washington pipeline zones can be seen in Figure 3-1. Additionally, pipeline zone maps of Washington and Oregon can be found in Figures 12-9 and 12-10. In Figure 3-2, Cascade shows the citygates that belong to each pipeline zone.

Figure 3-1: Washington Pipeline Zone Map



Cascade has a total of 76 citygates, of which nine citygates feed only non-core customers and the remaining 67 serve at least one core customer. Of the 67 citygates that serve core customers, 22 are grouped into nine different citygate loops. These are then grouped by pipeline zone, made up of varying numbers of citygates and citygate loops. Each of these areas contain multiple rate classes, resulting in approximately 57 individual dynamic regression models. Each zone is assigned to a weather location. For this IRP, the Company assigned the zones to the closest weather location by distance. The forecast results are shown in Appendix B. In Figure 3-2, Cascade shows the citygates that belong to each pipeline zone.

Figure 3-2: Demand Areas

Citygate	Loop	State	Weather Location	Zone
7TH DAY SCHOOL		WA	Yakima	10
A/M RENDERING	Sumas SPE Loop	WA	Bellingham	30-W
ACME		WA	Bellingham	30-W
ARLINGTON		WA	Bellingham	30-W
ATHENA		OR	Pendleton	ME-OR
ATTALIA		WA	Walla Walla	GTN
BAKER		OR	Baker City	24
BELLINGHAM 1 (FERNDALE)	Sumas SPE Loop	WA	Bellingham	30-W
BEND	Bend Loop	OR	Redmond	GTN
BREMERTON (SHELTON)		WA	Bremerton	30-S
BURBANK HEIGHTS	Burbank Heights Loop	WA	Walla Walla	20
CASTLE ROCK		WA	Bremerton	26
CHEMULT		OR	Redmond	GTN
DEHAWN DAIRY		WA	Yakima	10
DEMING		WA	Bellingham	30-W
EAST STANWOOD	East Stanwood Loop	WA	Bellingham	30-W
FINLEY		WA	Walla Walla	20
GILCHRIST		OR	Redmond	GTN
GRANDVIEW		WA	Yakima	10
HERMISTON		OR	Pendleton	ME-OR
HUNTINGTON		OR	Baker City	24
KALAMA #1		WA	Bremerton	26
KALAMA #2		WA	Bremerton	26
KENNEWICK	Kennewick Loop	WA	Walla Walla	20
LA PINE		OR	Redmond	GTN
LAWRENCE		WA	Bellingham	30-W
LDS CHURCH		WA	Bellingham	30-W
LONGVIEW-KELSO	Longview South Loop	WA	Bremerton	26
LYNDEN	Sumas SPE Loop	WA	Bellingham	30-W
MADRAS		OR	Redmond	GTN
MCCLEARY (ABERDEEN/HOQUIAM)		WA	Bremerton	30-S
MILTON-FREEWATER		OR	Walla Walla	ME-OR
MISSION TAP		OR	Pendleton	ME-OR
MOSES LAKE		WA	Yakima	20
MOUNT VERNON	Sedro-Woolley Loop	WA	Bellingham	30-W
MOXEE (BEAUCHENE)		WA	Yakima	11
NORTH BEND		OR	Redmond	GTN
NORTH PASCO	Burbank Heights Loop	WA	Walla Walla	20
NYSSA-ONTARIO		OR	Baker City	24

Citygate	Loop	State	Weather Location	Zone
OAK HARBOR/STANWOOD	East Stanwood Loop	WA	Bellingham	30-W
OTHELLO		WA	Walla Walla	20
PASCO	Burbank Heights Loop	WA	Walla Walla	20
PATTERSON		WA	Yakima	26
PENDLETON		OR	Pendleton	ME-OR
PRINEVILLE		OR	Redmond	GTN
PRONGHORN		OR	Redmond	GTN
PROSSER		WA	Yakima	10
QUINCY		WA	Yakima	11
REDMOND		OR	Redmond	GTN
RICHLAND (Richland Y)	Kennewick Loop	WA	Walla Walla	20
SEDRO/WOOLLEY	Sedro-Woolley Loop	WA	Bellingham	30-W
SELAH	Yakima Loop	WA	Yakima	11
SOUTHRIDGE	Kennewick Loop	WA	Walla Walla	20
SOUTH BEND	Bend Loop	OR	Redmond	GTN
SOUTH LONGVIEW	Longview South Loop	WA	Bremerton	26
STANFIELD		OR	Pendleton	GTN
STEARNS (SUNRIVER)		OR	Redmond	GTN
SUNNYSIDE		WA	Yakima	10
UMATILLA		OR	Pendleton	ME-OR
WALLA WALLA LOOP		WA	Walla Walla	ME-WA
WALLULA		WA	Walla Walla	ME-WA
WCT-CNG INTERCONNECT	Sumas SPE Loop	WA	Bellingham	30-W
WENATCHEE		WA	Yakima	11
WOODLAND		WA	Bremerton	26
YAKIMA CHIEF RANCH		WA	Yakima	10
YAKIMA TRAINING CENTER		WA	Yakima	11
YAKIMA/UNION GAP	Yakima Loop	WA	Yakima	11
ZILLAH (TOPPENISH)		WA	Yakima	10

Weather

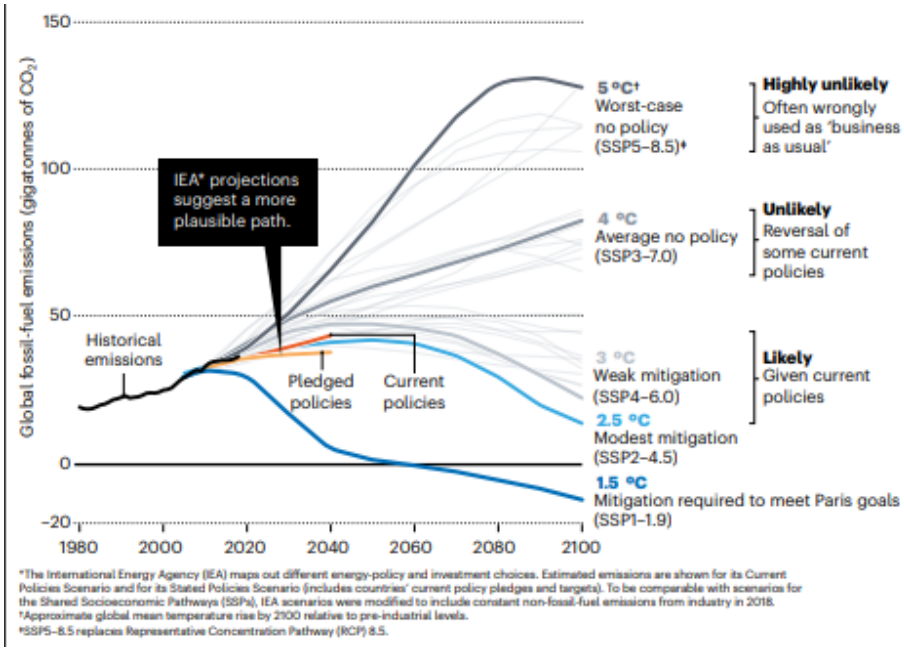
Heating Degree Day, or HDD, values are calculated with the daily average temperature, which is the simple average of the high and low temperatures for a given day. The daily average is then subtracted from an HDD degree threshold (for example 60°F) to create the HDD for a given day. Should this calculation produce a negative number, a value of zero is assigned as the HDD. Therefore, HDDs can never be negative. The HDD threshold number is designed to reflect a temperature below which heating demand begins to significantly rise.[1]
Historical weather data is provided by a contractor, Schneider Electric. Cascade has seven weather locations, with four located in Washington and three in Oregon. The four locations in Washington are Bellingham, Bremerton, Walla Walla, and Yakima. Historically, Cascade has accessed data from National Oceanic and Atmospheric Administration (NOAA), but found many months/locations with missing data. The previous forecasts used 30 years of recent history as the normal weather.

For the 2025 IRP, Cascade has contracted with ICF, a global advisory and technology service provider, to provide climate impact projections and a cold weather qualitative analysis. According to ICF, scientists develop climate change projections using Global Climate Models (GCMs), which are simulations of Earth's climate and physical processes. Using a method called downscaling, scientists can translate global climate data to a higher spatial resolution. This allows for projections to capture local climate characteristics and improve planning. The most recent climate projections, shown in Figure 3-3, use Shared Socioeconomic Pathways (SSPs) emission scenarios[2]:

- SSP 2-4.5 represents a more likely scenario assuming meaningful greenhouse gas emissions reductions by mid-century when compared to the likely scenario in Figure 3-3.
- SSP 3-7.0 represents a less likely scenario assuming greenhouse gas emissions increase throughout the century.

[1] The historical threshold for calculating HDD has been 65 °F. However, as discussed in prior IRPs, Cascade has determined that lowering the threshold to 60 °F produces more accurate results for the Company's service area.
[2] *See:* https://media.nature.com/original/magazine-assets/d41586-020-00177-3/d41586-020-00177-3.pdf

Figure 3-3: Possible Emission Futures Under CMIP6



For both SSPs, Cascade received 22 model projections for each of the Company's seven weather locations. Figure 3-4 shows the 22 models, as well as the average of all the models. The difference of the impact between the two SSPs on usage is minimal, which can be seen in Figure 3-5. For the reference case, Cascade projects the total therms to be approximately 9.3 billion therms and the difference between the two SSPs is approximately 10 million therms.

Figure 3-4: SSP 3-7.0 HDD projections

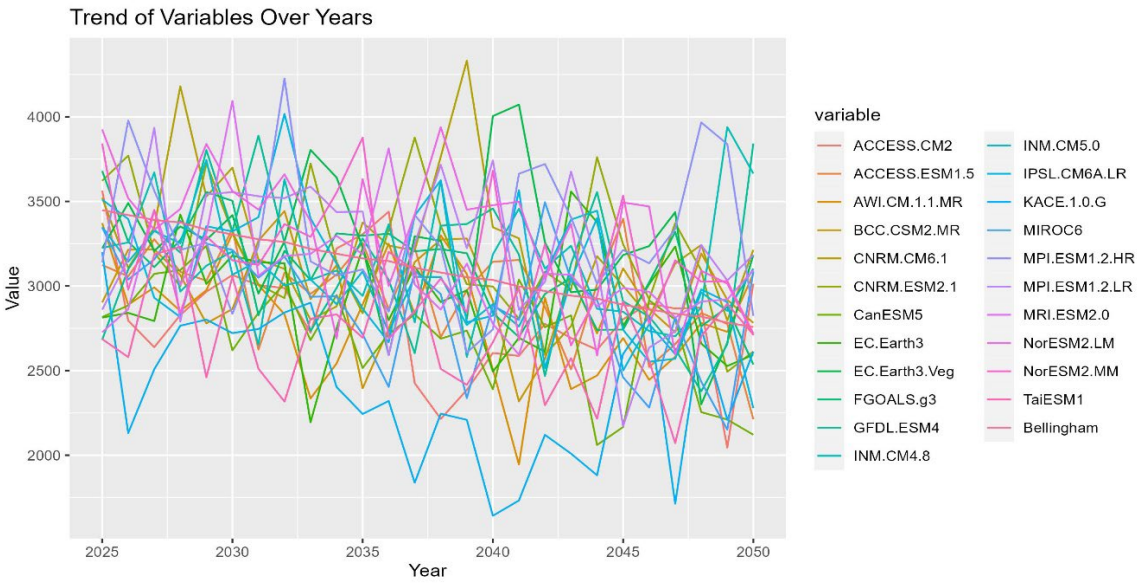
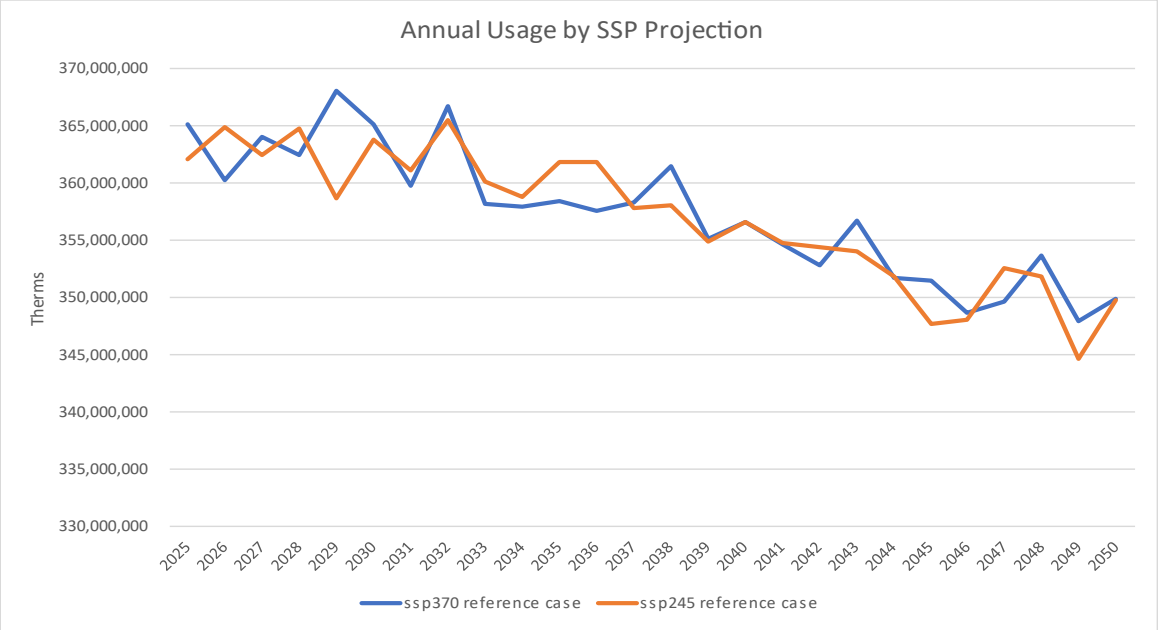


Figure 3-5: Annual Usage by SSP Projection



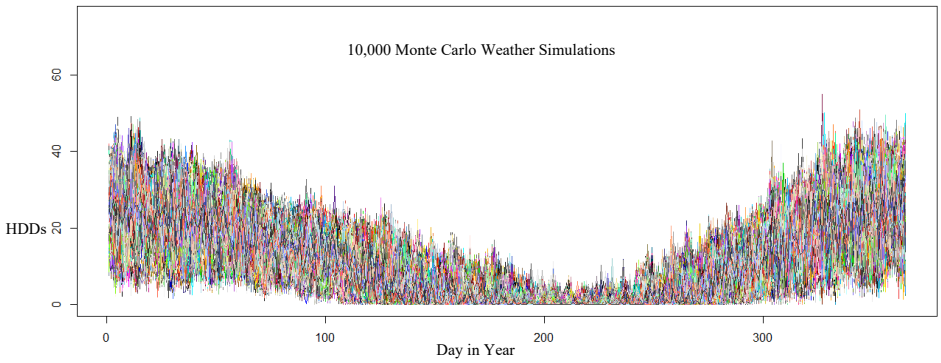
Peak Day Methodology

In order to ensure satisfaction of core customer demand on the coldest days, Cascade must use a methodology for determining what a peak day might be and then include it in the modeling. In the 2023 IRP, Cascade evolved its peak day methodology from a deterministic peak day to a stochastic peak day. Peak day forecasts enable Cascade to make prudent distribution system and peak upstream pipeline capacity planning decisions to fulfill its responsibility to provide heating under all but *force majeure* conditions, particularly as most space-heating customers will have no alternative heating source during the coldest days in the event gas does not flow.

The stochastic peak day that was analyzed in the forecast model is a weather zone specific 99th percentile peak day. This 99th percentile peak day will give Cascade the confidence that the system can handle a peak day based on the weather of each weather zone with varying amounts of demand. This peak day HDD methodology allows Gas Supply to plan for the highest peak event during a heating season.

The 99th percentile peak day is derived by running 10,000 Monte Carlo simulations on each of the seven weather zones. Once 10,000 draws are gathered and ordered for each weather zone, Cascade can pull the 9,900th draw as the 99th percentile to use in the demand forecast. Figure 3-6 displays all 10,000 draws graphed together.

Figure 3-6: 10,000 Monte Carlo Weather Simulations



For Plexos® modeling, Cascade uses this peak day for each weather zone by applying the HDDs on December 21st of each year in the forecast. The selection of December 21st is mostly arbitrary (though one of Cascade's coldest peak days did occur on December 21st), with the intention of mimicking a cold winter day. For example, all citygates associated with the Yakima weather station use the 99th percentile peak HDD for Yakima for each December 21st of the forecast period, and similarly for all the other weather stations and citygates. This provides the highest demand scenario for peak demand load based on Monte Carlo simulations of years of weather history for each citygate. Applying this stochastic peak day to December 21st of each forecasted year gives Cascade an accurate representation of the demand the Company could expect if this weather happened during the planning horizon.

Based on feedback from ICF's cold weather qualitative analysis, Cascade maintains the same peak day throughout the planning horizon and does not adjust it for climate impacts. Cascade Natural Gas' service area has historically experienced extreme cold events, though the magnitude of these extremes varies by region. Climate change is projected to continue to drive warmer temperatures in the Pacific Northwest, reducing the overall frequency of extreme cold events across the region in the long term. This does not preclude cold snaps from occurring. Some evidence suggests that climate change could worsen cold extremes resulting from polar vortex events or other processes in the near to medium term (e.g. through 2050). The non-Gaussian temperature distribution in the Pacific Northwest suggests that the region could experience a slower decrease in the number of extreme cold threshold exceedances.[3]

Cascade is continuously monitoring its peak day methodology to ensure an accurate and realistic peak day forecast.

[3] *See:* Loikith, P.C. And Neelin, J.D. (2019). Non-Gaussian Cold-Side Temperature Distribution Tails and Associated Synoptic Meteorology. Journal of Climate. HTTPS://DOI.ORG/10.1175/JCLI-D-19-0344.1.

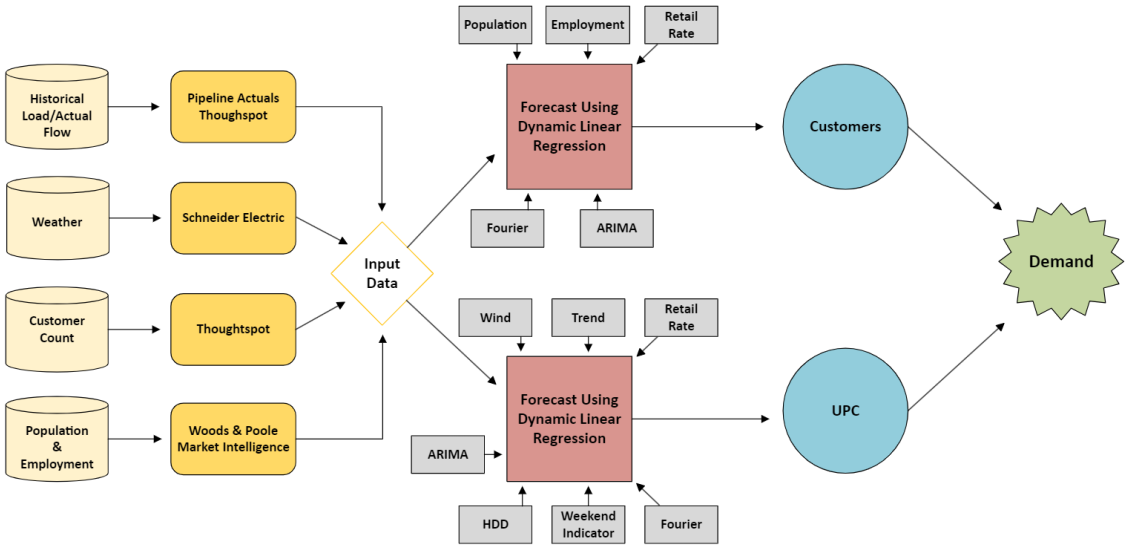
Wind

Wind values are calculated with the daily average wind speed, which is the simple average of the high and low wind speeds for a given day. Wind speeds are also weather location specific, similar to HDDs. Wind typically has a positive correlation with use in that when wind speeds are higher then usage is higher as well.

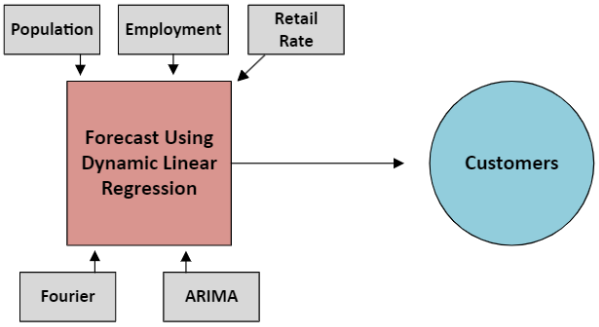
Demand Overview

Figure 3-7 provides a roadmap for Cascade's demand forecast. The inputs are displayed along with their sources in yellow and gold. The customer forecast and use-per-customer (UPC) forecast are shown in red along with their respective inputs into the model. Finally, the customer forecast is multiplied by the use-per-customer forecast to create the final demand forecast.

Figure 3-7: Demand Forecasting Process Overview



Customer Forecast Methodology



Customer count forecasts are designed to reflect both demographic trends and economic conditions each in the short- and long-term. Cascade uses population and employment growth data from Woods & Poole (W&P) to create an economical look at customer forecasts. W&P growth forecasts are provided at the county level. It should be noted that W&P forecasts can be adjusted when the internal intelligence about a demand area indicates a significant difference from W&P regarding observed economic trends. Cascade utilizes dynamic regression models for the customer forecast as well as regression models for the UPC forecast, which will be discussed in the next subchapter. Below is the formula the Company used to run the regressions:

$$C_{Class}^{Zone} = \alpha_0 + \alpha_1 Pop^{Zone} + \alpha_2 Emp^{Zone} + \alpha_3 Rate^{Zone}\ Fourier(k) + ARIMA\epsilon(p,d,q)$$

Model Notes:

- $C_{Class}^{Zone} = Customers\ by\ Pipeline\ Zone\ by\ Class$
- $Pop^{Zone} = Population\ by\ Pipeline\ Zone$
- $Emp^{Zone} = Employment\ by\ Pipeline\ Zone$
- $Fourier = Terms\ used\ to\ capture\ seasonal\ patterns$
- $k = Number\ of\ Fourier\ terms\ used\ in\ model$
- $ARIMA\epsilon(p,d,q) =$ $Indicates\ that\ the\ model\ has\ p\ autoregressive\ terms, d\ difference\ terms, and\ q\ moving\ average\ terms.$

Cascade runs this model approximately 57 times to account for each customer class by pipeline zone. The Company begins by testing 31 different combinations of the regressors in both dynamic regression models and one Autoregressive Integrated Moving Average (ARIMA) only model. The dynamic regression models test Fourier, Population, Employment, Retail Rate and all combinations of those four regressors as an ARIMA model. The last model only uses ARIMA terms and no regressors. The method used to compare and select a model is called the AIC, or the Akaike Information Criterion. This is a measure of the relative quality of statistical models, relative to each of the other models. In each of the models, except for the 'ARIMA Only' model, an ARIMA term is used to capture any structure in the errors (or residuals) of the model. In other words, there could be predictability in the errors, so they could be modeled as well. If the data is non-stationary, the ARIMA function will difference the data. Most times, the data does not require differencing or, if so, only

needs to be differenced once. Once the best model is selected for each customer class by citygate, a forecast is performed using the selected model.

Building Code Impacts

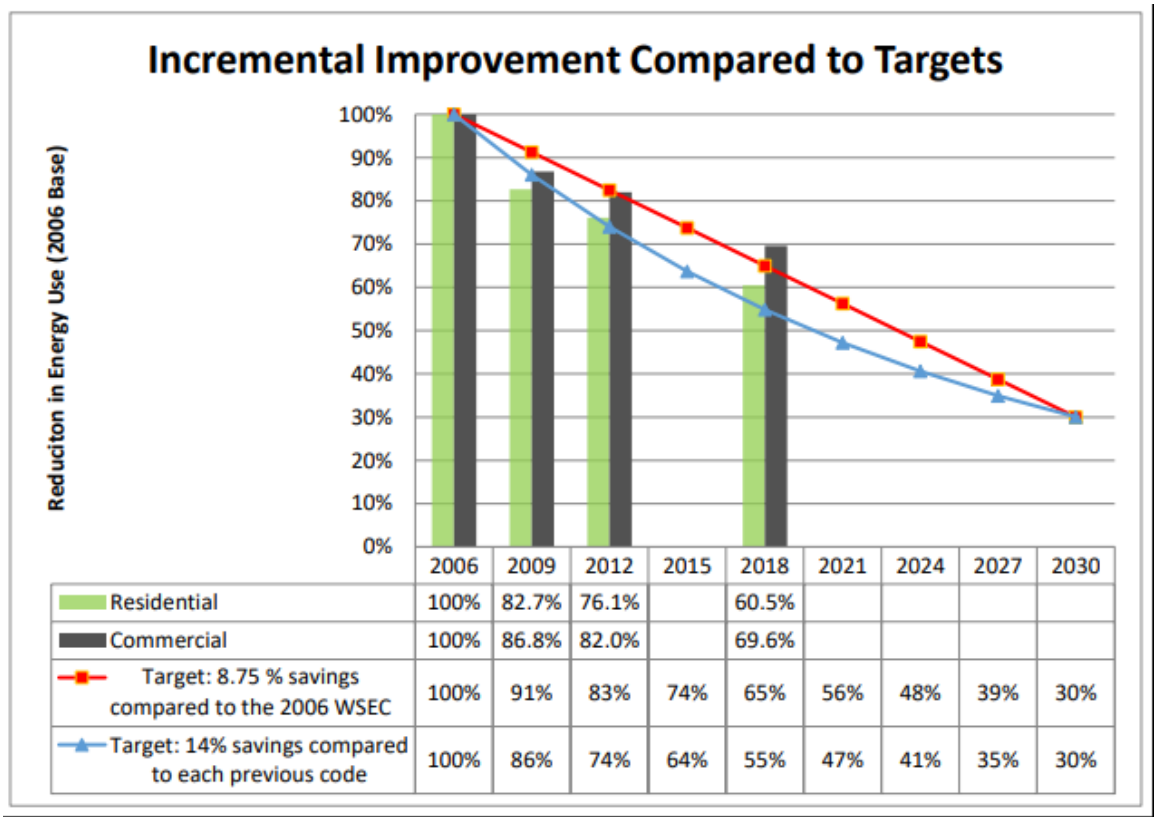
As the Washington State Energy Codes (WSEC) continue to progress and impact new construction for natural gas end use appliances, Cascade must consider these impacts in the Company's customer and load forecasts.

RCW 19.27A.020(2)(a) is a broad goal that provides direction to the Washington State Building Code Council (SBCC) to adopt amendments to the WSEC that progressively moves the needle for new construction houses and buildings to be non-emitting by 2031. To achieve this goal, it is important to consider that a non-emitting (zero fossil-fuel greenhouse gas emission) home/building is typically considered based upon the net emissions; however, the legislative direction does not specify "net" in this circumstance. Consideration of net emissions is important, as it allows for a broader and more reliable energy portfolio. To achieve net-zero, emitting energy uses can be offset by renewable energy production (i.e., wind or solar) or energy that has a negative carbon intensity (i.e., renewable natural gas); thus, allowing for emitting (i.e., natural gas) energy use during severe weather events, while still having a house/building that has net-zero emissions.

Under RCW 19.27A.020(2)(a), the SBCC is directed to "…help achieve the broader goal…" of zero emission homes/buildings. Note that this is a goal, not a mandate. Conversely, RCW 19.27A.160 is an explicit direction to the SBCC to move towards a 70% reduction in annual net energy consumption by 2031. This is a mandate and is clear that the goal is a "net" energy.

Since the enacting legislation, RCW 19.27A.020(2)(a), resulted from the 2009 Senate Bill 5854, the 2012, 2015, 2018, and 2021 code cycles were all likely impacted by this legislation. Figure 3-8 provides an explanation of how the SBCC has addressed the more explicit legislative direction of RCW 19.27A.160.

Figure 3-8: Reduction Targets in Energy Use[4]



	2006	2009	2012	2015	2018	2021	2024	2027	2030
Residential	100%	82.7%	76.1%		60.5%				
Commercial	100%	86.8%	82.0%		69.6%				
Target: 8.75 % savings compared to the 2006 WSEC	100%	91%	83%	74%	65%	56%	48%	39%	30%
Target: 14% savings compared to each previous code	100%	86%	74%	64%	55%	47%	41%	35%	30%

The most impactful measures were found in the 2018 and 2021 WSEC. For example, NEEA's Washington Residential Post Code Adoption Market Research Final Report[5] found that "…builder practices have significantly changed under the 2018 WSEC compared to the 2015 WSEC. This includes a shift towards electric space heating and water heating…" "…the incidence of electric primary space heating is 88% in this study of the 2018 WSEC; the 2015 WSEC study (CLEAResult 2020) recorded a 20% incidence of electric primary space heating for comparison. Water heating fuel is also showing significant changes. This study of the 2018 WSEC shows 87% electric water heating, while the 2015 WSEC study recorded 44% electric water heating." (Note that this NEEA report was focused solely on residential; NEEA's 2018 WSEC Energy Savings Analysis for Nonresidential Buildings provide some additional insight for commercial projects).[6]

With the 2021 WSEC, effective March 15, 2024, the use of natural gas for space and water heating is generally prohibited for commercial buildings and may only be used for supplementary (backup) heating or within gas heat pumps in residential buildings. Given the shift towards electric appliances already found from the 2018 WSEC, the

[4] Final Cost Benefit Analysis for the 2021 WSEC-R

[5] *See* Washington Residential Post-Code Adoption Market Research (neea.org)

[6] *See* Northwest Energy Efficiency Alliance (NEEA) | 2018 Washington State…

2021 WSEC will only further this trend. Figure 3-9 shows the energy equalization credits for residential construction.[7]

Figure 3-9: Energy Equalization Credits

System Type	Description of Primary Heating Source	Credits	
		All Other	Group R-2[a]
1	For combustion heating equipment meeting minimum federal efficiency standards for the equipment listed in Table C403.3.2(5) or C403.3.2(6)	0	0
2	For an initial heating system using a heat pump that meets federal standards for the equipment listed in Table C403.3.2(2) and supplemental heating provided by electric resistance or a combustion furnace meeting minimum standards listed in Table C403.3.2(5)[b]	1.5	0
3	For heating system based on electric resistance only (either forced air or Zonal)	0.5	-0.5
4[c]	For heating system using a heat pump that meets federal standards for the equipment listed in Table C403.3.2(2) or C403.3.2(9) **or** Air to water heat pump units that are configured to provide both heating and cooling and are rated in accordance with AHRI 550/590	3.0	2.0
5	For heating system based on electric resistance with: 1. Inverter-driven ductless mini-split heat pump system installed in the largest zone in the dwelling, **or** 2. With 2kW or less total installed heating capacity per dwelling	2.0	0

Customer count and therm forecasts are augmented by revisions to the base data and output to create a portfolio of potential scenarios. Since the economic models cannot accurately forecast the building code impacts, Cascade must make some assumptions. Cascade is assuming flat growth due to building code changes. These assumptions are built with the understanding that Cascade will see very little growth, assuming only homes with gas stoves or other appliances are added to the system. This is offset with minimal growth assuming losing customers each year. Historically, Cascade loses approximately 0.15% customers per year as they shut off gas connection without reconnecting.

The 2025 IRP is experiencing significant uncertainty around forecasting natural gas customer counts than in previous IRPs. The current restrictions under the 2021 WSEC regarding new construction, the Climate Commitment Act, the passage of initiatives such as I-2066, and the City of Berkley appeal causes forecasting natural

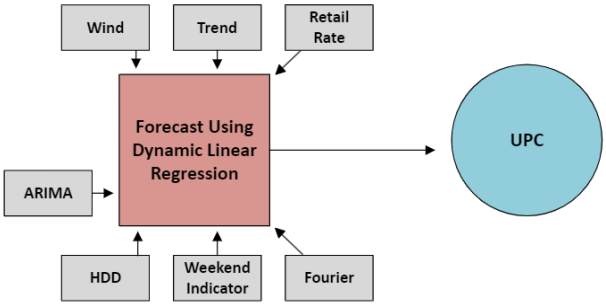
[7] *See:* HTTPS://SBCC.WA.GOV/STATE-CODES-REGULATIONS-GUIDELINES/STATEBUILDING-CODE/ENERGY-CODE

gas customer counts to be difficult and must include wide ranges of outcomes.[8,9] Cascade's high customer growth scenario assumes building codes are amended and growth returns to existing rates before the adoption of the 2018 WSEC pre-building code rates. On November 22, 2024, the WA SBCC voted to approve an out of cycle code review of the 2021 WSEC for compliance with I-2066 which may affect restrictions on natural gas use. The low scenario assumes a heavy push to reduce natural gas new construction to zero and Cascade begins to lose customers as houses are demolished and rebuilt under restrictive building codes. To capture an extreme impact, Cascade assumes losing 1.5% customers per year in the low forecast. Cascade is not predicting either will happen, nor is Cascade saying one is more likely than the other, but the Company must understand the risks that pertain in a high and low customer count future.

Cascade locked in the forecast model in September of 2024 as it is a key input for several other aspects of this IRP.

Use-Per-Customer (UPC) Forecast Methodology

As previously mentioned, Cascade utilizes regression models for the UPC part of the demand forecast as well.[10] Sources for the inputs into this model are pipeline actuals, Cascade's gas management system, and Cascade's billing system data from ThoughtSpot. Cascade developed the UPC coefficient by first gathering historical pipeline demand data by day. The pipeline demand data includes core and non-core usage. The non-core data is backed out using Cascade's measurement data stored in the Company's Aligne energy transaction system which leaves only the daily core usage data. Then the daily data is allocated to a rate schedule for each citygate, which is now rolled up to the pipeline zonal level, by using Cascade's ThoughtSpot system, which analyzes the therms billed for each rate class. Finally, this data is divided by number of customers to come up with a UPC number for each day and for each rate schedule at each pipeline zone.



[8] Initiative 2066 Full Text.pdf

[9] City of Berkeley Agrees to Repeal Ban on Natural Gas in New Construction as Required by Federal Law - American Gas Association

[10] A regression model provides a function that describes the relationship between one or more independent variables and a response, dependent, or target variable. A regression analysis provides the means for many types of prediction and for determining the effects on target variables. Multiple regression indicates there are more than one input variables that may affect the outcome, or target variable.

Below is the model used for the UPC forecast:

$$\frac{Therms}{C_{Class}^{Zone}} = \alpha_0 + \alpha_1 HDD^{Zone,M} + \alpha_2 I_w + \alpha_3 WIND^{Zone,M} + \alpha_4 Rate^{Class,M} + Fourier(k) + ARIMA(p,d,q)$$

Model Notes:

- $C_{Class}^{Zone} = Customers\ by\ Pipeline\ Zone\ by\ Class.$
- $HDD^{Zone} = Heating\ Degree\ Days\ from\ Weather\ Location$
- $m = month$
- $w = weekend$
- $I = Indicator\ variable, 1\ if\ weekend, and\ 0\ if\ weekday.$
- $WIND^{Zone} = Daily\ average\ wind\ speed\ from\ Weather\ Location$
- $Rate^{Class} = Daily\ retail\ rate\ from\ class$
- $Fourier(k) = Captures\ seasonality\ of\ k\ number\ of\ seasons.$
- $ARIMA(p,d,q) = Indicates\ model\ has\ p\ autoregressive\ terms, d\ difference\ terms, and\ q\ moving\ average\ terms.$

Cascade runs this model for each of the ten pipeline zones, breaking each of those out into their respective rate classes results in 57 different regressions. Cascade begins each model with a simple linear model regressing on HDDs, wind, retail rate, and weekend. If the residuals analyzed show structure, then the models are expanded to include ARIMA and Fourier terms.

Retail Rate as a New Regressor

Retail Rate is a slight adjustment to the price regressor for this IRP.[11] Overall, retail rate has not seen much significance in the models. The largest coefficients were on the commercial and industrial customer classes, and even then the coefficients were quite small, seemingly insignificant. The residential coefficients were close to zero. Through the targeted TAG process, stakeholders suggested Cascade replace the price regressor with a retail rate regressor in an attempt to better capture customer behavior. Cascade is looking forward to performing this analysis in the next demand forecast.

[11] A regressor is the name given to any variable in a regression model that is used to predict a response variable.

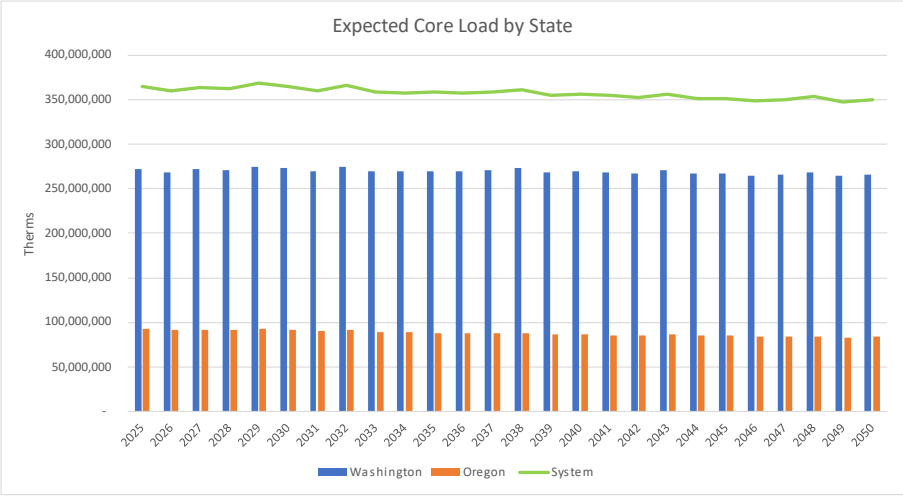
Uncertainties

This forecast represents Cascade's best estimate about future events. At this time, several important factors make predicting future demand particularly difficult such as continued economic growth, carbon legislation, building code changes, direct use of natural gas campaigns, energy efficiency, and long-term weather patterns. The range of scenarios presented here and in Chapter 9 encompass the full range of possibilities through econometric analysis. These forecasts were created after statistical analyses of a matrix of different functional forms and economic indicators. The chosen indicators were selected because of their consistency in returning statistically valid results. While they may be the best results mathematically, they are not the sole and only determinants of demand. As a result, while Cascade believes the numbers provided here are accurate and that the scenarios presented represent the full range of possibilities; there are, and always will be, uncertainties in forecasting future periods.

Forecast Results

Load across Cascade's two-state service territory is relatively flat, to slightly declining under the reference case. Cascade's reference case forecast anticipates flat customer counts, with a decline in use per customer. Figure 3-10 shows the reference case core load volumes by state.

Figure 3-10: Reference Case Core Load by State (Volumes in Therms)



Load growth across Cascade's system through 2050 fluctuates due to accounting for leap years and including retail rates in the customer and load forecast models. Figure 3-7 illustrates the growth forecast for Cascade's system load year over year, showing growth on Cascade's system but at a declining rate.

For the SSP 3-7.0 HDD projections, the reference case results in Washington growth rates of -0.09%. For the SSP 3-7.0 HDD projections, the reference case results in Washington growth rates of -0.06%. Figure 3-10 represents the load comparison for Washington state between SSP 3-7.0 and SSP 2-4.5. Figure 3-11 represents the system load compared to previous IRPs. Figure 3-12 represents the load stack between Residential, Commercial, and Industrial customers.

Figure 3-10: Washington Annual Load Comparison by SSP

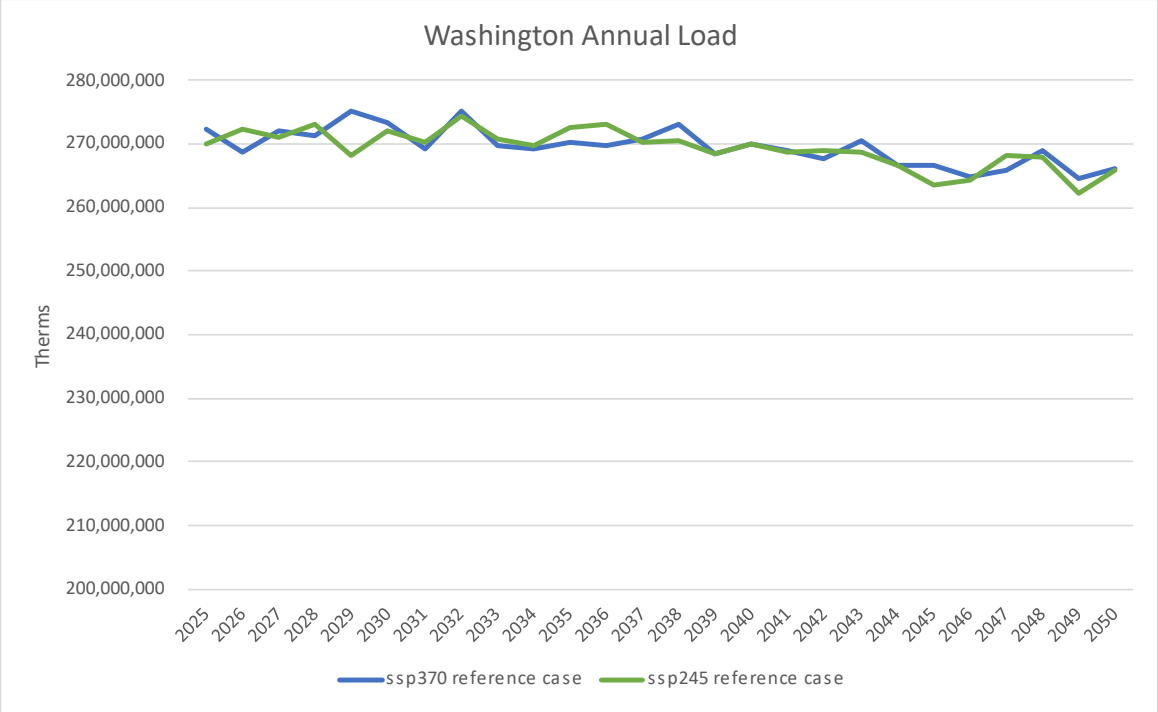


Figure 3-11: System Load Comparison to Previous IRPs

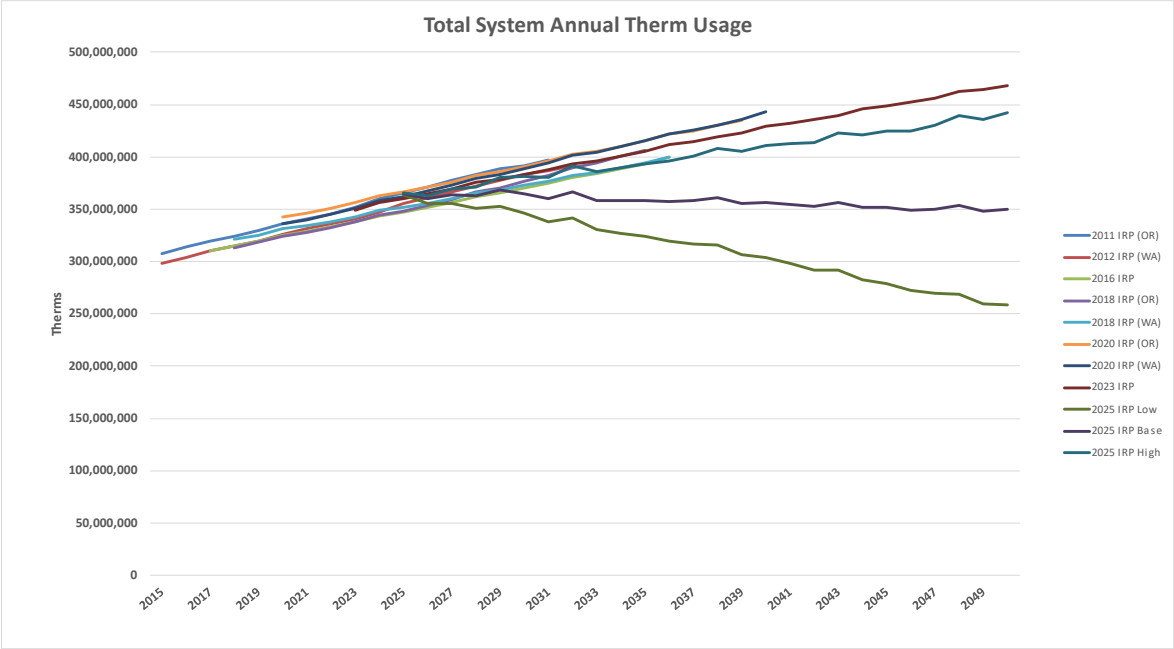
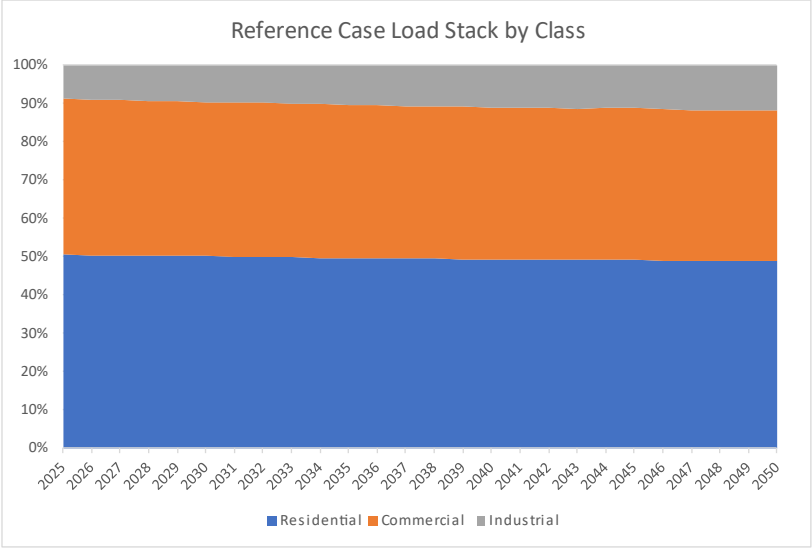


Figure 3-12: Expected Load Stack by Class

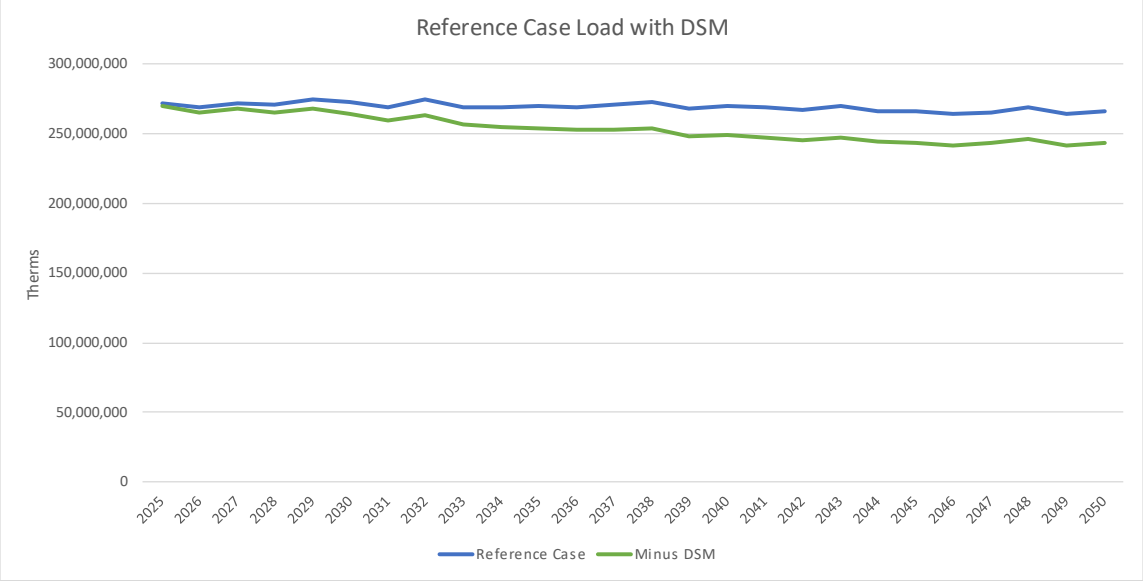


System Load and Demand Side Management (DSM)

Demand Side Management (DSM) refers to the reduction of natural gas consumption through the installation of energy efficiency or through other load management programs such as demand response efforts that shift gas consumption to off-peak periods. For more details, please refer to Chapter 7, Demand Side Management.

Figure 3-13 displays total Washington and Oregon DSM projected annual savings as it compares to Cascade's system load forecast.

Figure 3-13: System Base Load vs DSM



With DSM projections factored in, Cascade's anticipated Washington average annual growth rate drops from -0.09% to -0.42%. This represents approximately 22 million therms saved by 2050.

Geography

For Cascade to ensure the Company has the appropriate amount of transportation rights on the upstream pipelines described in Chapter 4, Supply Side Resources, Cascade must understand the Company's demand at the pipeline zonal level. Figure 3-14 shows the annual system load by each of Cascade's pipeline zones. For a map of the pipeline zones, please refer to Figures 13-10 and 13-11. For a detailed list, Figure 3-1 gives information on each citygate's zone. Lastly, Figure 3-15 displays the expected system core peak day growth over the planning horizon. Peak day average annual growth is expected to be approximately 1.58%.

Figure 3-14: System 28-Year Load by Pipeline Zone (Volumes in Therms)

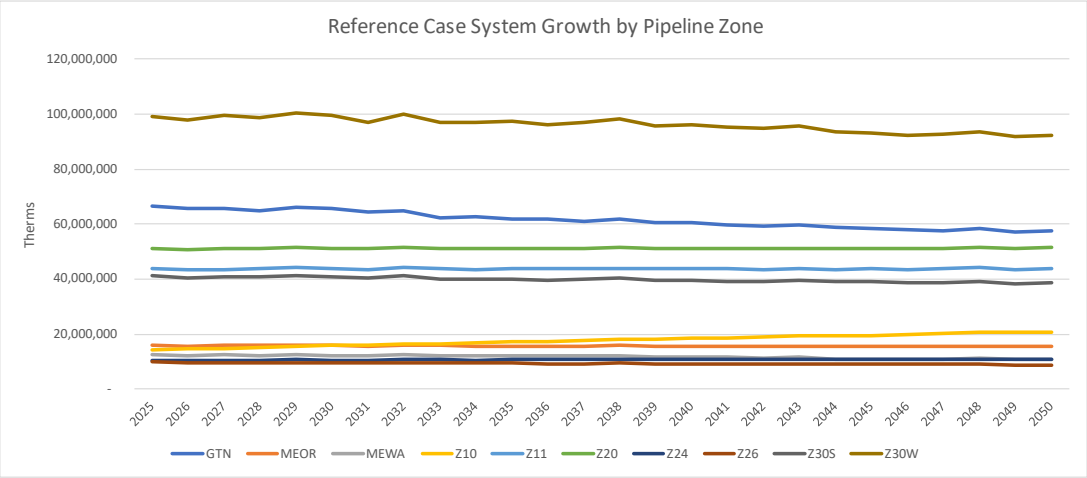
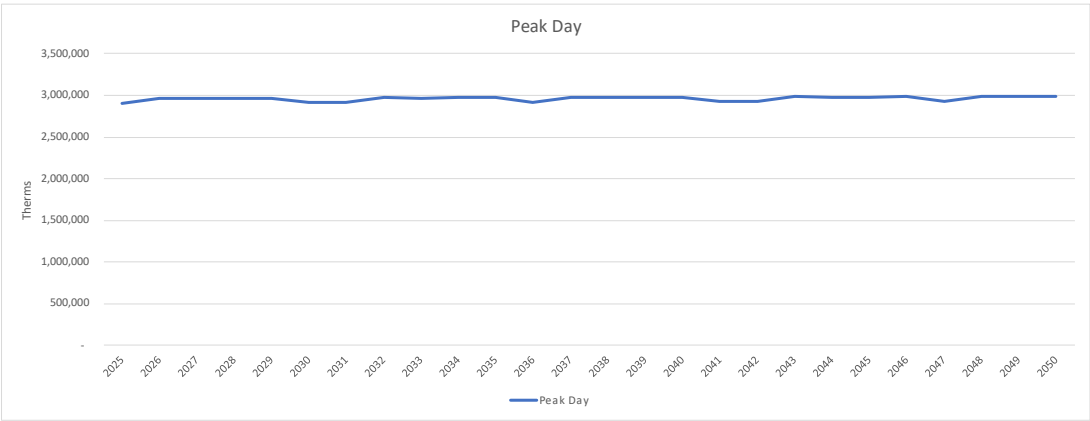


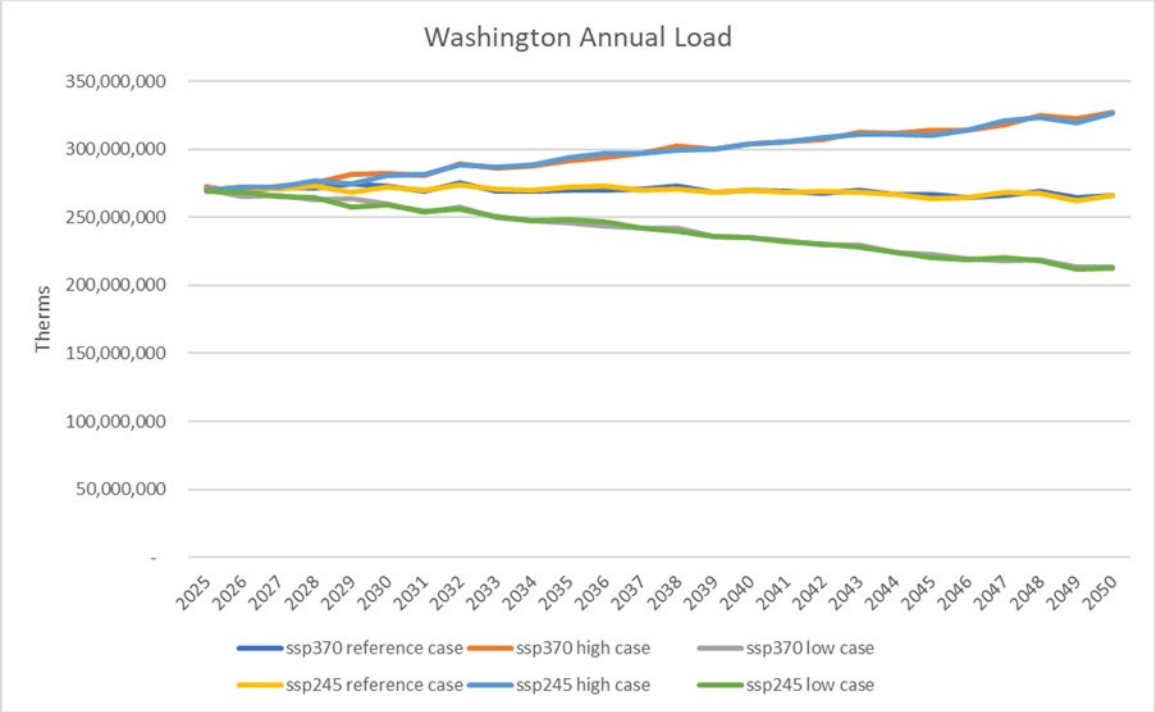
Figure 3-15: Expected System Peak Day Growth (Volumes in Therms)



High and Low Growth Scenarios

In the previous IRP, Cascade analyzed the slowest and fastest growth years of each citygate by comparing them to the average growth rate of each citygate. In the 2025 IRP, as described in the building codes section, Cascade has taken the approach of putting together updated assumptions around building code impacts. Figure 3-16 displays the total system load growth across the various growth scenarios.

Figure 3-16: Total System Load Growth Across Scenarios



Load growth under the low scenario shows a decline of approximately 0.96% from 2025 to 2050. High growth under the high growth scenario is showing an increase at approximately 0.74% from 2025 to 2050.

Non-Core Outlook

Unlike the core, non-core (or transportation) customers are customers who schedule and purchase their own gas and upstream pipeline contracts, generally through a marketer, to get gas to the citygate. The customer then uses Cascade's distribution system to get the gas to the customer's facility. Cascade has approximately 242 transportation customers, with seven of those customers being electric generation customers. In both Washington and Oregon, the 2025 forecast for non-electric generation customers is approximately 525 million therms and that for electric generation customers is about 598 million therms for a total of 1.123 billion therms for the transportation customers. For information on the emissions for these customers, see Chapter 6 – Environmental Policy.

Conclusion

Cascade has moved to utilizing a reference case, with a high and low scenario. The reference case is built using all assumptions Cascade currently has around use per customer, climate change, and building code impacts. High and low scenarios were considered and alternative forecasting assumptions were analyzed. Extensive modeling included: extending the forecast analyses of demand areas, HDDs, and wind out to 2050 to better align with emissions modeling; analyzing peak day stochastically using 10,000 Monte Carlo simulated draws for each weather zone; adding a retail rate regressor to the Use-Per-Customer forecast, and utilizing dynamic regression modeling techniques for customer and annual demand forecasts.

Chapter 4

Supply Side Resources

Overview

Cascade's core market residential and small volume commercial and industrial customers expect and require the highest reliability of energy service. Because of the Company's obligation to provide gas service to these customers, Cascade must determine and achieve the needed degree of service reliability and attain it at the most reasonable lowest cost and least risk possible while maintaining infrastructure that is sufficient for customer growth. Assuming such infrastructure is operating effectively, the most important functions necessary for reliable natural gas service are planning for, providing, and administering the gas supply, interstate pipeline transportation capacity, and distribution service purchased by core market customers.

This chapter describes the various gas supply resources, renewable natural gas (RNG), storage delivery services from Jackson Prairie underground storage, MIST underground storage and Plymouth liquified natural gas (LNG) service, and transportation resource options available to the Company as supply side resources.

Key Points

- To meet the Company's core market demand, Cascade accesses firm gas supplies and short-term gas supplies purchased on the open market, in addition to utilizing storage.
- Cascade purchases gas from the Rockies, British Columbia (Sumas), and Alberta (AECO). Gas is transported to the Company's system via pipelines by either bundled or unbundled contracts.
- Extensive discussion of Renewable Natural Gas (RNG) and other low carbon alternative fuels is included in this chapter.
- The long-term planning price forecast is based on a blend of futures market pricing along with long-term fundamental price forecasts from multiple sources.
- The Company identifies potential incremental supply resources for the 2020 IRP.
- Risk management policies are implemented to promote price stability.
- Cascade's Gas Supply Oversight Committee (GSOC) oversees the Company's gas supply purchasing strategy.
- Modeling of Cascade's available resources results in the lowest reasonably priced optimum portfolio.

Gas Supply Resources

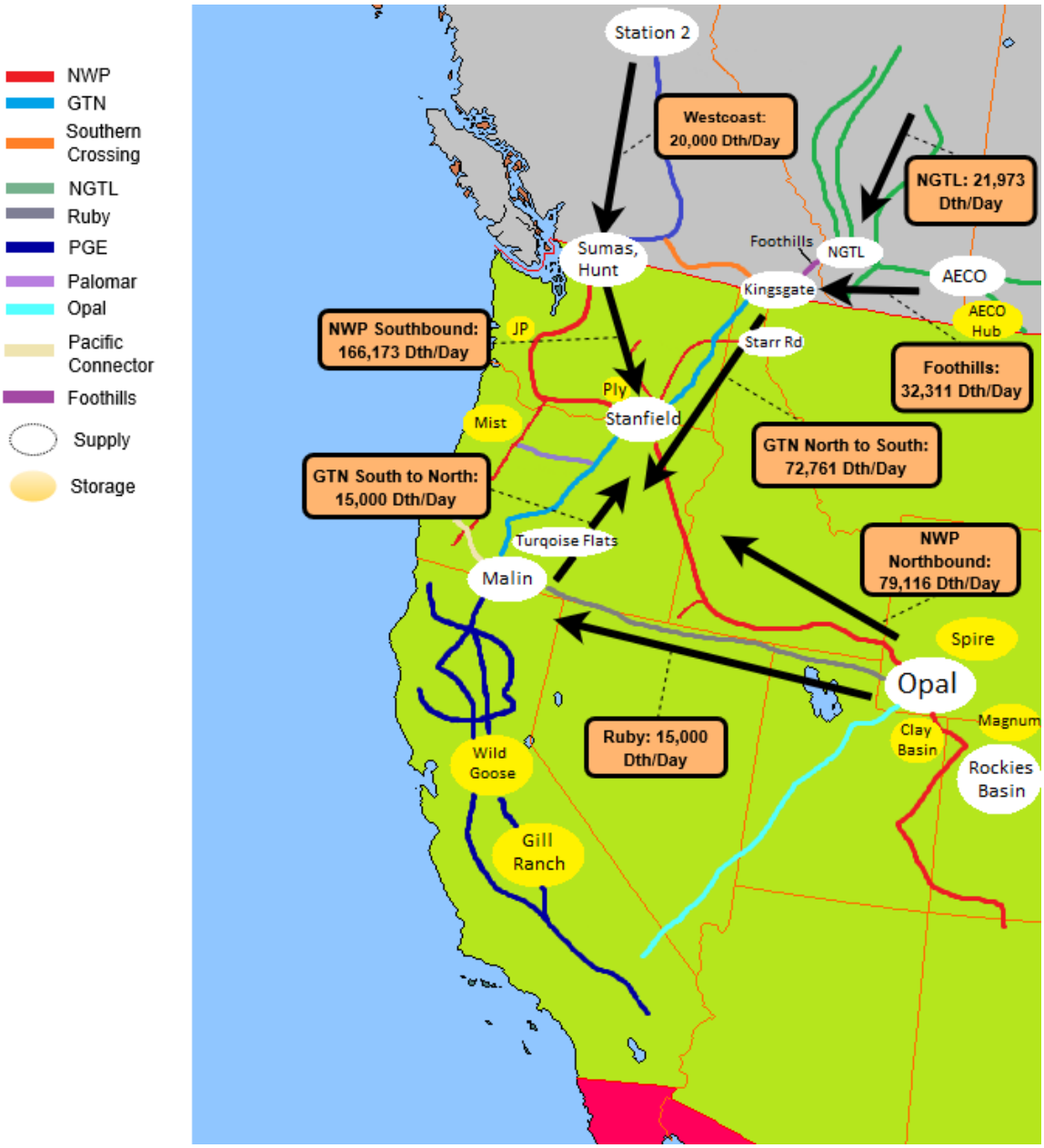
Gas supply options available to Cascade to meet the core market demand requirements generally fall into two groups: 1) Firm gas supplies on a short- or long-term basis, and 2) Short-term gas supplies purchased on the open market as needed in a particular month for one or more days. A third option, renewable natural gas, is emerging.[1] A separate and important source of gas supply is natural gas storage

[1] In Cascade's last IRP, renewable natural gas was addressed in the Renewable Natural Gas chapter but is now included in this chapter.

service, which is required to provide economical service to low load factor customers during seasonal and other high demand periods.

Cascade's gas supply portfolio is sourced from three basic areas of North America: British Columbia, Alberta, and the Rockies. Figure 4-1 provides a general overview of regional gas flows to Cascade's distribution system.[2]

Figure 4-1: Regional Map Showing General Flow Paths for System Gas Supplies



[2] This map does not reflect three contracts Cascade anticipates acquiring December of 2024: GTN North to South of 20,000 dth/day, 20,000 dth/day on NGTL, and 10,000 dth/day on Foothills.

Firm Traditional Supply Contracts

Firm supply contracts commit both the seller and the buyer to deliver and take gas on a firm basis, except during *force majeure* conditions. From Cascade's perspective, the most important consideration is the seller's contractual commitment to make gas available day in and day out regardless of market conditions. Firm supplies are a necessary component of Cascade's core market portfolio given its obligation to serve and the lack of easily obtainable alternatives for customers during periods of peak demand. Firm supply contracts can provide base load services, seasonal load increases during winter months, or they can be used to meet daily peaking requirements. Quantities vary, depending on the need and length of the contract. Operational considerations regarding available upstream pipeline transportation capacity and any known constraints must also be considered. Base load contracts can range from as small as 500 dths/day to quantities in excess of 10,000 dths/day. Blocks of 1,000, 2,500, 5,000 and 10,000 dths/day are standard as these are the most operationally and financially viable blocks for suppliers.

Base load supply resources are those that are typically taken day in and day out, usually 365 days a year. As a result, base load gas tends to be the least expensive of the firm supply contracts because it matches the production of gas and guarantees the producer that the volumes will be taken. The Company’s ability to contract for base load supplies is limited because of the relatively low summer demand on Cascade’s system. Base load resources are used to meet the non-weather sensitive portion of the core market requirements or may be used to refill storage reservoirs during periods of lower demand.

Winter gas supplies are firm gas supplies that are purchased for a short period during the winter months to cover increased loads, primarily for space heating. The contracts are typically three to five months in duration (primarily November through March). This enables the Company to ensure firm winter supplies without incurring obligations for high levels of supply contracts during periods of low demand in the summer months. Winter supplies combined with base load supplies are adequate to cover the moderately cold days in winter.

Supply contract terms for firm commodity supplies vary greatly. Some contracts specify fixed prices, while others are based on indices that float from month to month. Most contain penalty provisions for failure to take the minimum supply identified in the North American Energy Standards Board (NAESB) contract terms. Contract details will also vary for each individual supplier’s needs and the NAESB contract special addendums.

Gas that is purchased for a short period of time (one to thirty days) when neither the seller nor the buyer has a longer-term firm commitment to deliver or take the gas is referred to as a spot market purchase. Spot market supplies differ from firm

resources in that they are more volatile, both in terms of availability and price, and are largely influenced by the laws of supply and demand.

In general, spot market supplies (also called day gas) are provided from gas supplies not under any long-term firm contract. Therefore, as firm market demand decreases, more gas becomes available for the spot market. Prices for spot market supplies are market driven and may be either lower or higher than prices under firm supply contracts. In warmer weather, as firm market demand requirements decrease, usually more gas becomes available for the spot market, resulting in lower prices. In colder weather, as firm markets demand their gas supplies, the remaining spot market supplies can carry higher prices.

The role for spot market gas supply in the core market portfolio is based on economics. Spot market supplies may be used to supplement firm contracts during periods of high demand or to displace other volumes when it is cost effective to do so. Depending upon availability and price, spot market volumes may be used in place of storage withdrawal volumes to meet firm requirements on a given day or for mid-heating season refills of storage inventory during periods of moderate weather.

While Figure 4-1 provides a general overview of regional gas flows to Cascade's distribution system, supporting detail is included in Appendix E.

Renewable Natural Gas

Renewable natural gas (RNG) is an emerging supply option that brings many benefits, chief among them emissions reduction. Since submitting its last IRP, Cascade has continued to refine its process for analyzing, planning, and acquiring RNG and RTCs. This section, and elsewhere in this IRP, will highlight key issues related to RNG and Renewable Thermal Certificates (RTCs.) A quick reference guide to specific subjects is found in the inset box.

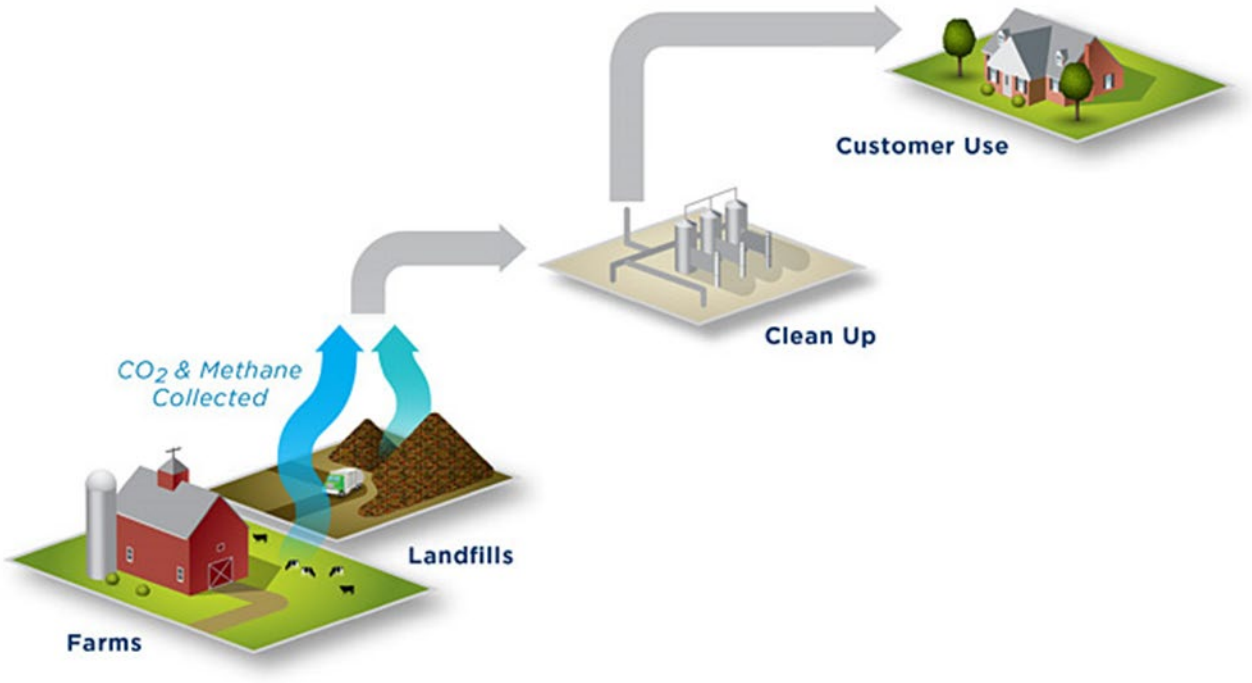
QUICK REFERENCE TO RNG LOCATIONS IN IRP

RNG, as defined in RCW 54.04.190,[3] is a gas consisting largely of methane and other hydrocarbons derived from the decomposition of organic material in landfills,

[3] *See* https://app.leg.wa.gov/rcw/default.aspx?cite=54.04.190

wastewater treatment facilities, and anaerobic digesters. Cascade is committed to developing programs that allow the Company to acquire RNG under guidelines and rules stated in Washington HB 1257 and Oregon SB 98.
Figure 4-2,[4] provides an example of a general RNG process from landfill to end-user.

Figure 4-2: Example of RNG process from landfill to end user



Renewable natural gas, biomethane and biogas are sometimes used interchangeably but they are different biofuel products along the value chain:

- Biogas is a mixture of carbon dioxide and hydrocarbons, primarily methane gas, from the biological decomposition of organic materials.
- Biomethane is a biogas-derived, high BTU gas that is predominately methane after the biogas is upgraded to remove contaminants.
- Renewable natural gas is biomethane upgraded to natural gas pipeline-quality standards so it can substitute or blend with conventional natural gas.[5]

Examples of RNG sources include:

- Biogas from Landfills
  - Collect waste from residential, industrial, and commercial entities.
  - Digestion process takes place in the ground, rather than in a digester.
- Biogas from Livestock Operations

[4] U.S. Department of Energy, Alternative Fuels Data Center, Renewable Natural Gas
[5] American Natural Gas.com

  - Collects animal manure and delivers to anaerobic digester.
- Biogas from Wastewater Treatment
  - Produced during digestion of solids that are removed during the wastewater treatment process.
- Other sources include organic waste from food manufacturers and wholesalers, supermarkets, restaurants, hospitals, and more.[6]

Biofuel estimates vary, for example, E3 estimates 25 million dry tons of biomass supply available to Washington and Oregon, compared to Washington State's deep decarbonization study which assumed 23.8 million dry tons available to the state.[7]

RTCs, for contrast, are a regulatory instrument that reflects only the environmental attributes associated with RNG. There are no physical molecules associated with RTCs, and RTCs can be separated from and transacted without the associated gas molecules from RNG.

Applicable Regulations

In the past few years, RNG has been driven by public policy with the intent to reduce emissions. These laws and regulations are summarized below. Compliance with these requirements, from the perspective of targets to be achieved, is addressed in Chapter 6, Environmental Policy.

On April 15, 2019, Washington House Bill 1257[8] (HB 1257) was passed by the Senate and on April 18, 2019, the bill was passed by the House. Several sections within the bill are related to RNG and will be covered in this chapter.

Below, Cascade lists key portions of the House Bill relevant to RNG:

Sec. 12. (1) The legislature finds and declares that:

(a) Renewable natural gas provides benefits to natural gas utility customers and to the public; and

(b) The development of renewable natural gas resources should be encouraged to support a smooth transition to a low carbon energy economy in Washington.

(2) It is the policy of the state to provide clear and reliable guidelines for gas companies that opt to supply renewable natural gas resources to serve their customers and that ensure robust ratepayer protections.

[6] U.S. Department of Energy, Alternative Fuels Data Center, Renewable Natural Gas.

[7] Energy + Environmental Economics, Pacific NW Pathways to 2050: Achieving an 80% reduction in economy-wide greenhouse gases by 2050.

[8] *See* http://lawfilesext.leg.wa.gov/biennium/2019-20/Pdf/Bills/House%20Passed%20Legislature/1257-S3.PL.pdf?q=20201020144814.

Following the adoption of HB 1257 into law,[9] workshops were convened to determine how best to comply with these new mandates. Cascade has actively participated in all relevant workshops under Docket UG-190818, RNG Staff Investigation. Multiple company representatives engaged in these proceedings. The Company has also worked closely with its trade organization, the Northwest Gas Association, to provide the information and feedback necessary to support proposals submitted on behalf of the northwest LDCs.

In addition to Section 12, HB 1257 included two other sections with language pertaining to the development of renewable natural gas and offset programs:

Sec. 13. A new section is added to chapter 80.28 RCW to read as follows:

(1) A natural gas company may propose a renewable natural gas program under which the company would supply renewable natural gas for a portion of the natural gas sold or delivered to its retail customers. The renewable natural gas program is subject to review and approval by the commission. The customer charge for a renewable natural gas program may not exceed 5% of the amount charged to retail customers for natural gas.

(2) The environmental attributes of renewable natural gas provided under this section must be retired using procedures established by the commission and may not be used for any other purpose. The commission must approve procedures for banking and transfer of environmental attributes.

(3) As used in this section, "renewable natural gas" includes renewable natural gas as defined in RCW 54.04.190. The commission may approve inclusion of other sources of gas if those sources are produced without consumption of fossil fuels.

Cascade has been identifying viable pathways for the inclusion of renewable natural gas as part of its fuel mix, following the guidelines developing from the UG-190818, RNG Staff Investigation workshops and compliance obligations under Oregon's Climate Protection Plan (CPP) and Washington's Climate Commitment Act (CCA). Cascade has entered into one contract to bring RNG onto its system plus has been the selected bidder to enter into another contract. Cascade continues sourcing RNG with several producers as it performs analyses across its Washington and Oregon service areas. Fourteen projects are in various stages of planning and development, which Cascade discuss the projects that are either contracted for or very close beginning on page 4-11.

The Company's current timeline to incorporating RNG onto the system under its first contract is late 2023. In the meantime, Cascade continues developing a cost effectiveness evaluation tool, as described in the following subsection, for RNG to

[9] Signed by Governor Jay Inslee on May 13, 2019, with an effective date of July 28, 2019.

allow the Company to model the impact to retail customers in order to not exceed the 5%of the amount charged from section 13.1 of the bill.

Sec. 14. A new section is added to chapter 80.28 RCW to read as follows:

(1) Each gas company must offer by tariff a voluntary renewable natural gas service available to all customers to replace any portion of the natural gas that would otherwise be provided by the gas company. The tariff may provide reasonable limits on participation based on the availability of renewable natural gas and may use environmental attributes of renewable natural gas combined with natural gas. The voluntary renewable natural gas service must include delivery to, or the retirement on behalf of, the customer of all environmental attributes associated with the renewable natural gas.

(2) For the purposes of this section, "renewable natural gas" includes renewable natural gas as defined in RCW 54.04.190. The commission may approve inclusion of other sources of gas if those sources are produced without consumption of fossil fuels.

As noted above, Cascade is constantly assessing options for how to best acquire RNG and its associated attributes. These resources would be applied for the purposes described under Sec 13 and 14 of HB 1257 and to meet the obligations under the CCA and CPP. Cascade is in the process of identifying internal and external resources to support the acquisition of environmental attributes and renewable gas for the voluntary renewable natural gas service required under Washington law prior to the first contracted RNG coming into Cascade's system in late 2023.

Cascade Project Cost Effectiveness Evaluation Methodology

Several departments within the Company have collaborated to create a model that allows Cascade to evaluate the cost-effectiveness of all potential RNG projects before entering into an agreement with potential suppliers. Similar to the Company's PLEXOS® modeling, the results of this calculation help inform final acquisition decisions, but ultimately must be combined with qualitative analysis from RNG subject matter experts. This subsection will present the model notes, a discussion of the static and dynamic inputs to the model and provide an understanding of how the results should be interpreted.

Cost Effectiveness Evaluation Model Notes

$$C_{RNG} = I_{RNG} - AC_U - AC_D + \sum_{T=1}^{365} (P_{RNG} + VC - CIF) * Q$$

$$\boldsymbol{C_{Conventional}} = \sum_{\boldsymbol{T=1}}^{\boldsymbol{365}} (\boldsymbol{P_{Conventional}} + \boldsymbol{VC}) * \boldsymbol{Q}$$

Where:

C_{RNG} = The all-inclusive annual cost of a proposed RNG project
I_{RNG} = The annual required investment to procure a proposed RNG resource. If Cascade is simply buying the gas and/or environmental attributes, this value is zero.
AC_U = Avoided upstream costs
AC_D = Avoided distribution system costs
P_{RNG} = Daily price of renewable natural gas being evaluated
Q = Daily quantity of gas being evaluated
VC = Variable cost to move one dekatherm of gas to Cascade's distribution system. This value can be zero if a project connects directly to the Company's system.
CIF = Carbon Intensity Factor. This is calculated by multiplying the Company's expected carbon compliance cost by 1 minus the ratio of a proposed project's carbon intensity to conventional gas' carbon intensity. For the purpose of compliance with the CCA and CPP, the CIP factor is just Cascade's expected carbon compliance cost in the various jurisdictions, as these rules do not account for the variable carbon intensities of various sources of RNG.
$C_{Conventional}$ = The all-inclusive annual cost of conventional natural gas.
If $C_{Conventional} \geq C_{RNG}$, a project can be considered cost effective, and should be acquired. If not, the project may still be considered under the regulatory exceptions discussed earlier in this chapter.

Static Versus Dynamic Inputs

Inputs to Cascade's model can be classified as either static or dynamic. Static inputs are ones that are not project specific, but rather related to the Company's system as a whole. They include Cascade's avoided costs, costs associated with the price of conventional gas, and regulatory factors that are used to calculate the impact to revenue requirement. Dynamic inputs on the other hand, are ones that need to be updated on a project by project basis. These include the price and quantity of the RNG, initial investment required, and carbon intensity of the project.

Purchase Versus Build

Cascade utilizes different proprietary models based on whether the Company is evaluating the purchase of RNG or the building and ownership of an RNG generating facility. While philosophically the same, the models are calibrated to account for slight differences in the various decision-making processes. The build decision model allows for more detailed inputs and evaluation of overhead variables related to ownership,

such as tax impacts of ownership and depreciation of assets. The purchase model, on the other hand, allows for analysis of variable purchase structures, where Cascade may only purchase a fraction of the RNG quantity that will ultimately be flowed from an RNG deal, which also allows the model to consider revenue that the Company would earn from transportation agreements related to the volumes of RNG that Cascade would not own, but would still flow on its system.

Model Results

Once all inputs are populated, the model provides three main pieces of information: The potential enterprise value of the project over its lifetime, the first year dollar impact to revenue requirement, and the first year percentage impact to revenue requirement. As discussed in the model notes, if the cost of conventional gas is greater than or equal to the cost of RNG, the project can be considered cost effective. If not, the impact to revenue requirement provides a valuable insight as to whether the project is attractive from a regulatory perspective.

Selling Versus Procuring

As highlighted in other sections of this IRP, one of the major challenges associated with long-term planning is the difficulty around projecting resource needs over the planning horizon. Stakeholders have highlighted this as a point of concern during this IRP process, as many of the procurement contracts Cascade evaluates with the model discussed above are long-term contracts. If demand projections do not materialize as expected, or demand reductions driven by forces such as electrification materialize faster than expected, the Company could find itself in a situation where it has procured more RNG than it needs for a given year. In situations like these, Cascade explores a multitude of options, including utilizing the RNG in other jurisdictions, in voluntary programs, or selling the RNG on the open market. Cascade is constantly engaging with market participants to ensure that if the Company does need to sell a portion of its RNG portfolio, it is done prudently to the benefit of its customers.

RNG Projects

Cascade is currently progressing on RNG projects at varying stages of development. There are three types of RNG projects with which Cascade is involved: “Purchase Projects,” “Transport Projects,” and “Production Projects.”

Purchase Projects are defined as projects where the Company would invest in the Cascade infrastructure required to on-board or flow the RNG produced by a third party into the Company’s distribution system and purchase the environmental attributes or Renewable Thermal Credits (“RTC”) to be utilized for compliance obligations or voluntary RNG tariffs. The Company’s investment in the infrastructure influences the negotiated price to purchase the RNG.

In Transport Projects, RNG produced by a third party is injected into the Company’s distribution system, and Cascade transports the customer’s RNG so that the customer may market the environmental attributes to other parties. Cascade is not the purchaser of the environmental attributes of “Transport Projects”, either because they are priced higher than would be prudent for cost recovery from utility customers or they are already committed to another customer. For a Transport Project, the third-party producer will normally be placed on Cascade’s transportation rate schedule 663, and Cascade will make an investment in the infrastructure required to flow the gas in the distribution system in accordance with Cascade’s line extension tariff. Although Cascade plays an essential role in enabling Washington’s emissions reductions through its facilitation of RNG Transport Projects, under current rules, Cascade receives no credit for the emissions reductions accorded to the RNG production entity.

The third type of RNG projects, called Production Projects, are defined as projects where Cascade invests in the RNG production facility as well as the infrastructure required to flow the RNG into the distribution system. Cascade will ultimately produce and own the RNG, including the associated environmental attributes. Cascade plans to grow its portfolio of RNG Production Projects over time to support Washington and Oregon’s GHG emissions reduction goals.

Cascade has signed contracts for five RNG projects. Four are contracts with third-party producers where the gas will be injected into Cascade’s distribution system. Three of the four projects are Purchase Projects where Cascade will be purchasing some or all of the environmental attributes. The fourth is a Transport Project where Cascade is only facilitating the transportation of RNG on its distribution system. The fifth project is a Production Project where Cascade will own and operate the production facility and retain both the biomethane and RTCs for use by its customers. Cascade is also pursuing several other potential RNG projects at varying stages of development.

Below are the details of the Purchase Projects under contract:

City of Richland – Horn Rapids Landfill & Lamb Weston RNG Project – Richland, Washington

Source - 3rd party developer has rights to raw biogas from two sources in close proximity to each other.

1. Landfill Gas from the City of Richland's Horn Rapids Landfill
2. Food Waste from potatoes at Lamb Weston's Richland Processing Plant.

Scope of Cascade Work

- Design and construct interconnect facilities
- Design and construct pipeline from interconnect facility to local distribution system

Status & Terms

- Placed in-service March 2024
- 1,860,000 therm/yr
- 15-year term

Industrial Wastewater RNG Project - Franklin County Washington

Source - Industrial wastewater processing facility currently serving several aggregated industrial food processors & growers.

Scope of Cascade Work

- Design and construct interconnect facilities
- Design and construct pipeline from interconnect facility to local distribution system

Status & Terms

- Interconnect facilities currently under construction
- 3,400,000 therm/yr
- 20-year term
- Projected in-service date Q4 2024

The following are details of the Transportation Project under contract:

Food Waste RNG Project – Cowlitz County, Washington

Source – Aggregated food waste from approximately 100 chain grocery outlets in Washington and Oregon

Scope of Cascade Work

- Design and construct interconnect facilities
- Design and construct pipeline from interconnect facility to local distribution system

Status & Terms

- Interconnect facilities under construction
- 1,800,000 therm/yr (non-Cascade compliance therms)
- 10-year term
- Projected in-service date early Q2 2025

The following are details of the Production Project currently under contract:

Deschutes County Landfill RNG Project - Bend Oregon

Source - Cascade/Jacobs Engineering Team was successful candidate chosen through RFP process to own and operate processing facilities to convert landfill gas to RNG

Scope of Cascade Work

- Build, own, operate, and maintain the gas processing plant
- Design and construct interconnect facilities
- Design and construct pipeline from interconnect facility to local distribution system

Status & Terms

- Plant and interconnect facilities engineering and design in progress
- 2,500,000 therm/yr
- 20-year term
- Projected in-service date Q4 2025

Renewable Thermal Certificates

The Oregon Department of Environmental Quality (DEQ) has adopted M-RETS as the tracking platform to validate and track environmental attributes from RNG and hydrogen in the CCP. M-RETS utilize Renewable Thermal Certificates (RTCs) to track the production, transfer and retirement of these qualified environmental attributes. The RTC includes specific details like source, vintage, location, feedstock and a unique identifier. Each RTC is equal to one dekatherm of RNG produced. Currently, Washington only allows environmental attributes to be used for RCW 80.28.390, the voluntary renewable natural gas service. The current rules of the Climate Commitment Act (CCA) do not allow for environmental attributes, whereas the Climate Protect Program (CPP) in Oregon does. Cascade is currently in discussions with several producers to secure the necessary environmental attributes to meet future voluntary RNG programs as well as the CPP in Oregon.

Hydrogen and other low carbon alternative fuels

Information to be provided once low carbon alternative fuels projections are finalized.

Storage Resources

Cascade also utilizes natural gas storage to meet a portion of the requirements of its core market. Storing gas supplies, purchased and injected during periods of low demand, is a cost-effective way of meeting some of the peak requirements of Cascade's firm market. Natural gas can be stored in naturally occurring reservoirs, such as depleted oil or gas fields, salt caverns or other geological formations with an impermeable cap over a porous reservoir. Gas can also be stored in tanks under pressure as compressed natural gas (CNG) or cooled to a liquid state (LNG).

Natural gas storage service is not only an excellent supply source for meeting peak winter demand, but it can also be an important gas supply management tool. Storing excess or unused supply during periods of low demand increases the annual utilization rate of a supply contract, thereby improving the annual load factor for the Company's gas supplies. Improving the annual load factor of a supply contract improves the Company's ability to purchase gas supplies on a more economical basis. Purchasing natural gas for storage during periods of low demand generally yields prices at the low point on the seasonal price curve.

Depending upon the location of the storage facility, pipeline transportation may also be required to move the gas from the facility to the distribution system. Storage facilities located within the Company's distribution system or on the immediately upstream interstate pipeline are preferable to those located off-system. Off-system storage requires additional upstream pipeline transportation and may limit the flexibility of the resource. Cascade does not own any storage facilities and, therefore, must contract with storage owners to lease a portion of those owners' unused storage capacity. Figure 4-1 on page 4-3 displays the location of some of the storage facilities in the region.

Cascade has contracted for storage service directly from NWP since 1994. Jackson Prairie is located in Lewis County, Washington, approximately ten miles south of Chehalis. The following paragraph explaining the Jackson Prairie facility is found on Puget Sound Energy's website.[10] Puget is a one-third owner of the Jackson Prairie facility.

"Jackson Prairie is a series of deep underground reservoirs-basically thick, porous sandstone deposits. The sand layers lie approximately 1,000 to 3,000 feet below the

[10] *See:* Jackson Prairie Underground Natural Gas Storage Facility, https://www.pse.com/pages/energy-supply/natural-gas-storage, as of February 2, 2021.

ground surface. Large compressors and pipelines are employed at JP to both inject and withdraw natural gas at 45 wells spread across the 3,200-acre facility. Currently it is estimated that Jackson Prairie can store nearly 25 BCF of working gas. The facility also includes "cushion" gas which provides pressure in the reservoir of approximately 48 BCF. In terms of withdrawal capability, the facility is capable of delivering 1.15 BCF of natural gas per day."

The Company also has contracted for service from NWP's Plymouth, Washington LNG facility. Plymouth is located in Benton County, Washington approximately 30 miles south of Kennewick. According to NWP's website, the total facility has storage capacity of 2.4 BCF. Cascade has leased approximately 28% of this storage capacity.

In addition to the other storage facilities, the Company leases storage capacity from Mist. The Mist facility is located near Mist, Oregon and is adjacent to Northwest Natural Gas' distribution system and has a direct connection to NWP for withdrawals and injections. The Mist facility is owned and operated by Northwest Natural Gas. Cascade has 1,640,000 dth of leased capacity.

Both the Jackson Prairie and the Plymouth facilities are located directly on NWP's transmission system, while Mist Storage is located on the Northwest Natural Gas system that is connected to NWP via two different citygates. Therefore, storage withdrawal rates can be changed several times during an individual gas day to accommodate weather driven changes in core customer requirements. This type of operating flexibility would not necessarily be available with off-system storage. Withdrawal capabilities must also be accompanied by firm capacity on the transporting pipeline(s) to be of any value as a reliable source of gas supply. Cascade's Jackson Prairie storage and Plymouth LNG service require TF-2 firm transportation service for storage withdrawals; Cascade has sufficient firm TF-2 service to meet its storage daily deliverability levels. The Company's contracted storage services are summarized in Figure 4-6.

Figure 4-6: Cascade Leased Storage Services (Volumes in Therms)

Facility	Storage Capacity	Withdrawal Rights
Jackson Prairie (Principle)	6,043,510	167,890
Jackson Prairie (Expansion)	3,500,000	300,000
Jackson Prairie (2012)	2,812,420	95,770
Plymouth LNG (Principle)	5,622,000	600,000
Plymouth LNG (2016)	1,000,000	181,250
Mist	16,400,000	500,000

Capacity Resources

Capacity options are either interstate pipeline transportation resources or capacity on Cascade's local distribution system. Cascade's local distribution system is built to serve the entire connected load in its various distribution service areas on a coincidental demand basis, dependent upon the type of service the customer has contracted to receive.

Pipeline transportation resources are utilized to transport the gas supplies from the producer/supply sources to Cascade's system. Cascade currently purchases supplies from three different regions or basins: U.S. Rockies, British Columbia, and Alberta, Canada. Unless the supplier has bundled its sale of gas supplies with capacity (i.e. a citygate delivery), these resources require pipeline transportation to deliver them to Cascade's local distribution system. Transportation resources historically have been purchased from the pipeline(s) at the time of an expansion under long-term (20 to 30 year) contracts.

Cascade has over 30 long-term annual contracts with NWP, numerous long-term annual and winter-only transportation contracts with GTN (including the upstream capacity on TransCanada Pipeline's Foothills and Alberta systems), a long-term, winter-only contract with Ruby Pipeline, and one long-term annual contract with Enbridge (Westcoast Transmission) in British Columbia, Canada. These contracts do not include storage or other peaking services that may provide additional delivery capability rights. Figure 4-1 on page 4-3 provides a general flow of Cascade's combined contracted pipeline transportation rights.

GTN Express

In the 2018 IRP (LC 69), Cascade had identified an upstream shortfall along the GTN pipeline. A shortfall occurs when the Company's customer demand exceeds the maximum daily quantity a company has contracted for on an upstream pipeline. As seen in Figure 4-7, Cascade identified this shortfall beginning in 2020 and exceeding 20,000 dth in the early 2030's.

Figure 4-7: **Oregon Load Centers with Potential Peak Day Unserved Demand in Dekatherms – As Is Scenario**

Area	2018	2020	2025	2030	2035	2037
Bend Loop	-	1,504	8,488	15,835	23,266	26,262
Total	**-**	**1,504**	**8,488**	**15,835**	**23,266**	**26,262**

Once Demand Side Management options were included, it delayed the first shortfall until 2023 and the time to reach 20,000 dth shortfall to the mid 2030's.

In the 2018 OR IRP Updated, Cascade gave an update to Action Item 11: *"Evaluate the cost of purchasing incremental GTN capacity now versus in 4 years. Confirm with GTN on the availability of upstream capacity either from Kingsgate to Malin or from Turquoise Flats to Kingsgate. At a minimum, on a quarterly basis analyze the potential availability and price of GTN capacity currently compared to at least four years out. Provide the results of this analyses to GSOC to determine actions necessary to meet Bend capacity shortfalls anticipated late in the upcoming decade."*

Cascade's update stated: In the Oregon IRPs prior to the 2018 Oregon IRP, Cascade noted a potential shortfall along GTN. The 2016 WA IRP also noted a potential shortfall along GTN. During the 2018 OR IRP modeling period, Cascade purchased 10,000 dths/day of GTN north to south forward haul on December 1, 2017. Due to the timing, Cascade did not include this 10,000 dths in the modeling and instead included it in the solve for the GTN shortfall. The 2018 OR IRP showed a GTN shortfall beginning in 2019-2020 which was delayed until 2026-2027 because of the 10,000 dths/day that was already purchased.

The Company takes into account many different factors when it comes to evaluating the cost of purchasing incremental GTN capacity now versus in four years. These factors include, but are not limited to, cost of capacity, risk of availability of capacity, and risk around error in the Company forecast. Looking further into these factors Cascade found:

- The cost of acquiring the 20,000 dths of capacity now will more likely be cheaper than capacity four years from now.
- It is Cascade's understanding that GTN is near fully subscribed.
- Cascade's Bend growth forecast from 2018 to 2019 in the OR IRP was 2.44% but has actually seen a 3.33% increase from January 2018 to January 2019. In the 2018 WA IRP, which accounted for the higher growth rate, it was shown that the GTN shortfall started in 2023.

The factors listed above were provided to GSOC which determined that purchasing 10,000 – 20,000 dths/day would be the necessary action to meet Bend capacity shortfalls. Cascade signed a non-binding term sheet between GTN and the Company on April 18, 2019. The non-binding term sheet essentially stated Cascade would participate in an Open Season with an interest in 10,000 – 20,000 dths/day of GTN capacity, GSOC authorized Cascade to continue to monitor the situation and will keep the OPUC up to date through the PGA quarterly meetings.

On September 13, 2019, consistent with GSOC's authorization, Cascade executed a binding precedent agreement with GTN to acquire 20,000 dths/day of GTN capacity as part of the GTN Express project.

In the 2020 and 2023 IRP, Cascade included the 20,000 dth of GTN Cascade contracted for beginning November 1, 2023, in the modeling. Since this new contract

was included in the modeling Cascade did not identify any shortfalls in the 2020 IRP and identified a small shortfall on GTN in the 2023 IRP, but not until late 2040's.

Further evidence that Cascade needs the expansion occurred when Cascade flowed approximately 66,000 dth of gas along GTN on December 22, 2022. On this day, Cascade experienced 52 HDD temperatures, which is approximately 18 HDDs warmer than what the Company models for peak day HDDs. Cascade's contracted capacity without the 20,000 dth is 72,603. Therefore, Cascade was about 6,000 dth from exceeding upstream pipeline contracted capacity while experiencing cold, but not peak day temperatures.

In this 2023 IRP, Cascade shows in the Demand Forecast chapter that the Company anticipates growth to continue to go rise even with the carbon compliance around the CPP. In the Resource Integration chapter, Cascade identifies ways the Company plans to meet CPP decarbonization goals even with an increasing customer base.

Natural Gas Price Forecast

For IRP purposes, the Company develops a baseline, high, and low natural gas price forecast. Demand, oil price volatility, the global economy related to inflationary pressure, geopolitical turmoil, and LNG imports/exports, electric generation, opportunities to take advantage of new extraction technologies, hurricanes and other weather activity will continue to impact natural gas prices for the foreseeable future. Cascade did reach out to its hedging consultant, Gelber & Associates, who provided the following analysis in the Company's 2024 Hedge Plan:

"Gelber & Associates has identified several primary drivers of the natural gas market in its annual Natural Gas Price Forecast. For 2024, there are four key identified pricing factors at play:

- Production has climbed back from lows seen in 2Q 2024, supported by a sizeable rally in June.
- Far above-average storage levels going into the 2024 fall season.
- Demand increases from pending LNG export demand growth from Plaquemines LNG and Golden Pass LNG beginning in 2025. There is also increased reliance on natural gas power generation this summer and winter with the current La Niña weather pattern.
- LNG Canada and Woodfibre LNG will begin to weigh on Canadian supply and further link Canada to international pricing dynamics."

Cascade considers price forecasts from several sources, such as Wood Mackenzie, Energy Information Administration (EIA), S&P Global, NYMEX Henry Hub, Northwest Power and Conservation Council (NWPCC), as well as Cascade's own observations of the market to develop the low, base, and high price forecasts. For confidentiality

purposes, the Company refers to the selected sources as Sources 1-4 when discussing how these sources are weighted in Cascade's Henry Hub forecast. The following discussion provides an overview of the development of the baseline forecasts.

Cascade's long-term planning price forecast is based on a blend of futures market pricing along with long-term fundamental price forecasts from multiple sources. Since pricing on the market is heavily influenced by Henry Hub prices, the Company closely monitors this market trend. While not a guarantee of where the market will ultimately finish, the futures market (NYMEX) is the most current information available that provides some direction as to future market prices. On a daily basis, Cascade can see where Henry Hub is trading and how the future basis differential in the Company's physical supply receiving areas (Sumas, AECO, Rockies) is trading.

Cascade believes that relying on a single source for developing the Company's 20-year price forecast is not the most reasonable approach. Some sources such as EIA and Wood Mackenzie produce Henry Hub pricing over the long-term; whereas other sources like the NYMEX basis (e.g., Sumas) provide price indicators over a shorter period of time. Additionally, price forecast sources produce their forecasts or indicators at varying points in time throughout the year. Finally, most forecasts are at an annual level versus a monthly level. In order to capture the potential seasonality as well as the variances of monthly price within the producing basins, the Company blends the pricing data from these various forecast sources.

The fundamental forecasts of Wood Mackenzie, the EIA, NWPCC, Platts, S&P Global, and Cascade's trading partners are resources for the development of a blended long-range price forecast. Wood Mackenzie publishes a long-term price forecast twice a year to subscribing customers. This forecast was broken down by month through the planning horizon and includes Henry Hub as well as basis differentials, or price differential from Henry Hub, for the Company's receiving areas. Cascade also considers the EIA forecast; however, it has its limitations since it is not always as current as the most recent market activity. Further, the EIA forecast provides monthly breakdowns in the short-term, but longer-term forecasts are only by year. Many of the other sources mentioned only provide price forecasts by year. Given Cascade's load profile and the need for more winter gas than summer, the Company developed a pattern based on the market monthly forward prices to create a long-term, monthly Henry Hub price.

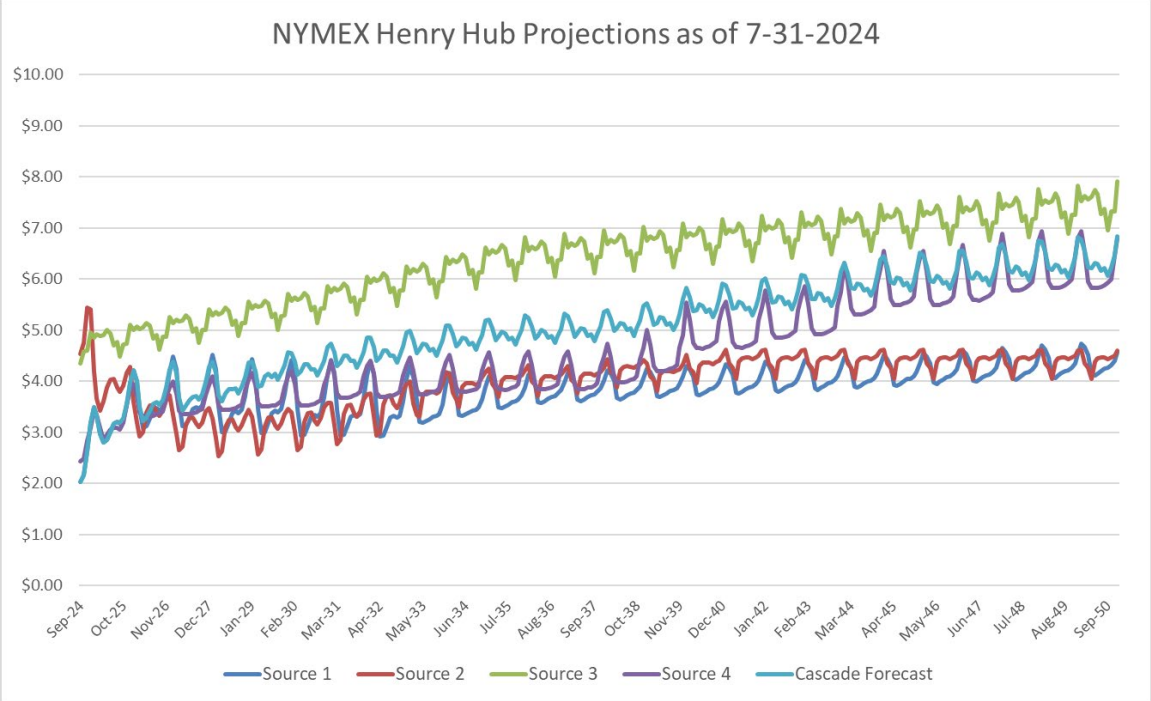
With a monthly Henry Hub price determined from the above sources, the Company assigned a weight to each source to develop the monthly Henry Hub price forecast for the 20-year planning horizon. These weights were derived by calculating the Symmetric Mean Absolute Percentage Error (SMAPE) of each source versus actual Henry Hub pricing since 2010. The inverse of these error terms was then used to determine the weight given to each source. A sample of the forecast weighting factors are shown in Figure 4-8. A comparison of the sources Cascade uses in its forecast

and the actual blended forecast is provided in Figure 4-9. Cascade's price forecast was locked in on July 31, 2024.

Figure 4-8: Sample of Cascade's Henry Hub Price Forecast Weights

Date	Source 1	Source 2	Source 3	Source 4
T+24	75.000%	8.950%	9.333%	6.717%
T+25	72.917%	9.559%	10.283%	7.241%
T+26	70.833%	10.127%	11.278%	7.761%
T+27	68.750%	10.653%	12.322%	8.275%
T+28	66.667%	11.132%	13.417%	8.784%
T+29	64.583%	13.160%	12.372%	9.884%
T+30	62.500%	13.954%	13.142%	10.404%
T+31	60.417%	14.722%	13.944%	10.917%
T+32	58.333%	15.455%	14.786%	11.426%
T+33	56.250%	16.141%	15.677%	11.932%
T+34	54.167%	16.777%	16.620%	12.436%
T+35	52.083%	17.365%	17.615%	12.937%
T+36	50.000%	17.901%	18.666%	13.433%

Figure 4-9: Henry Hub Price Forecast by Source ($US/Dth)



Age-Dampening Mechanism

To ensure that the forecast is accounting for the most current information in the market, Cascade has introduced an age dampening mechanism to its price forecast. Every month, if there is a source that is over one year old, all sources' weights are reduced by their share of the total number of months that all sources are outdated by. For example, if Source 1's forecast was fifteen months old, Source 2's was seven months old, and Source 3's was two months old, then each of these sources would be reduced by 15/24, 7/24, and 2/24 respectively. The detracted weights are then added back into the weight of the forwards market since that will always be the most current source (as it is updated daily). The one-year threshold was chosen qualitatively, as this methodology could be too punishing if all sources were not that old. For example, if one source was two months old, another was one month old, and another brand new, the first source would lose 66% of its weight to the forward curve, even though it still contains relatively current information regarding the market.

Cascade weights the futures market at 100% for the first fifteen months of the forecasting period. The weights are then linearly interpolated over the next two years in order to align them with the calculated weights as described above.

The Company recognizes the importance of verifying forecast accuracy periodically and as such, will perform routine cross-validation to evaluate the impact of any modifications to the price forecast.

Development of the Basis Differential for Sumas, AECO and Rockies

Cascade utilizes the basis differential from Wood Mackenzie's most recently available update and compares that to the future markets' basis trading as reported in the public market because the Company's physical supply receiving areas (Sumas, AECO, and Rockies) are typically traded at a discount to Henry Hub. Correspondingly, the Company applied a weighted average to determine the individual basis differential in the price forecast.

Pros and Cons of Methodology Changes

The changes made in the 2018 and 2020 IRPs represent a continual methodological improvement over the forecasts in previous IRPs. Using the daily NYMEX forwards for short term forecasting allows the Company's forecast to incorporate current market data, such as weather and *force majeure* events, into its projections. Additionally, the age dampening mechanism favors sources that have been updated

more recently, which better captures a paradigm shift in the markets on a long-term basis versus a forecast that may be a few months or even years old. Finally, the use of SMAPE to assign weights to the sources creates a more scientific rationale for the blending of forecasts.

While Cascade believes this forecast is accurate, there are always areas of potential improvement. Since the forecast is a blending of other forecasts, the Company relies on the accuracy of its sources. While the SMAPE calculation helps to reward the more accurate forecasts, if all sources failed to capture a major market movement, Cascade's forecast would ultimately end up inaccurate as well. Additionally, some sources produce fairly infrequent forecasts, creating a small sample size for them to be evaluated in the SMAPE calculation. The Company is monitoring these problems to ensure they do not skew the forecast and has mechanisms in place to allow for a manual adjustment if market intelligence deems such a modification to be appropriate.

Incremental Supply Side Resource Options

As is more thoroughly described in Chapter 10, Resource Integration, some of the load growth under the high growth scenario, described in Chapter 3, may require Cascade to secure incremental supply side resources. The purpose of this section is to identify the potential incremental supply resources the Company considered for the high growth scenario.

Cascade models its incremental resources simultaneously through PLEXOS®. This allows the Company to evaluate each resource as a potential solution relative to all other resources, without any bias towards a particular option. Cascade utilizes functionality within PLEXOS® to allow the program to deterministically select the optimum timing and quantity of incremental supply resources. Any of the following resources that do not appear in Cascade's final preferred portfolio were deemed by PLEXOS® to be either not cost effective or not optimal in comparison with other resource options.

Pipeline Capacity

- **Cross-Cascades, Trail West (Palomar, NMax, Sunstone, Blue Bridge, et al):** Trail West is a proposed pipeline starting at GTN's system near Madras, Oregon, and connecting NWP's Grants Pass Lateral near Molalla, Oregon. Since portions of the Company's distribution system are not connected to Molalla, incremental pipeline capacity would be needed to transport gas northbound to certain load centers. NWP has proposed a transport service that would bundle Trail West capacity with NW Natural's northbound Grants Pass Lateral capacity. From Cascade's perspective,

this might present an alternative means to move Rockies gas to the I-5 corridor. At this time, there has been no new activity associated with this project. The development of this project would likely have a two to three year lead time.

- **GTN Capacity Acquisition:** The Company would acquire currently unsubscribed capacity on GTN in order to secure its gas supplies at liquid trading points primarily to serve Central Oregon.

- **NWP Eastern Oregon Expansion:** This alternative resource would be incremental NWP capacity from a Washington State receipt point that is designed to serve load growth needs in Zone 24 and Zone ME-OR. Examples of the Cascade service areas that would benefit from this project are Pendleton and Baker City. Similar to a proposed NWP Wenatchee expansion, it would be relatively small scale and could be expected to have a relatively high unit cost. The development of this project would likely have a three or four year lead time. As of this writing, there hasn't been any new activity associated with the potential project.

- **NWP Express Project/I-5 Sumas Expansion Project (Regional or Cascade Specific Project):** Cascade envisions this project as expanding capacity from Sumas on a potential NWP project that is the successor to the Western Expansion project. It would potentially combine Cascade's infrastructure expansion needs with other regional requests from parties such as local distribution companies (LDCs), power generators, and large petrochemical projects. The scale of this project is larger, potentially resulting in a more favorable unit cost; although with scale and multiple parties involved, timing for in-service dates may vary by the various participants. Examples of the Cascade service areas that would benefit from this project are Bellingham, Mount Vernon, Bremerton, and Longview. Cascade, through the Company's active membership in various industry task forces and associations, works with regional pipelines and LDCs to consider potential pipeline expansions. The development of this project would likely have a three or four year lead time. As of this writing, there hasn't been any new activity associated with the potential project.

- **NWP Wenatchee Expansion:** This alternative resource would be incremental NWP capacity from a Washington State receipt point (e.g. Sumas) that is designed to serve load growth needs in Zone 10 and Zone 11. Examples of the Cascade service areas that would benefit from this project are Yakima and Wenatchee. Accordingly, it would have a relatively small scale and so could be expected to have a relatively high unit cost. The development of this project would likely have a three or four year lead time. As of this writing, there hasn't been any new activity associated with the potential project.

- **NWP Zone 20 Expansion:** This alternative resource would be incremental NWP capacity from a Washington State receipt point that is designed to serve load growth needs in Zone 20. Examples of the Cascade service areas that would benefit from this project are Kennewick and Moses Lake. Similar to a proposed NWP Wenatchee expansion, it would have a relatively small scale and so could be expected to have a relatively high unit cost. The development of this project would likely have a three or four year lead time. As of this writing, there hasn't been any new activity associated with the potential project.

- **Pacific Connector:** The Pacific Connector Pipeline project is tied to the development of the Jordan Cove LNG export terminal in Coos Bay, Oregon. This pipeline would start near Malin, Oregon, and would cross NWP's Grants Pass Lateral (GPL) in the vicinity of Roseburg, Oregon. This project presents an opportunity as a potential supply resource for this IRP. Cascade would not be seeking to become a shipper on Pacific Connector. The Company views this project as a bundled pipeline supply service from Malin to the Company's citygates. The project was initially denied due to lack of demand, which has since increased, but faces considerable opposition including but not limited to landowners, activists, and protesters. Incremental transport involving GTN might be necessary to ensure transport from Malin to Cascade's GTN receipt point at Turquoise Flats. On January 19, 2021, federal regulators upheld Oregon's decision to deny a water quality certification for Jordan Cove and Pacific Connector.[11] This latest event has led to some concern the project may not proceed.

- **Southern Crossing Expansion:** FortisBC Southern Crossing is considering an addition of 300-400 MMcf/d of bidirectional capacity. FortisBC has proposed a reinforcement project for the Southern Crossing Pipeline that would permit more flow of Alberta gas to Sumas. This would also require an expansion of NWP from Sumas at the Canadian border which, in the Company's view, does not need to be modeled since it essentially is replicated by the current inclusion of the NWP I-5 expansion project. This is primarily a price arbitrage opportunity, but the Company does not see any significant advantage to the system at this point given limited availability to move the gas from Sumas. However, Cascade will continue to consider this resource to see if it might make sense as a potentially cost-effective dedicated resource for the Company's direct connect with Westcoast.

[11] *See* https://www.oregonlive.com/politics/2021/01/federal-regulators-deliver-potentially-fatal-blow-to-jordan-cove.html

Storage Opportunities

- **AECO Hub Storage:** This is Niska's commercial natural gas storage business in Alberta, Canada. The service is comprised of two gas storage facilities: Suffield (South-eastern Alberta) and Countess (South-central Alberta). Although the two AECO facilities are geographically separated across Alberta, the toll design of the Nova Gas Transmission Ltd. (NGTL) system means they are both at the same commercial point. Capacity at one of the facilities is possible as an alternative resource. However, some services are available for limited periods of time but are subject to possible interruption. Incremental transport involving NGTL, Foothills, GTN, and possibly NWP would also be necessary.

- **Gill Ranch Storage:** Gill Ranch Storage is an underground intra-state natural gas storage facility near Fresno, Calif. It includes a pipeline that links the facility to Pacific Gas & Electric Company's (PG&E) mainline transmission system, allowing it to serve customers throughout California. Storage from this facility would require California Gas Transmission (CGT) transport, which has a potentially cost-prohibitive demand charge of $0.50/Dth to $1.00/Dth. Incremental transport involving GTN would also be necessary.

- **Mist Storage:** This facility is located near Mist, Oregon and is adjacent to NW Natural Gas' distribution system and has a direct connection to NWP for withdrawals and injections. The Mist facility is owned and operated by NW Natural Gas**.** NW Natural's 2018 IRP (LC71), Chapter 9, Section 9.2.1 indicates that "Mist storage capacity is currently reserved for the core market… NW Natural has developed additional capacity in advance of core customer need. This capacity currently serves the interstate/intrastate storage (ISS) market but could be recalled for service to NW Natural's utility customers as those third-party firm storage agreements expire."

  In the past several years NW Natural has held a Mist open season in 2017, followed by two Mist RFPs. Cascade became a Mist ISS customer for the first time in May 2019. The Company leases 600,000 dths of storage capacity. This lease is set to expire in 2024.

  On January 14, 2021, NW Natural sent their latest RFP to Cascade with bids due by January 29, 2021. With assistance in modeling from Cascade's asset manager, Tenaska Marketing, Cascade's GSOC authorized Cascade to submit a bid at 76% of the maximum rate (for reference, the current Mist agreement is at 100% of the maximum rate). Cascade was awarded 540,000 dths of additional Mist capacity on

February 1, 2021. The term of this additional Mist service is May 1, 2021, through April 30, 2026.

In the previous IRP, the latest Mist leased storage was not included in the IRP analysis. It is important to note that Cascade does not own any storage. In addition to the currently leased Mist storage, the Company leases storage at Jackson Prairie and Plymouth LNG. Given the Company's wide geographical and noncontiguous service territory, storage has a unique role in daily upstream operations compared to other regional LDCs. For Cascade, storage functions primarily as an operational tool for balancing and upstream pipeline operational flow orders as opposed to use primarily for price arbitrage. Also, Cascade continues to have the lowest ratio of customers to storage capacity in comparison to other regional LDCs. The addition of this second Mist account improves the Company's portfolio flexibility with minimal impact to customer rates.

- **Spire (formerly Ryckman Creek) Storage:** As of December 2017, Ryckman Creek, LLC operates as a subsidiary of Spire Inc. Spire Gas Storage Facility is located near the town of Evanston, Wyoming and approximately twenty-five miles southwest of the Opal Hub. Spire Storage has converted a partially depleted oil and gas reservoir into a gas storage facility with 35 BCF of working gas and a maximum daily withdrawal rate of 480,000 Dths/d. Spire Storage currently has interconnects with Questar Gas Pipeline, Kern River Transmission, Questar Overthrust Pipeline, Ruby Pipeline, and NWP. Incremental transport involving Questar and possibly Ruby would be necessary.

- **Wild Goose Storage:** Wild Goose is located north of Sacramento in northern California and is the first independent storage facility built in the state. The facility commenced full commercial operations in April 1999 and in April 2004 completed its first expansion. Storage from this facility would require California Gas Transmission (CGT) transport, which has a potentially cost-prohibitive demand charge of $10.50/Dth to $1.00/Dth. Incremental transport involving GTN would also be necessary.

- **Magnum Gas Storage:** Magnum is currently developing the Magnum Gas Storage facility at the Western Energy Hub. Magnum Gas Storage will be the first high-deliverability storage facility in the Rocky Mountain Region. The facility will contain four solution mined storage caverns capable of storing 54 billion cubic feet (Bcf) of natural gas.[12] Magnum would be connected to the Kern River Gas Transmission and Questar Pipeline systems at Goshen, Utah. Incremental transport involving Questar and possibly Ruby would be necessary.

[12] *See* https://www.wyopipeline.com/magnum-gas-storage-llc-western-energy-hub-project/

- **Clay Basin:** Clay Basin is located in Northeast Utah and is a 54 Bcf working gas storage facility. Clay Basin is connected to the Questar Pipeline system. Incremental transport involving Questar and possibly Ruby would be necessary.

Other Alternative Gas Supply Resources

- **Satellite LNG:** Some gas utilities rely on satellite LNG tanks to meet a portion of their peaking requirements. The term satellite is commonly used because the facility is scaled down and has no liquefaction capability. LNG facilities in this context are peaking resources because they provide only a few days of deliverability and should not be confused with the much larger facilities such as LNG export or import terminals. The concept is that a small tank serving a remote area would be filled with LNG as winter approaches, and the site operated during cold weather episodes when vaporization is required. Since satellite LNG has no on-site liquefaction process, the facility is fairly simple in design and operation. While likely as expensive as some pipeline projects, satellite LNG may be more practical in areas where pipeline capacity shortfalls for peak day are the highest and most immediate. The addition of satellite LNG could defer significant pipeline infrastructure investments for several years. A project of this nature would likely have a three-four year lead time.

- **Additional transportation realignments:** The Company's geographically widespread service territory gives Cascade great flexibility to utilize 316,994 Dths/day of delivery rights vs 205,123 Dths/day of receipt rights. Cascade has the right to deliver gas to any delivery point within Washington and Oregon so long as the total MDDOs are not exceeded. Cascade and NWP have worked continuously in recent years for ways to address Cascade's potential peak day capacity shortfalls through re-alignment of the Company's contractual rights where possible, which mitigates the need to acquire incremental NWP capacity through expansions.

Cascade considers unconventional gas supply resources such as supplies from an LNG Import Terminal, local bio-natural gas, or other manufactured gas supply opportunities as potentially speculative supply side resources at this point in time. Ultimately these gas supply resources are treated as alternative resources and have to compete with traditional gas supplies from the conventional gas fields in Canada or the Rockies for inclusion in the Company's portfolio planning.

Supply Side Uncertainties

Several uncertainties exist in evaluating supply side resources. These include regulatory risks, deliverability risks, and price risks. Regulatory risks include the unknown impacts of future Federal Energy Regulatory Commission (FERC) or Canada's Energy Regulator (CER)[13] rulings that may impact the availability and cost of interstate pipeline transportation.

Deliverability risk is the risk that the firm supply will not be available for delivery to the Company's distribution system. Purchasing resources from larger producers or marketers who typically have gas reserves in multiple locations may minimize this risk. The risks associated with prices rising or falling during any winter period represent another supply side uncertainty. To the extent the Company purchases firm contracts that are tied to an index price, it may be at risk for paying more than was initially anticipated for the resource after the resource decision has been made. Price risks associated with climbing prices can be minimized through the use of fixed price contracts or through the use of financial derivatives.

As the United States continues to search for environmentally friendly, economically viable options to displace gasoline and coal, natural gas is seen as a fuel that could be a viable resource in a greener future. It is worth noting that some planned and proposed projects could have a direct impact on the availability of supply or at least may pose potential risks to increasing the price of supplies sourced from British Columbia and Alberta. For example, Coastal GasLink Pipeline 670 kilometer project was completed and will transport natural gas from northeast British Columbia to an LNG export facility near Kitimat BC near the Pacific coast. Shippers using this pipeline will likely lead to increased competition for gas supplies in the region. Also, expansions on the TransCanada pipelines in 2022 and 2023 have also increase competition for available gas supplies in Alberta and British Columbia. The Company will continue to monitor and be actively involved in the various pipeline forums as these initiatives develop.

As mentioned in Chapter 3, predicting demand is challenging due to the unpredictable nature of building codes and environmental policies in Washington and Oregon. In the reference case scenario, where Cascade shows flat growth, and in the low growth scenario, Cascade might consider offloading transportation or storage contracts. This could involve temporarily or permanently releasing capacity or choosing not to renew a contract. More discussion on this topic can be found in Chapter 10.

[13] The Canada Energy Regulator (CER) is the agency of the Government of Canada under its Natural Resources Canada portfolio, which licenses, supervises, regulates, and enforces all applicable Canadian laws as regards to interprovincial and international oil, gas, and electric utilities. The agency came into being on August 28, 2019, under the provision of the Canada Energy Regulator Act of the Parliament of Canada superseding the National Energy Board from which it took over responsibilities.

Financial Derivatives and Risk Management

Cascade constantly seeks methods to ensure customers of price stability. In addition to methods such as long-term physical fixed price gas supply contracts and storage, another means for creating stability is through the use of financial derivatives. The general concept behind a derivative is to lock-in a forward natural gas price with a hedge, consequently mitigating exposure to significant swings in rising and falling prices. Financial derivatives include futures, swaps, and options on futures or some combination of these.

Natural gas futures contracts are actively traded on the NYMEX. The use of futures allows parties to lock-in a known price for extended periods of time (up to six years) in the future. Contracts are typically made in quantities of 10,000 dths to be delivered to agreed-upon points (e.g., NWP Sumas, Westcoast Station 2, NGTL AECO, NWP Rockies, etc.).

In a swap, parties agree to exchange an index price for a fixed price over a defined period. In this scenario, Cascade would be able to provide its customers with a fixed price over the duration of the swap period. In theory, the price would be levelized over the long-term. Futures and swaps are typically called costless collars.

Unlike futures and swaps, an option only provides protection in one direction - either against rising or falling prices. For example, if Cascade wanted to protect customers against rising gas prices but keep the ability to take advantage of falling prices, Cascade would purchase a call option on a natural gas future contract. This arrangement would give the Company the right (but not the obligation) to buy the futures contract at a previously determined price (strike price). Similar to insurance, this transaction only protects the Company from volatile price spikes, via a premium. The premium is typically a function of the variance between the strike price compared to the underlying futures price, the period of time before the option expires, and the volatility of the futures contract.

Cascade's Gas Supply Oversight Committee (GSOC) oversees the Company's gas supply hedging strategy. The Company's current gas hedging strategy is outlined below:

Hedged Fixed-Price Physical or Financial Swap Targets

- Year one target set at 50-60% of annual requirements.
- Year two target set at 30-40% of annual requirements.
- Year three target set at 15-25% of annual requirements.

Depending on market conditions, the strategy allows for the ratchets to increase to 75%, 40%, and 25%, respectively, provided current market information supports moving to a different level.

Cascade employs prudent risk management strategies within designated parameters to minimize the risk of operating losses or assumption of liabilities from commodity price increases because the price the Company pays for gas is subject to market conditions. Risk is associated with business objectives and the external environment. The number of hedging strategies to deal with risk are almost infinite. The decision-making process to manage a risk categorizes whether the risk is one to be avoided, one to be accepted and controlled, or a risk left uncontrolled. When a risk is high impact with a high likelihood of occurrence, the risk is probably too high in relation to the reward and should be avoided. It is reasonable to accept business risks that can be managed and controlled. For some risk, the measurable impact is low, and the risk may not be worth controlling at all. These are risks where the Company can absorb a loss with little financial or operational impact. The Company's policy is directed toward those risks that are considered manageable, controllable, and worth the potential reward to customers. This manageable risk includes acceptable analysis of the possible side effects on the financial position of the Company as compared to the rewards.

The use of derivatives is permitted only after identified risks have been determined to exceed defined tolerance levels and are considered unavoidable. Cascade's GSOC makes these decisions. In recent years, GSOC has adjusted the percentage of the portfolio hedged based on volatility of the market. For example, in the early 2000s, the Company hedged up to 90% of the base gas supply portfolio. When MDU Resources acquired Cascade in 2007, this threshold was reduced to 75% to align with MDU Resources' Corporate Derivatives Policy. As the market began to fall dramatically in the 2008-2010 period, the Company continued to lower the percentage to approximately 30%. Current MDU Resources' corporate policy encourages Cascade to keep the hedging percentage at approximately 55%. For the 2020 procurement design, GSOC felt that it prudent for Cascade to enter into its first financial derivative during the 2019-2020 period, which the Company successfully executed.

The Company entered into fixed price physical transactions and one financial swap for the current programmed buying period. The Company entered into

fixed price physical transactions rather than executing financial swaps for the current programmatic buying period. Fixed prices consist of locked-in prices for physical supplies. As discussed in Appendix E, the Company utilizes a multi-tiered buying approach for locking in or hedging gas supply prices. The Company monitors market conditions and stands ready to execute financial swaps when market and pricing conditions warrant. At the time the current procurement strategy was made, the forward price spread between the November 2019 through October 2020 period and the November 2022 through October 2023 period was less than 20%, which was deemed a reasonable and manageable spread given market intelligence available. Figure 4-10 provides a graph showing the Company's projected weighted average cost of gas (WACOG), including the base case carbon adder, for the 2020 IRP.

Figure 4-10: Projected Cascade WACOG as of June 2020 (Updated after draft)

With the assistance of Gelber & Associates (G&A or Gelber), an energy consulting firm with 30 years of experience in utility hedging, Cascade has continued to evolve its hedging practices to develop a hedging plan that uses a data-driven approach, and provides the flexibility to manage both upside price risk and downside hedge loss risk.

Gelber has been working in close coordination with Cascade to design and implement processes and analytics to comply with the Washington Utility and Transportation Commission UG-132019 policy statement while simultaneously complying with Oregon Public Utility Commission UM-1286 PGA integrated hedging guidelines.

WUTC's Docket UG-132019 requires that hedging programs steer away from inflexible, programmatic practices employed previously to become more "risk responsive" and "data driven". WUTC requires an annual hedging plan submission that demonstrates risk responsive strategies in addition to retrospective hedge reporting. Gelber believes and Cascade concurs that the use of a diversified portfolio of hedging instruments including swaps, call options, and fixed-price physicals is the appropriate design criteria to satisfy Commission requirements.

An update on Cascade's work with Gelber on an evolving hedge program can be found in the Company's 2022 Annual Hedge Plan in Appendix E.

Portfolio Purchasing Strategy

As stated earlier, GSOC oversees the Company's gas supply purchasing strategy. The Company contracts physical supplies for up to three years. The Company's current gas procurement strategy is to secure physical gas supplies for approximately one-third of the core portfolio supply needs each year for the subsequent rolling three-year period. This method ensures some portion of the current market prices will affect a portion of the next three years of the portfolio.

GSOC determines the framework for the portfolio design including the allowable percentage of fixed-priced purchases. The execution of the portfolio and the hedging plan is accomplished primarily by the Manager of Gas Supply, under the leadership of the Director of Gas Control & Supply for the Western Region. Either the Manager or Director can execute purchases under the current plan; additionally, they may designate a backup within Gas Supply with the responsibility to execute trades in the event of their absence. The Manager of Upstream Resources and Special Projects functions as compliance manager regarding the WUTC's UG-132019 policy statement. These teams are overseen by the Director, Director of Gas Control & Supply for the Western Region.

Under this procurement strategy, approximately 5% to 12% of the annual portfolio is to be met with spot purchases. Spot purchases consist of either first of the month transactions, executed during bid week for the upcoming month, or day purchases which are utilized to meet incremental daily needs.

Once GSOC has approved the portfolio procurement strategy and design, the Company employs a variety of methods for securing the best possible transactions under existing market conditions. The Company employs a variety of methods for securing the best possible deal under existing market conditions. CNGC employs a number of processes when procuring fixed-price physical and indexed-riced spot physical. There is a separate process for financial derivatives as discussed throughout this annual hedge plan.

Physical Supply

CNGC utilizes TruMarx's COMET transaction bulletin board system to assist in communicating, tracking, and awarding most activities involving the Company's physical supply portfolio. In the procurement process for physical natural gas the Company posts an RFP to Cascade's 25+ physical supply parties to solicit offers on needed supply. The Company then collect bids from these parties over a period, depending on the number or time requirements of the packages sought, comparing the indicative pricing to each party as well as comparing the information to market intelligence available at the time. Ideally, after monitoring these indicatives and the

market, CNGC awards the posted packages. Please note that posting on COMET does not obligate CNGC to execute any proposal made by physical suppliers.

Naturally, price is the principal factor; however, CNGC also considers reliability, financial health, past performance, and the party's share of the overall portfolio as to ensure party diversity. It should be noted that there is always the possibility the lowest market price may be during period when the Company is initially gathering the price indicatives; in that situation there is a risk that a sudden price run-up may lead to filling the transaction at the higher end of the bids over time or delay the acquisition to another time. However, the reverse is also true—the initial price indicatives may start high and drop over time, allowing CNGC to capture the transaction on the downward swing. In the end, timing is always a factor as the market cannot be perfectly predicted. As discussed, beginning at page 4-7, compliance with applicable laws is a primary factor for RNG rather than price.

Occasionally, an operational situation may occur where time is of essence, such as a need to acquire spot gas to meet sudden swings in load demand or in response to an upstream pipeline operational event. In such situations, CNGC may make a short procurement purchase within a narrow time window to procure and schedule the supply. The Company contacts one to three reliable physical parties to meet these short-term supply needs. Again, price is the principle but not the only driver for the awarding of these supply needs. Also, please note the Company always encourages physical suppliers to propose other transactions or packages that they feel may be of interest in helping CNGC secure cost effective and operationally flexible transactions to meet CNGC's needs. In addition to analysis using Excel, CNGC also uses the PLEXOS® resource optimization model, which is a useful tool for examining logical, operationally, and financially feasible physical packages that best utilizes CNGC's various transportation, storage, and operational capabilities.

Financial Derivatives

For financial derivatives, CNGC contacts Company-approved financial counterparties ("counterparties") to request bids consistent with the GSOC approved hedge execution plan (HEP). Naturally, this process requires additional analysis regarding financial reasonableness, timing, hedging strategy, and volumes. The Monthly Guidance and CNG Book Model are the primary tools used to identify and analyze potential financial derivatives possibilities. Price comparisons may also become more complicated since pricing could be tiered; part of a structure deal may be tied to an index or contain floors, caps, etc. Bids are received from the counterparties and, similar to the physical portfolio, the Company then collect bids from these parties over a period, depending on the number or time requirements of the packages sought, comparing the indicative pricing to each party as well as applying the information from market intelligence available at the time. Furthermore, G&A uses MarketView and CNGC has limited access to ICE. Both deliver real-time market pricing information for hedging transactions. Ideally, after monitoring these indicatives and the market, CNGC will award the specific packages to individual parties. Again, please note that CNGC is not obligated to execute any offer received. Further information regarding Cascade's evolving hedge program can be found in the Company's 2024 Annual Hedge Plan in Appendix E.

Conclusion

Cascade's 20-year supply side resource goal is to continue to meet the energy needs of its core market customers and compliance requirements for emission reductions. This is accomplished through a package of services that combines adequate gas supplies, low carbon alternative fuels, and cost-effective winter peaking services with long-term pipeline transportation contracts and sufficient distribution system capacity at the lowest possible cost. The Company has identified several transport, storage, and other alternative resources which may be modeled to join the Company's existing demand and supply side resources to address the load demand needs over the planning horizon.

Chapter 5

Avoided Costs

Overview

The avoided cost is the estimated cost to serve the next unit of demand with a supply side resource option at a point in time. This incremental cost to serve represents the cost that could be avoided through energy efficiency. The avoided cost forecast can be used as a guideline for comparing energy efficiency with the cost of acquiring and transporting natural gas to meet demand.

This chapter presents Cascade's avoided cost forecast and explains how it was derived. While the IRP planning horizon is 25 years, avoided costs are forecasted for 45 years to account for the full measure life of some energy efficiency measures, such as insulation, which has a 30-year life. The avoided cost forecast is based on the performance of Cascade's resource portfolio under expected conditions.

Key Points

- Avoided cost forecasting serves as a primary input for determining energy efficiency targets.
- Cascade's avoided costs include fixed transportation costs, variable transportation costs, commodity costs, carbon compliance costs, distribution system costs, a risk premium, and a 10% adder.
- As per WUTC guidelines, Cascade is using the Social Cost of Carbon with a 2.5% discount rate as its base carbon compliance costs
- The total avoided cost ranges between $1.38and $2.54/therm over the 28-year planning horizon.

Costs Incorporated

The components that go into Cascade's avoided cost calculation are as follows:

$$AC_{nominal} = (TC_f + TC_v + SC_v + CC + E_{Comp} + DSC + RP) * E_{adder}$$

Where:

- $AC_{nominal}$ = The nominal avoided cost for a given year. To put this into real dollars apply the following: Avoided Cost/ (1+Discount Rate)^Years from the reference year.
- TC_f = Incremental Fixed Transportation Costs
- TC_v = Variable Transportation Costs
- SC_v = Variable Storage Costs
- CC = Commodity Costs
- E_{Comp} = Environmental Compliance Costs
- DSC = Distribution System Costs
- RP = Risk Premium

- E_{adder} = Environmental Adder, as recommended by the Northwest Power and Conservation Council

The following parameters are also used in the calculation of the avoided cost:

- The most recent load forecast (February 2024);
- The inflation rate used to scale the Social Cost of Carbon (SCC) from Real $2007 to Real $2024 uses the chain type price index for the Gross Domestic Product from the Bureau of Economic Analysis (BEA)[1]
- The discount rate of 6.09% (30-year fixed mortgage rate as of 8/15/2024).

Understanding Each Component

- **Incremental Fixed Transportation Costs**

  In the 2025 IRP, Cascade has not included any additional upstream capacity in its preferred portfolio for the 25-year planning horizon. If such a need were to be identified, fixed transportation costs would represent the average reservation rate of all incremental contracts that would be used to solve shortfalls. Importantly, in some cases, these costs are an estimate based on information from the pipeline companies, and furthermore, are treated as confidential as any incremental fixed transportation costs could ultimately be a negotiated rate.

- **Variable Transportation Costs**

  Variable transportation costs are the cost per therm that Cascade pays only if the Company moves gas along a pipeline. This rate is set by the various pipeline companies and can be changed if one of the pipeline companies files a rate case. The final rates filed at the conclusion of a rate case (whether reached through a settlement or a hearing) must be approved by the Federal Energy Regulatory Commission (FERC) for U.S. pipelines and the Canadian Energy Regulator (CER) for Canadian pipelines. To model rate changes in its forecast, Cascade multiplies its transportation costs by the CPI escalator every four years. Four years is a proxy, since rate cases may not be filed each year.

- **Storage Costs**

  Storage costs are the cost per therm that Cascade would pay for a storage contract that solved some or all of Cascade's peak day shortfalls. This

[1] *See* https://officeofbudget.od.nih.gov/gbiPriceIndexes.html

would include an on-system storage facility, or a satellite LNG facility connected to Cascade's distribution system. Cascade does not project a need for this resource in its 2025 IRP.

- **Commodity Costs**

  Commodity costs are the costs of acquiring one therm of gas. Cascade first uses PLEXOS® to calculate the monthly percentage of gas that the optimizer would purchase from each of the three basins to serve that climate zone. These weights are then used to derive a single price for the acquisition of that therm. The source for the price that is used for each month's calculation is the monthly price from each year of Cascade's 25-year price forecast.

- **Environmental Compliance Costs**

  Once the Company has calculated its average cost of gas, a price for expected carbon compliance costs must be added. Cascade converts the cost of carbon in dollars per metric ton to dollars per dekatherm, accounting for the upstream natural gas value chain emissions in this calculation. Further information about this calculation can be found in Chapter 6, Environmental Policy. Accurate modeling of these costs has been challenging in years past due to uncertainty surrounding how these costs will ultimately be quantified. For this IRP, Cascade will continue to follow the guidance outlined in Docket U-190730 by using the SCC with a 2.5% discount rate as its carbon compliance cost. Cascade will also follow the WUTC guidance for adjusting the values of the SCC from Real $2007 to Real $2024 by using GDP data published by the BEA. Cascade is also using the marginal abatement cost for emissions compliance in a given year, in addition to the SCC, as reflected by the cost of the next most expensive resource for emissions reduction (RNG, Hydrogen, projected allowance price in auction.)

  Cascade calculates the inflation adjusted SCC to start at $104.67/Metric Ton CO_2e in 2025, rising to $147.15/Metric Ton CO_2e in 2050. In Cascade's initial avoided cost calculation, these values were equivalent to $5.55/dth in 2025, rising to $7.81/dth in 2050. Overall, carbon compliance costs related to the SCC are a significant factor in Cascade's avoided cost calculation, accounting for as much as 40.25% of the total system avoided cost in a given year.

- **Environmental Adder**

  Cascade includes a 10% adder for non-quantifiable environmental benefits as recommended by the Northwest Power and Conservation Council. As a result of conversations with various stakeholders during the 2023 IRP process, Cascade modified its methodology for applying the 10% adder. In the Company's 2025 IRP the adder will be applied to all elements of the avoided cost. For reference, this adder was only applied to the Commodity and Environmental Compliance Costs in prior IRPs.

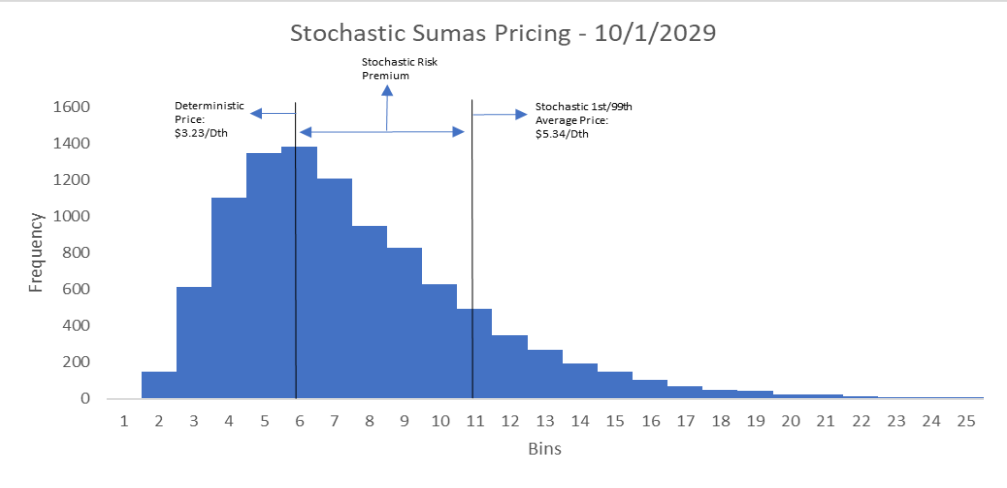
- **Distribution System Costs**

  Distribution system costs capture the costs of sending gas from the citygate to Cascade's customers. During the 2023 IRP, Cascade moved away from defining these costs as a function of margin and towards a capacity deferral valuation calculation. It is important to recognize that while energy efficiency may not be able to fully eliminate the need for a distribution system enhancement, it can defer the need for these enhancements to a later year. Because of the economic principle of the time value of money, this deferral has value, and that value is the avoided distribution system cost for the 2025 IRP. To calculate these costs, the Company projects what investments it may need to make related to growth of the distribution system and divides that by the projected peak day load growth from Cascade's load forecast. Cascade generally calculates distribution system costs for both peak day and peak hour, as distribution system analysis is most concerned about system capabilities during a peak hour scenario. Cascade's reference case does not anticipate growth, therefore, does not include distribution system costs in the avoided cost.

- **Risk Premium**

  Cascade defines risk premium as the difference between the impacts of a potential extreme upward price movement versus that of an extreme downward price movement. Due to the lognormal nature of gas prices, the risk presented from rising prices will typically exceed that of falling prices. This is presented visually in Figure 5-1, which shows the frequency of Sumas pricing over 10,000 stochastic draws for a given month. By identifying the average of the 1st and 99th percentile of these draws, and comparing that to the deterministic or expected pricing, the Company can identify a Stochastic Risk Premium.

Figure 5-1: Stochastic Sumas Pricing 10/1/2029



The Stochastic Risk Premium is then entered into the company's Risk-Adjusted Risk Premium Final Calculation, which is defined as:

Deterministic Price * .75 + (((99th Percentile Stochastic Price + 1st Percentile Stochastic Price) /2) * .25)) - Deterministic Price

The result of this calculation is the Company's risk premium input to its avoided cost calculation.

Application

The 2025 IRP makes several enhancements in calculating and applying the avoided costs, specifically related to enhancements of the environmental compliance cost calculation methodology. This cost metric becomes the foundation for prudency determinations regarding energy efficiency, both operationally and from a resource planning perspective. It may be helpful to think of the final avoided cost figure as something of a cutoff point. Any action that would save a therm of gas could be evaluated based on the cost per therm saved of that measure. If that number is lower than the avoided cost, it may make sense to implement that measure. If not, such a measure may not be optimal to engage in.

Avoided Cost Sensitivity Analysis

The 2025 IRP incorporates emissions reduction goals related to the Climate Commitment Act in Washington and the Climate Protection Program in Oregon. To mitigate risks from the uncertainty around these regulations, the Company is

performing scenario analyses around customer growth that may impact Cascade's compliance options. The Company is evaluating the amount of energy efficiency that Cascade can acquire under a low and high growth scenario. The impact of this sensitivity adjustment can be found in Appendix H.

Results

Figure 5-2 displays a comparison of the average nominal avoided cost over the planning horizon for the current and past IRPs. Figure 5-3 displays the total avoided cost by each conservation zone over the 25-year IRP horizon, while Figure 5-4 provides the net present value of avoided costs over the planning period. Conservation Zone 1 covers the west side of Cascade's service territory, with load centers such as Bellingham, Stanwood, and the Sedro/Wooley area. Conservation Zone 2 refers to the central Washington service area, with load centers such as Bremerton, Longview, and Castle Rock. Conservation Zone 3 covers the eastern Washington service area, including Yakima, Walla Walla, and the Tri Cities. Finally, Zone 4 refers to Oregon citygates. A map of the Conservation Zones can be found in Figure 12-14 in Chapter 12, Glossary and Maps. For the 2025 IRP, nominal system avoided costs range between $1.38/therm and $2.54/therm, with the average avoided cost of $1.99/therm.

As mentioned earlier, the avoided cost is based on the performance of the portfolio under expected conditions for the entire 25-year planning horizon. Overall, avoided costs for the 2025 IRP are higher than in the 2023 IRP. The main driver of this would be the increase in the commodity cost as well as the addition of the SCC. The 45-year avoided costs and other detailed tables of avoided costs are found in the Excel version of Appendix H.

Figure 5-2: Avoided Cost Comparison to Previous IRPs

	2012 IRP	2014 IRP	2016 IRP	2018 IRP	2020 IRP	2023 IRP	2025 IRP
Nominal $/Therm	$0.810	$0.528	$0.610	$0.673	$0.936	$1.779	$1.379

Figure 5-3: Nominal Avoided Costs by Zone (Cost per Therm)

Nominal Avoided Cost (By Zone) - $/Therm							
	Zone 1	Zone 2	Zone 3	Zone 4	Oregon	Washington	System
2025	$ 1.379	$ 1.379	$ 1.379	$ 1.379	$ 1.379	$ 1.379	$ 1.379
2026	$ 1.468	$ 1.468	$ 1.468	$ 1.468	$ 1.468	$ 1.468	$ 1.468
2027	$ 1.586	$ 1.586	$ 1.586	$ 1.586	$ 1.586	$ 1.586	$ 1.586
2028	$ 1.668	$ 1.668	$ 1.668	$ 1.668	$ 1.668	$ 1.668	$ 1.668
2029	$ 1.720	$ 1.720	$ 1.720	$ 1.720	$ 1.720	$ 1.720	$ 1.720
2030	$ 1.669	$ 1.669	$ 1.669	$ 1.669	$ 1.669	$ 1.669	$ 1.669
2031	$ 1.852	$ 1.852	$ 1.852	$ 1.852	$ 1.852	$ 1.852	$ 1.852
2032	$ 1.947	$ 1.947	$ 1.947	$ 1.947	$ 1.947	$ 1.947	$ 1.947
2033	$ 2.029	$ 2.029	$ 2.029	$ 2.029	$ 2.029	$ 2.029	$ 2.029
2034	$ 2.107	$ 2.107	$ 2.107	$ 2.107	$ 2.107	$ 2.107	$ 2.107
2035	$ 2.183	$ 2.183	$ 2.183	$ 2.183	$ 2.183	$ 2.183	$ 2.183
2036	$ 1.950	$ 1.950	$ 1.950	$ 1.950	$ 1.950	$ 1.950	$ 1.950
2037	$ 1.866	$ 1.866	$ 1.866	$ 1.866	$ 1.866	$ 1.866	$ 1.866
2038	$ 1.934	$ 1.934	$ 1.934	$ 1.934	$ 1.934	$ 1.934	$ 1.934
2039	$ 2.018	$ 2.018	$ 2.018	$ 2.018	$ 2.018	$ 2.018	$ 2.018
2040	$ 2.066	$ 2.066	$ 2.066	$ 2.066	$ 2.066	$ 2.066	$ 2.066
2041	$ 2.061	$ 2.061	$ 2.061	$ 2.061	$ 2.061	$ 2.061	$ 2.061
2042	$ 1.974	$ 1.974	$ 1.974	$ 1.974	$ 1.974	$ 1.974	$ 1.974
2043	$ 2.032	$ 2.032	$ 2.032	$ 2.032	$ 2.032	$ 2.032	$ 2.032
2044	$ 2.119	$ 2.119	$ 2.119	$ 2.119	$ 2.119	$ 2.119	$ 2.119
2045	$ 2.183	$ 2.183	$ 2.183	$ 2.183	$ 2.183	$ 2.183	$ 2.183
2046	$ 2.248	$ 2.248	$ 2.248	$ 2.248	$ 2.248	$ 2.248	$ 2.248
2047	$ 2.316	$ 2.316	$ 2.316	$ 2.316	$ 2.316	$ 2.316	$ 2.316
2048	$ 2.387	$ 2.387	$ 2.387	$ 2.387	$ 2.387	$ 2.387	$ 2.387
2049	$ 2.461	$ 2.461	$ 2.461	$ 2.461	$ 2.461	$ 2.461	$ 2.461
2050	$ 2.539	$ 2.539	$ 2.539	$ 2.539	$ 2.539	$ 2.539	$ 2.539

Figure 5-4: Real $2021 Avoided Costs by Zone (Cost per Therm)

Real 2021$ Avoided Cost (By Zone)							
	Zone 1	Zone 2	Zone 3	Zone 4	Oregon	Washington	System
2025	$ 1.379	$ 1.379	$ 1.379	$ 1.379	$ 1.379	$ 1.379	$ 1.379
2026	$ 1.383	$ 1.383	$ 1.383	$ 1.383	$ 1.383	$ 1.383	$ 1.383
2027	$ 1.409	$ 1.409	$ 1.409	$ 1.409	$ 1.409	$ 1.409	$ 1.409
2028	$ 1.397	$ 1.397	$ 1.397	$ 1.397	$ 1.397	$ 1.397	$ 1.397
2029	$ 1.358	$ 1.358	$ 1.358	$ 1.358	$ 1.358	$ 1.358	$ 1.358
2030	$ 1.242	$ 1.242	$ 1.242	$ 1.242	$ 1.242	$ 1.242	$ 1.242
2031	$ 1.299	$ 1.299	$ 1.299	$ 1.299	$ 1.299	$ 1.299	$ 1.299
2032	$ 1.288	$ 1.288	$ 1.288	$ 1.288	$ 1.288	$ 1.288	$ 1.288
2033	$ 1.264	$ 1.264	$ 1.264	$ 1.264	$ 1.264	$ 1.264	$ 1.264
2034	$ 1.238	$ 1.238	$ 1.238	$ 1.238	$ 1.238	$ 1.238	$ 1.238
2035	$ 1.209	$ 1.209	$ 1.209	$ 1.209	$ 1.209	$ 1.209	$ 1.209
2036	$ 1.018	$ 1.018	$ 1.018	$ 1.018	$ 1.018	$ 1.018	$ 1.018
2037	$ 0.918	$ 0.918	$ 0.918	$ 0.918	$ 0.918	$ 0.918	$ 0.918
2038	$ 0.897	$ 0.897	$ 0.897	$ 0.897	$ 0.897	$ 0.897	$ 0.897
2039	$ 0.882	$ 0.882	$ 0.882	$ 0.882	$ 0.882	$ 0.882	$ 0.882
2040	$ 0.851	$ 0.851	$ 0.851	$ 0.851	$ 0.851	$ 0.851	$ 0.851
2041	$ 0.800	$ 0.800	$ 0.800	$ 0.800	$ 0.800	$ 0.800	$ 0.800
2042	$ 0.723	$ 0.723	$ 0.723	$ 0.723	$ 0.723	$ 0.723	$ 0.723
2043	$ 0.701	$ 0.701	$ 0.701	$ 0.701	$ 0.701	$ 0.701	$ 0.701
2044	$ 0.689	$ 0.689	$ 0.689	$ 0.689	$ 0.689	$ 0.689	$ 0.689
2045	$ 0.669	$ 0.669	$ 0.669	$ 0.669	$ 0.669	$ 0.669	$ 0.669
2046	$ 0.650	$ 0.650	$ 0.650	$ 0.650	$ 0.650	$ 0.650	$ 0.650
2047	$ 0.631	$ 0.631	$ 0.631	$ 0.631	$ 0.631	$ 0.631	$ 0.631
2048	$ 0.613	$ 0.613	$ 0.613	$ 0.613	$ 0.613	$ 0.613	$ 0.613
2049	$ 0.596	$ 0.596	$ 0.596	$ 0.596	$ 0.596	$ 0.596	$ 0.596
2050	$ 0.579	$ 0.579	$ 0.579	$ 0.579	$ 0.579	$ 0.579	$ 0.579

Chapter 6

Environmental Policy

Purpose

This chapter considers Greenhouse Gas (GHG) emission reduction policies and regulations that impact, or have the potential to impact, natural gas distribution companies and Cascade's methodologies for applying the cost of carbon to natural gas distribution. This discussion also includes the assumptions made in determining a 45-year avoided cost of natural gas and pairs these costs with associated two-year action items.

Key Points

- State agencies have issued GHG emission reduction regulations that are considered in the 2025 IRP.
- On July 21, 2021, the Washington legislature passed the Climate Commitment Act directing the Department of Ecology (Ecology) to develop and enforce a rule for implementing a GHG cap and trade program. Ecology released the final Climate Commitment Act rule on September 29, 2022, and plans linkage with California and Quebec in future.
- Cascade models carbon compliance costs as the SCC with a 2.5% discount rate, updated to real $2024 and per Washington Climate Commitment Act requirements.
- On March 20, 2020, Oregon Governor Brown issued EO 20-04 directing state agencies to reduce GHG emission under their existing authority. The Oregon Court of Appeals invalidated the rule and DEQ reestablished the Climate Protection Program on November 21, 2024.
- Washington state building code revisions effective July 1, 2023, limit natural gas use for space and water heating in new and retrofitted commercial and residential.
- Cascade continues to monitor and engage in state, local, and federal regulatory and legislative actions.

Policymakers in Washington passed the Climate Commitment Act (CCA) in July 2021, giving the Department of Ecology (Ecology) authority to regulate GHG emissions from natural gas distribution utilities, including customer emissions. Also, two initiatives were on the November 5, 2024, Washington state ballot. Ballot initiative 2117, which would have repealed the CCA, did not pass, while ballot initiative 2066 did pass. Initiative 2066 prohibits state and local governments from restricting access to natural gas and is anticipated to have impacts on building code adoption and other state actions affecting natural gas use limitations.

In Oregon, Governor Brown issued an executive order in 2020 directing state agencies to pursue GHG emission reductions under their authority, which included the Department of Environmental Quality (DEQ) issuing the Climate Protection Program (CPP) rule in late 2021 which established a cap on GHG emissions for certain sectors, including natural gas distribution customers, and required significant reductions between 2022 and 2050. In December 2023, the CPP was invalidated by the Oregon Court of Appeals. DEQ revised and reestablished the CPP with the Environmental Quality Council's unanimous approval of the revised CPP rule on November 21, 2024. The rule is effective January 1, 2025, requiring significant emission reductions from the original CPP rule 2017-2019 average emissions baseline of 50% reduction by 2035 and 90%

by 2050. In Spring 2024, the Environmental Protection Agency (EPA) released a revised GHG emissions standard rule for electric generating units that requires carbon dioxide pollution controls on new natural gas-fired combustion units and existing coal-fired units.

Federal legislation has also passed, which incentivizes development of lower or zero-carbon energy resources. As President Trump takes office on January 20, 2025, it is anticipated many of President Biden's regulations and policy enactments will be amended and potentially rolled back entirely in some cases. Cascade will evaluate impacts from policy changes in the new administration when they are implemented.

Company Environmental Policy

Cascade's policy states:

"The Company will operate efficiently to meet the needs of the present without compromising the ability of future generations to meet their own needs. The environmental goals are:

> *To minimize waste and maximize resources;*
> *To be a good steward of the environment while providing high quality and reasonably priced products and services; and*
> *To comply with or surpass all applicable environmental laws, regulations and permit requirements."*

Cascade is committed to maintaining compliance with all laws and regulations and strives to operate in a sustainable manner, while taking into consideration the cost to customers. Cascade actively engages in public proceedings related to federal and state legislative and regulatory activities. This includes offering comments and suggested improvements on environmental policy, including air emissions and other environmental requirements. The Company has also established memberships in relevant trade organizations to assist in monitoring the potential impact of proposed legislation and regulation on the Company's operations. Cascade's goal is to ensure safe, affordable, reliable energy for Cascade's customers while serving as stewards of the Company's natural resources, balancing our commitment to economic, environmental, and social considerations to ensure our operations continue to provide essential products and services for our customers.

Overview

Cascade monitors environmental regulatory requirements that are in progress at the national, regional, and local levels that impact natural gas distribution companies. As of November 21, 2022, there are no regulations at the federal level that would require the Company to reduce GHG emissions. However, the Climate Commitment Act (CCA) rule was finalized in Washington on September 29, 2022, which require GHG emissions reductions from natural gas distribution companies' customers use of natural gas as well as Cascade's distribution infrastructure and operations GHG emissions. On November 21, 2024, Oregon re-instated the Climate Protection Program (CPP), which is effective January 1, 2025. The CPP requires GHG emissions reductions from natural gas distribution companies' customers use of natural gas. Cascade's compliance plan for these rules is modeled within this IRP.

There have been no congressional bills or federal agencies proposing direct GHG reductions that would significantly impact natural gas distribution. Rather, on a federal level, most programs established provide platforms to encourage the natural gas distribution segment to make voluntary commitments in reducing GHG emissions. One of the voluntary platforms is EPA's Natural Gas Star Methane Challenge Program. The Methane Challenge Program[1] was established by the EPA with Cascade participating as a founding partner of the program in March 2016 along with about 50 other oil and natural gas companies. Partners in the program demonstrate their commitment and concern for the environment through voluntary methane emissions reductions. With the EPA amending Subpart W which has expanded emissions reporting requirements and the passage of the Inflation Reduction Act (IRA), the EPA plans to end the Methane Challenge Program in 2024. Under the IRA, the Methane Emissions Reduction Program[2] (MERP) was created to help reduce oil and gas sector GHG emissions by providing financial and technical assistance through funding opportunities. Cascade has been monitoring opportunities for grants under MERP and has not yet identified viable opportunities applicable to our operations.

At the suggestion of WUTC in past IRPs, and as outlined in Docket U-190730, Cascade is using the Social Cost of Carbon (SCC) with a 2.5% discount rate in avoided cost modeling and as the main CO_2 adder in sensitivity modeling. This discount rate was established by the Interagency Working Group (IWG) on Social Cost of Greenhouse Gases to model societal costs of GHG emissions resulting from customers' combustion of natural gas. Agencies, such as the EPA, have used the SCC in determining the cost of climate impacts from rulemaking.

[1] Methane Challenge Partnership (2016 – 2024) | US EPA
[2] Methane Emissions Reduction Program | US EPA

Cascade has been involved in state-focused evaluation of renewable natural gas (RNG) opportunities in Washington, Oregon, and regionally. Cascade also monitors federal and regional RNG policy development through the Company's membership in trade organizations. Cascade provides further discussion of RNG projects and additional RNG procurement opportunities in Chapter 4, as this energy resource is important to consider for Oregon and Washington GHG emissions compliance and community interest in reducing GHG emissions.

There are community-driven efforts to achieve GHG emission reduction targets within, and adjacent to, Cascade's service areas. On February 7, 2022, the Bellingham City Council passed an ordinance requiring electric space and water heating equipment for new commercial and large (4-plus story) multifamily buildings. The electric-only mandate for space and water heating does not apply to single family construction, detached houses, duplexes, townhomes or row houses. The ordinance took effect on August 7, 2022. Cascade continues to engage both internally and externally on pathways to reduce GHG emissions and support the environmental priorities of the City and other communities we serve. This includes potential consideration of networked geothermal pilot efforts following the passage of the HB 2131, the Thermal Energy Network (TENs) bill in Washington.

Additional efforts in Oregon have included a pilot energy assessment for Cascade's transportation customers in the Bend region, which is ongoing and offers pathways for further GHG reductions which were shared with participants. Cascade will continue engaging with our local communities to support GHG emission reduction targets and goals while supporting the triple bottom line of economics, equity, and sustainability.

Cascade ensures policies and regulatory activities like those mentioned above are taken into consideration when determining GHG emissions compliance or carbon costs for the IRP analyses. The Company considers both proposed and final regulations and legislation in this process. The following subsections provide discussion of the policy and regulatory developments that have been most informative in evaluating carbon impacts on Cascade's operations and customers. Cascade also includes discussion on the Company's GHG emissions, and actions and commitments the Company has taken to reduce GHG emissions.

Federal Regulation and Policy

As President Trump takes office on January 20, 2025, it is anticipated many of President Biden's regulations and policy enactments will be amended and potentially rolled back entirely in some cases. Cascade will evaluate impacts from

policy changes in the new administration when they are implemented.

1. Congressional Actions

Cascade monitors congressional actions on clean energy and decarbonization matters and discusses them below.

a. Infrastructure, Investment and Jobs Act

President Biden signed the Infrastructure, Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law (BIL), into law in November 2021. The law provides infrastructure funding opportunities, including direction to EPA in making investments in communities to improve water quality, promote cleanup of contaminated sites and recycling and waste management of batteries, decarbonizing school buses, and overall pollution prevention. Also, per the IIJA, DOE has launched a notice of intent for funding opportunities for Clean Energy Programs, including demonstration of regional clean hydrogen hubs. The IIJA hydrogen programs work in combination with the Hydrogen Energy Earthshot (Hydrogen Shot) which DOE launched in June 2021 which aims to accelerate a breakthrough in hydrogen as an abundant, affordable, and reliable clean energy solution and reduce the cost of clean hydrogen by 80% to $1 per 1 kilogram of hydrogen in 1 decade ("1 1 1").

In addition, and in consideration of the Hydrogen Shot, IIJA and the Inflation Reduction Act (IRA), DOE posted a draft National Clean Hydrogen Strategy and Roadmap in September 2022. The draft roadmap proposes a clean hydrogen strategy and roadmap focusing on a goal of achieving use of 10 million metric tons of clean hydrogen annually by 2030, 20 million metric tons annually by 2040, and 50 million metric tons annually by 2050. By 2050, DOE projects this hydrogen implementation would reduce US GHG emissions by 10% relative to 2005 levels, with a focus on developing cost-effective hydrogen for specific sectors having limited decarbonization alternatives, such as industrial facilities. Three key strategies noted by DOE for clean hydrogen include targeting strategic high impact uses, focusing on regional networks (hydrogen hubs), and reducing its cost.

Most of the funding opportunities in the IIJA are directed to communities and do not appear to be directly available to utilities. However, there may be opportunities for utilities to participate or partner with other organizations regarding low carbon fuels and tax credits. Cascade has been engaging with its trade organizations and other LDCs to

understand the opportunities. We are engaged with Northwest Energy Efficiency Alliance (NEEA) as it monitors federal programs and identifies these opportunities. Cascade will continue to monitor these decarbonization programs through media alerts or government outreach for opportunities where the Company can best participate and/or provide support.

b. Inflation Reduction Act of 2022

The Inflation Reduction Act (IRA) was signed into law by President Biden on August 16, 2022. The law aims to address inflation through a number of measures including investment in domestic energy production and clean energy infrastructure for decarbonizing the economy. The law includes a waste emissions charge (WEC). The WEC applies fees to methane releases for certain oil and gas facilities that emit beyond 25,000 metric tons of carbon dioxide equivalent (CO_2e) annually and incentivizes investments in reducing methane leaks from oil and gas infrastructure. These requirements do not apply to distribution systems. As WEC fees go into effect starting in 2024, the cost of natural gas could increase as the upstream segments begin to pay their fees.

The IRA also incentivizes RNG development projects which could benefit Cascade and customers. The company has assessed opportunities for Section 48 tax credits for renewable natural gas (RNG). Cascade is pursuing a landfill gas RNG project at the Deschutes County Knott Landfill near Bend, Oregon. CNGC is working with a consultant to assist in ensuring the landfill project qualifies for IRA Section 48 tax credits. Cascade will continue to evaluate the IRA for potential opportunities in developing RNG projects, as well as other elements that may impact natural gas distribution.

2. Federal Agency Actions

Cascade monitors federal agency actions on clean energy and decarbonization matters and describes them below.

a. Loper Bright Decision

On June 28, 2024, the Supreme Court issued a 6-3 decision in *Loper Bright Enterprises v. Raimondo* in which the Court overruled the two-step Agency deference doctrine from *Chevron v. NRDC* as incompatible with the Administrative Procedure Act (APA). The majority's opinion focuses largely on the applicability of *Chevron*

deference, the "two step" doctrine that afforded deference to agencies' interpretations of their authority as established by their governing statutes. The decision may have significant consequences for current and future rulemaking across all federal agencies, including clean energy and decarbonization. Cascade will continue to keep apprised of potential impacts that may result from this decision.

b. US Department of Energy

The Department of Energy (DOE) establishes energy efficiency standards for many products used in residential, commercial, and industrial buildings and applications. The DOE is also required to review and update these standards periodically. The DOE considers in its rulemaking what is technically feasible and economically justified. In 2022, the DOE began holding public meetings to gain input from stakeholders on rulemaking for commercial water heating equipment energy conservation standards. Cascade reviewed these standards and shared information with potentially impacted internal departments such as Energy Efficiency, since incentives offered by Cascade do include condensing model furnaces which would be mandated under the new standards. On September 19, 2024, the U.S. Court of Appeals for the District of Columbia Circuit issued an order setting American Gas Association v. U.S. Department of Energy, for oral argument on November 21, 2024. This case involves the AGA challenge of three DOE final rules. These rules include:

1. Energy Conservation Standards for Residential Furnaces and Commercial Water Heaters, Notification of Final Interpretive Rule, 86 Fed. Reg. 73,947 (Dec. 29, 2021);
2. Energy Conservation Standards for Commercial Water Heating Equipment, 88 Fed. Reg. 69,686 (Oct. 6, 2023); and
3. Energy Conservation Standards for Consumer Furnaces, 88 Fed. Reg. 87,502 (Dec. 18, 2023).

AGA states these rules “will result in the unavailability of noncondensing gas-fired appliances” in violation of the federal Energy Policy and Conservation Act, which AGA states “expressly prohibits efficiency standards that will eliminate product classes that consumers rely on for their ‘performance characteristics.’” AGA claimed DOE committed procedural violations in communicating the Consumer Furnaces rule. The DOE responded that they properly followed procedure requirements, and the rules improve appliance

efficiency without compromising performance characteristics. A decision on this case could come in spring or summer of 2025.

c. Environmental Protection Agency

i. EPA Subpart W Oil and Gas Sector Emissions Reporting Amendments

On May 14, 2024, the Environmental Protection Agency (EPA) released the finalized updates to 40 CFR Part 98 Subpart W (Petroleum and Natural Gas Systems) GHG emissions reporting. These include updated emission factors for determining methane emissions from distribution mains and services, leaking components surveyed at transmission-distribution transfer stations, and below ground meter-regulating stations. The rule also requires reporting of additional emissions sources, including blowdowns, pneumatic devices, and other large release events. Other large release events are defined as release events that emit methane at any point in time at a rate of 100 kg/hr and are not fully accounted for using existing Subpart W methodology. Cascade is integrating the new requirements into its current procedures and GHG Monitoring Plan.

ii. EPA Electric Generating Unit GHG 111(b) and 111(d) New Source Performance Standards Amendments

On June 30, 2022, the U.S. Supreme Court issued an opinion in West Virginia v. EPA, regarding the scope of the EPA's authority under section 111(d) of the CAA for regulating EGUs. The Court did not call into question the EPA's authority to regulate GHGs under the CAA. The Court concluded that the EPA could not regulate under that section in a way that would force the power grid to shift from one type of generation to another. The Court also brought the "major questions doctrine" into the discussion, by observing that the Constitution does not authorize agencies to use regulations as substitutes for laws passed by Congress.

The EPA held stakeholder meetings and a non-rulemaking docket in 2022 to solicit input on amending the rule. The EPA proposed a revised rule on May 23, 2023, and published the final New Source Performance Standards for GHG Emissions from New, Modified, and Reconstructed Fossil Fuel-Fired

EGUs; Emission Guidelines for GHG Emissions from Existing Fossil Fuel-Fired EGUs; and Repeal of the Affordable Clean Energy Rule in the Federal Register on May 9, 2024. The new requirements became effective on July 8, 2024. The rule requires carbon capture and sequestration technology installation by January 1, 2032, at existing coal-fired units to operate beyond January 1, 2039. The rule did not address standards for existing natural gas-fired units. New natural gas-fired electric generating units permitted for construction after July 8, 2024, and allowed to operate at annual capacity factors above 40% must install carbon capture and sequestration controls by January 1, 2032. Industry has issued legal challenges and requested stays of the rule at the District of Columbia Circuit Court of Appeals (DC Circuit) and Supreme Court of the United States. Both courts denied rule stays. Oral argument is scheduled at the DC Circuit on December 6, 2024.

On March 25, 2024, the EPA opened a non-regulatory docket and issued framing questions to gather input on regulating GHG emissions from the entire fleet of existing gas combustion turbines in the power sector under Clean Air Act Section 111(d). The non-regulatory docket was open for public comment for 60 days and closed on May 28, 2024.The EPA plans to re-propose emission guidelines for existing natural gas-fired units in the near future.

d. Securities and Exchange Commission GHG and Climate-related Risk Disclosure Rulemaking

On March 6, 2024, the Securities and Exchange Commission (SEC) adopted the GHG and Climate-Related Risk Disclosure rules. The Climate-Related Risk Disclosure rule is applicable to Cascade through Cascade's parent company MDU Resources Group, Inc.

This rule requires publicly traded companies to disclose company climate-related risks, including actual and potential material impacts of these climate-related risks and if these material impacts have been integrated into their business model or strategy. The rule also requires disclosure of a company's GHG reduction targets or goals, as well as how the company intends to meet these goals, a plan for tracking progress, and what progress has been made. It also requires companies to report their material Scope 1 and 2 GHG emissions. Attestation will be required for reported Scope 1 and 2

emissions. Scope 3 emissions are not required to be reported, nor does the SEC prescribe use of a specific calculation methodology.

On April 4, 2024, the SEC issued an order staying these requirements to allow for a judicial resolution of legal challenges. Cascade will continue monitoring the outcome of this process and whether implementation of the rule would change with President Trump taking office in 2025.

3. Social Cost of Carbon

The Social Cost of Carbon (SCC) is estimated using different discount rates to develop a range of costs in dollars per ton of CO_2 that would represent the avoided cost of long-term damage from climate change caused by a ton of CO_2 emitted in a given year. Agencies, such as the EPA, have used the SCC in determining the cost of climate impacts within rulemakings. Other agencies, such as FERC, continue to consider whether and/or how to incorporate the SCC into their permitting and rulemaking processes.

At the suggestion of WUTC Staff and in consideration of the 2019 Clean Buildings legislation HB 1257 adding further instruction within RCW 80.28 on conducting avoided cost calculations, Cascade has modeled societal costs of CO_2 emissions resulting from customers' combustion of natural gas in the past IRPs using the SCC with a 2.5% discount rate that was established by the U.S. Governmental Interagency Working Group (IWG) on Social Cost of Greenhouse Gases. In this IRP Cascade continues to apply the SCC with a 2.5% discount rate from the IWG's August 2016 SCC report, but now updated to real $2024, as the carbon compliance adder in modeling impacts of a potential price that could be placed on CO_2 emissions from customers' usage of natural gas.

State Regulation and Policy

New and revised environmental regulations and policies have been enacted in Washington and Oregon. The purpose of these policies and rules is to address GHG emissions resulting from the use of fossil fuels. Some of these regulations result in increases to Cascade operating costs and reduce the sale and usage of conventional natural gas.

1. Washington

In July 2021, the Washington legislature passed the Climate Commitment Act (CCA), codified at Chapter 70A.65 RCW. The CCA provides the Department of Ecology (Ecology) the authority to regulate GHG emissions from natural gas distribution companies, of which Ecology's former Clean Air Rule (CAR) could not. The CCA gives direction to Ecology to implement a cap on greenhouse gas emissions from covered entities and a program to track, verify, and enforce compliance through the purchase of auction allowances and other compliance instruments.

The majority of the CCA's requirements are promulgated within Ecology's WAC 173-446 rulemaking, establishing a program to cap greenhouse gas emissions and implement an allowance trading market. Ecology also completed WAC 173-446A rulemaking which establishes criteria to identify emissions-intensive, trade-exposed (EITE) industries for allowance allocation purposes and amended WAC 173-441, the emissions reporting rule associated with determining WAC 173-446 compliance obligations. Cascade summarizes requirements on the main WAC 173-446 rulemaking below and Ecology's progress with linking the program with California and Quebec cap and trade programs.

A few other important actions in Washington include State Building Code Council building code revisions impacting natural gas usage, status of the UTC study examining natural gas utility decarbonization pathways per SB 5092, and Ecology's amended schedule for the GHG Assessment for Projects (GAP) rulemaking. Cascade provides some brief discussion of these state actions further below.

a. Washington Climate Commitment Act WAC 173-446 (CCA)

On September 29, 2022, the Washington Department of Ecology released a final Climate Commitment Act (CCA) rule, WAC 173-446, a Washington state GHG emissions cap and trade rule. The rule became effective on October 30, 2022, and the emissions cap applies to 2023 emissions and onward.

The rule regulates most GHG emissions, including carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) from covered entities emitting 25,000 metric tons or more of CO_2e per year. Covered entities include large stationary emission sources (e.g. manufacturing and industrial facilities), petroleum fuel suppliers, natural gas suppliers, suppliers of carbon dioxide, and electric utilities.

The emissions cap, or emissions allowance budget, is based on an average of 2015-2019 baseline emissions levels and declines over time to meet rule targets of 45% below 1990 levels by 2030 and 95% below 1990 levels by 2050. Natural gas suppliers are regulated for the GHG emissions in Washington associated with a company's aggregated customers' combustion or oxidation of natural gas where customers report less than 25,000 metric tons CO_2e to Ecology and are not covered entities themselves. For Cascade, regulated customer emissions are predominantly from core customers but also include some non-core (transport) customer emissions from facilities that do not emit 25,000 metric tons of CO_2e per year. Cascade's baseline customer emissions were about 1.8 million metric tons of CO_2e. Cascade's operational combustion and methane leakage emissions (e.g. Mt. Vernon compressor station combustion emissions and pipeline infrastructure) are also regulated under the CCA as those emissions have been reported at slightly higher than 25,000 CO_2e per year.

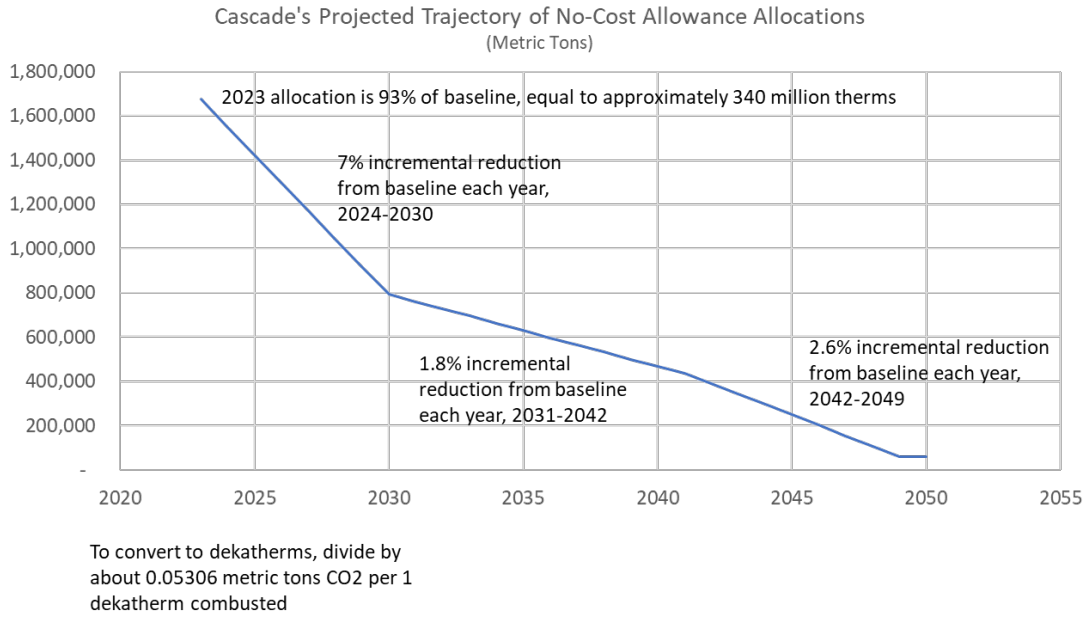
Excluded emissions for natural gas distribution companies include emissions from larger industrial customers who are covered entities themselves, customers who choose to opt-in to Ecology's program, customers who qualify under Ecology requirements as an Emissions Intensive Trade Exposed industry, or military facilities that fall under the national security NAICS code 928110. Other excluded emissions are CO_2 from the combustion of biomethane or RNG purchased for natural gas customers.

Compliance can be demonstrated through a combination of methods, such as purchasing and retiring emissions allowances and carbon offsets. Allowances can be banked indefinitely and used for future years of compliance. Discussion of allowance purchases in the IRP is for informational purposes and not meant to be indictive of Cascade's purchase strategy but rather a presentation of compliance options that are available. Emission reductions can also be achieved by replacing a portion of conventional natural gas supply with RNG and hydrogen in the future, and through implementing energy efficiency and conservation programs. Cascade provides charts and additional discussion of the compliance instruments and proposed compliance pathways modeled in Chapter 9, Resource Integration.

Ecology will distribute an amount of no-cost allowances to natural gas utilities that decline over time with the CCA program allowance budget cap. Cascade's no-cost allowances in 2023 were equivalent to 93% of the company's baseline of 2015-2019 average emissions

of about 1.8 million metric tons of CO_2e. The no-cost allowances decline annually by 7% of Cascade's baseline, incrementally each year from 2024 to 2030, 1.8% annually from 2031 to 2042, and 2.6% annually from 2043 to 2049. Cascade's projected no-cost allowance distributions over time are shown in Figure 6-1.

Figure 6-1: Cascade's Projected Trajectory of No-Cost Allowance Allocations



Each year, Ecology will distribute no-cost allowances by October 24th of the prior year. For example, 2025 no-cost allowances were distributed by October 24, 2024.

Full compliance demonstrations must be made by November 1st of the year following each four-year compliance period, with the first period from 2023 to 2026. Therefore, the first full compliance period deadline is November 1, 2027. There are also compliance demonstrations within the four-year compliance period required by November 1st annually, where covered entities must demonstrate compliance with 30% of the prior years' emissions compliance obligation. For example, the first annual compliance demonstration was November 1, 2024, to comply with 30% of the 2023 compliance obligation.

Ecology joined the Western Climate Initiative (WCI) in late 2021 and is utilizing WCI's allowance auction platform to administer the

allowance auctions and manage covered entity and auction participant holding and compliance accounts, as well as the limited use accounts for electric and natural gas utilities to receive no-cost allowance allocations. WCI's system is referred to as the Compliance Instrument and Tracking System Services (CITSS). Covered entity account representatives are required to register in CITSS and establish accounts for receipt of allowance allocations and potential auction participation. Cascade has registered account representatives within CITSS.

Covered entities will be assigned a holding account where purchased allowances are distributed to covered entities by Ecology after each auction an entity participates in and a compliance account where a covered entity holds allowances it has requested Ecology transfer from the entity's holding account for compliance demonstrations. Natural gas and electric utilities are also provided limited use accounts where no-cost allowances, required to be consigned at auction, have been transferred from holding accounts. Ecology places limits on the number of allowances that can be held within compliance accounts and holding accounts. There is no holding limit placed on a limited use account. Also, except for the holding limits here, an allowance can be banked indefinitely. For reports and other information on auctions, accounts, and auction performance, please see Ecology's webpage: *Auctions & market - Washington State Department of Ecology*.

Cascade is required to consign some of the Company's no-cost allowances. In 2024, 70% of Cascade's no-cost allowances had to be consigned to auction. The no-cost allowance consignment increases by 5% annually. Starting in 2030, all no-cost allowances received by Cascade must be consigned to auction.

Revenues from allowance consignment must be managed and used for the benefit of customers with oversight from the UTC. The rule states, "All proceeds from the auction of allowances consigned by natural gas utilities shall be used for the benefit of customers, as determined by the utilities and transportation commission for investor-owned natural gas utilities, including at a minimum eliminating any additional cost burden to low-income customers from the implementation of the Climate Commitment Act." Remaining revenue can be used under the oversight of the UTC for the benefit of customers in other ways, such as investing in additional emissions reductions and/or providing bill credits to reduce customer cost impacts.

Under oversight from the UTC, Cascade may use no-cost allowances that are not consigned at auction for compliance demonstrations up until 2030, when all no-cost allowances would need to be consigned. Depending on many factors, Cascade may need to purchase additional allowances for compliance. This can be done at auction or through secondary allowance markets.

Compliance demonstrations can also include a limited amount of carbon offsets, such as forestry carbon sequestration offsets. Offsets are limited to the use of up to 8% of a covered entity's compliance obligation in the first compliance period and 6% thereafter. Ecology will make reductions to the program's annual allowance budgets commensurate with the number of offsets covered entities use for compliance. The need for allowance and offset purchases at the outset of the program will be informed by Cascade's projected demand, demand-side management, conservation programs, and RNG acquisitions. In the future, potential hydrogen and other low carbon alternative fuels acquisition would be considered.

If a covered entity would reach the end of a four-year compliance period and was not able to purchase sufficient instruments for compliance, the rule allows for covered entities to request Ecology to issue higher priced "price ceiling units" to address the shortfall. There are penalties that would apply for noncompliance with requirements of the rule, including not meeting an emissions compliance obligation demonstration.

Auctions are typically held on a quarterly basis. Allowances offered at auction decline over time with the cap. Auction floor allowance prices, Allowance Price Containment Reserve (APCR) allowance prices, and "price ceiling unit" prices are set by Ecology per the rule in 2023 and increase annually by 5% plus inflation. These prices are published by the first business day of December of the year prior to the auctions where the prices will apply. For example, Ecology set the allowance floor price for 2024 allowances at $24.02 per ton.

The settlement price for all participants in the auction is the bid price where the last allowance from the auction is awarded. Also, there are two auctions each year, in parallel with two of the other general auctions, where a limited amount of future vintage allowances are offered for sale to market participants. APCR auctions would be held

if the settlement price in a general auction reaches Ecology's published APCR Tier I allowance price.

The CCA is planning to "link" with California and Quebec carbon markets for efficiencies with similar carbon cap and trade programs, structure, and goals consistent with 2024 law SB 6058. California and Quebec have been linked since 2014, as they share a common interest in reducing GHG emissions. Ecology notes that linking these carbon markets can benefit emission reductions with immediate collaborative action. California-Quebec expressed their interest in linking with WA as Ecology is drafting potential new language to incorporate linkage. Ecology recently requested public comment on establishing an agreement with the other carbon market and if the three jurisdictions enter an agreement, updates to regulations are expected to be adopted and similar by each jurisdiction. Ecology anticipates an agreement will not be finalized until 2025 or later.

At the outset, Cascade has been utilizing Resource Planning modeling tools for compliance planning and worked with a consultant, Guidehouse, in late 2022 to mid-2024 to develop shorter- and near-term planning tools which incorporate all types of compliance instrument options to best inform compliance instrument procurements.

There were two ballot initiatives in the 2024 Washington state general election that had potential impacts to the CCA and other major initiatives affecting the energy industry, Washington Initiative 2117 and Washington Initiative 2066.

Initiative 2117, which did not pass, would have repealed the CCA and prohibited any state agencies from implementing a cap-and-trade style program.

Initiative 2066, which did pass, prohibits state and local governments from restricting access to natural gas; prohibits the state building code council from discouraging or penalizing the use of natural gas in any building; requires gas companies to provide natural gas to any person or corporation even if other energy services or sources are available; and prohibits the WUTC from approving any multiyear rate plan requiring or incentivizing a natural gas company or utility company to terminate natural gas service or implement requirements that would make access to natural gas service cost-prohibitive. Cascade is monitoring the impacts from passage of this initiative.

b. Washington State Building Code Changes

The Washington State Building Code Council (SBCC) approved new building and energy codes this past year, impacting usage of natural gas for space and water heating in new and retrofitted commercial and residential buildings. On April 22, 2022, the SBCC approved changes significantly limiting the use of natural gas in new and retrofitted commercial buildings through the revised Washington State Energy Code-Commercial (WSEC-C). The revised WSEC-C went into effect on July 1, 2023, and stipulates new commercial construction may not include natural gas equipment for space or water heat, with a few exceptions. The use of natural gas equipment, other than natural gas space and water heating equipment in commercial buildings, has not been restricted as part of the revised WSEC-C. However, electric receptacles must also be installed next to certain natural gas appliances in dwelling units within new multifamily buildings.

On November 4, 2022, the SBCC voted 9-to-5 to approve two new residential code provisions for space and water heating, which went into effective on July 1, 2023. 21-GP2-065 requires installation of heat pump (electric or gas) space heaters for space conditioning in new residential buildings except for dwellings with small heat loads for supplementary heating needs and 21-GP2-066 requires heat pump (electric or gas) water heaters for domestic hot water heating in new residential buildings except for small water heaters, small dwelling units, supplemental water heating systems, and some renewable energy systems. These code revisions are expected to significantly limit the use of conventional natural gas equipment for primary space and water heating in new residential construction statewide.

A SBCC executive session in November 2024 discussed the implications of Initiative 2066 to the gas-restrictive building codes currently in effect. A proposal was drafted that would direct SBCC to consider off-cycle (but not emergency) rulemaking to evaluate the 2021 WA State Energy Code (WSEC) for compliance with Initiative 2066, EPCA, and state rules for efficiency. It was discussed that considerations would also be made during the 2024 WSEC development. It is unclear at this point when, and to what extent, the SBCC intends to make substantive adjustments to the building code in compliance with Initiative 2066, and how the newly passed ballot initiative will be integrated and complied with at a state and local

level. Cascade will continue to monitor the situation and potential impacts to the use of gas in Washington.

c. SB 5092 – WUTC Natural Gas Decarbonization Study

The legislature passed SB 5092 in 2021 which directs the WUTC to conduct a study examining feasible and practical pathways for investor-owned electric and natural gas utilities to contribute their share to greenhouse gas emissions reductions for Washington to achieve emissions reduction targets in RCW 70A.45.020, and the impacts of energy decarbonization on residential and commercial customers and the electrical and natural gas utilities that serve them. The WUTC contracted with Sustainability Solutions Group (SSG) to support the UTC with examining decarbonization pathways with privately owned energy utilities in Washington and created Docket U-210553 to manage information about the study and keep stakeholders informed. The UTC was allowed to utilize $251,000 of funding in 2022 and $199,000 in 2023 to complete this study, with a final report due to the legislature by June 1, 2023.

The UTC held public workshops and decarbonization advisory group meetings in 2022 to obtain and share information on the study and Cascade participated in this process as a member of the advisory group, providing comment at workshops and when opportunities were available to submit written comments on the proposed decarbonization pathways and dashboard developed throughout 2023. A final report was published in October 2023 and the UTC uploaded the report and associated documents on May 30, 2024, that had been submitted to the legislature.

d. Washington Department of Ecology (Ecology) - GHG Assessment for Projects (GAP)

At the end of 2019, Governor Inslee directed Ecology to adopt a rule by Sept 1, 2021, to consider GHG emissions in environmental assessments for major industrial projects and major fossil fuel projects with significant environmental impacts. Ecology announced rulemaking commencement on April 30, 2020, and began receiving feedback from stakeholders to obtain input for drafting a proposed rule planned for late 2020. In 2021, Ecology decided to pause this rulemaking as the agency is implementing the Climate Commitment Act and Clean Fuel Standard. Ecology will consider public input received on these rules and evaluate any potential intersections with

the new rules and the GAP rule before proceeding. The GAP rulemaking is currently on hold. Cascade will continue to monitor this regulatory action as it may impact future IRPs.

e. Thermal Energy Networks Bill

On March 5, 2024, House Bill 2131 was approved by the Washington State Legislature and passed into law. HB 2131 enables gas and electric utilities to own or operate Thermal Energy Networks (TENs). "Thermal energy" means piped noncombustible fluids used for transferring heat into and out of buildings. A thermal energy system does not produce onsite GHG emissions as part of the heating and cooling processes. The systems can provide comfort heating and cooling, domestic hot water, and refrigeration, and can improve energy efficiency.

HB 2131 allows gas companies and other energy providers to pursue TENs opportunities. It also provides specific opportunities to local distribution companies to pursue TENs pilots and receive potential grant funding from the Department of Commerce to offset the gas company's costs required to build and operate the pilot project, pending approval from the UTC and Commerce.

Cascade is actively assessing TENs pilot opportunities consistent with HB 2131 and the provisions of Commerce and the WUTC. The Company is also actively hiring a TENs manager to lead the selection and implementation of networked thermal energy efforts in Cascade's service area.

f. Other Washington Legislative Activity

Cascade is keeping apprised of additional legislation in Washington State with the intent to reduce GHG emissions. Such proposals may include support for innovations in the gas sector, such as tools to support Climate Commitment Act compliance, and to empower renewable natural gas, hydrogen, and other decarbonization technologies that can be paired with pipeline infrastructure. With the passage of Initiative 2066, it is uncertain if proposals to further restrict the use of natural gas will be seen in the coming session.

2. Oregon

Since the last IRP, no GHG cap and trade program legislation has passed in Oregon. In early 2020, Governor Brown released an Executive Order (EO) for state agencies to implement GHG reductions within their authority. Discussion of this EO and the Department of Environmental Quality's subsequent Climate Protection Program rulemaking and reinstatement is provided below.

a. Climate Protection Program

In early 2020 Oregon Governor Kate Brown issued Executive Order 20-04, directing state commissions and agencies to facilitate achievement of new GHG emissions goals of at least 45% below 1990 levels by 2035, and at least 80% below 1990 levels by 2050. The order specifically directed the Environmental Quality Council (EQC) and the Department of Environmental Quality (DEQ) to take actions necessary to cap and reduce GHG emissions. EO 20-04 is also intended to build on EO 17-20, Accelerating Efficiency in Oregon's Built Environment to Reduce Greenhouse Gas Emissions and Address Climate Change.

EO-20-04 included 13 directives to multiple state agencies, establishing reporting requirements and deadlines for implementing GHG reductions. Specifically, the EO directed the EQC and DEQ to take actions necessary to cap and reduce GHG emissions, consistent with the new GHG emissions goals from large stationary sources, transportation fuels, and other liquid and gaseous fuels, including natural gas. Since the EQC and DEQ do not have the authority to implement a market-based cap and trade type system, it was anticipated that a rule would be developed to cap emissions at a baseline emissions value with a limited number of allowances distributed to regulated entities and reduce allowance allocations over time. The EO directed DEQ to commence cap and reduce program options no later than January 1, 2022.

The DEQ published a report describing the EQC's legal authority to cap and reduce GHG emissions and proposed a process for rulemaking. In 2020, the DEQ was directed by the EO to propose rulemaking and sought input from the public to inform the agency's rulemaking approach and design. Throughout the DEQ's process, Cascade engaged in public meetings and provided input.

The DEQ issued the original Climate Protection Program (CPP) rule on December 16, 2021. On March 18, 2022, industry filed lawsuits challenging the CPP rule. Litigants included Cascade, along with Avista Utilities and Northwest Natural. On December 21, 2023, the Oregon Court of Appeals ruled that the DEQ did not comply with certain disclosure requirements for rulemaking and invalidated the program. The DEQ did not appeal the decision, and on January 22, 2024, gave notice that the agency would proceed with rulemaking to reinstate the CPP. The rulemaking process was conducted in the spring and summer of 2024. Cascade participated as a member of the Rulemaking Advisory Committee (RAC) and provided written comment throughout the process. The DEQ released the draft CPP rule for public comment on July 30, 2024, and the Environmental Quality Council (EQC) approved the final CPP rule on November 21, 2024. The reinstated CPP is effective January 1, 2025.

The 2024 final CPP rule regulates GHG emissions from covered entities, including carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Covered entities still include fuel suppliers, such as petroleum fuel suppliers and natural gas distribution utilities, as well as large stationary emission sources. Under the reinstated rule, the DEQ made a change to regulate Emissions-Intensive Trade Exposed (EITE) industries emitting more than 15,000 metric tons of CO_2e separately under their own emissions cap and removed EITE usage of natural gas from natural gas suppliers' compliance obligations. The DEQ identified six of Cascade's transport customers that are designated as EITE and are to be regulated separately. Cascade's regulated emissions include core customer emissions and emissions from non-EITE transport customers. Further, the CPP does not regulate GHG emissions from electric generation facilities.

The CPP emissions are capped at a baseline emissions level equivalent to the average of 2017-2019 emissions from fuel suppliers and at 2022-2023 average emissions for EITE entities. The cap declines over time to achieve emission reduction targets of 50% below baseline emissions by 2035 and 90% below baseline emissions by 2050.

The DEQ allocates no-cost emissions allowances to fuel suppliers starting in 2025, with that year's allocation approximately equivalent to an entity's baseline emissions. The DEQ reduces allowance allocation each year proportionate to that years' emissions cap and DEQ will distribute no-cost allowances to covered entities annually by June 30th. Allowances can be banked indefinitely. Cascade is

currently evaluating DEQ's calculation for determining allowance allocations for planning compliance.

Excluded emissions for natural gas distribution companies include CO_2 from the combustion of biomethane or RNG purchased for natural gas customers and GHG emissions from natural gas delivered to electric generating plants with a total nominal electric generating capacity of greater than or equal to 25 megawatts. Cascade delivers natural gas to electric generating plants having total electric generating capacities greater than 25 megawatts and does not currently deliver to plants with total nominal capacity lower than 25 megawatts.

The CPP requires compliance to be demonstrated by December 9 of the year following the end of each compliance period. The first compliance period is three years, from 2025 to 2027. The second compliance period and thereafter are 2-year compliance periods. There are no interim period emissions compliance obligations as in the WA CCA.

Compliance is demonstrated by surrendering no-cost emissions allowances to the DEQ for retirement, purchasing and retiring allowances that may potentially be offered for trade by other covered entities, and a limited amount of Community Climate Investment (CCI) credits (described further below). Emission reductions for natural gas distribution utilities can also be achieved by replacing conventional natural gas supply with RNG and hydrogen, and through implementing energy efficiency and conservation programs to reduce customer use of natural gas.

Oregon CPP compliance is expected to be predominantly met with no-cost allowances and RNG purchases, and possibly some CCIs depending on availability. A CCI can be used to offset one metric ton of CO_2e emissions and provide a limited mechanism for demonstrating compliance beyond no-cost allowances. CCIs can be used to meet up to 15% of a covered entity's compliance obligation in the first compliance period and 20% in the second compliance period and for each compliance period thereafter.

CCIs are generated and obtained by a covered entity when the DEQ approves payments from covered entities to DEQ-approved CCI entities. The DEQ expects CCI entities to achieve GHG emissions reductions through funding from the payments from covered entities. The cost of each CCI credit is equal to the carbon dioxide social cost

of carbon and is adjusted for inflation annually. Adjusted for inflation, a CCI is projected to cost about $133 in 2025. Covered entities can bank CCIs for two compliance periods only and cannot trade or transfer CCIs to another covered entity. There are currently no CCI entities approved by the DEQ but there could be in future. If no CCI entities are approved, no CCIs can be generated.

The CPP rulemaking does not have a direct impact on the WA IRP and is provided for general understanding of regulatory activities occurring in Cascade service areas in the neighboring state of Oregon. However, Cascade will consider both the WA CCA and OR CPP in compliance planning to achieve any potential compliance planning efficiencies.

Local Policy

Cascade has observed a heightened interest by local jurisdictions and municipalities in reducing GHG emissions. Those cities or counties establishing commitments are focusing on targets (whether formal or aspirational) in the range of 80% GHG reductions relative to 1990 levels by 2050, consistent with the Paris Climate Agreement.

For background, the Paris Climate Agreement was a pact made by many countries across the globe, responding to concerns regarding climate change. In the pact, countries committed to GHG reductions to limit increasing global temperatures and fund response to impacts of climate change. The U.S. had been a party to the pact in 2015. In 2017, the U.S. withdrew from the Paris Climate Agreement under President Trump and in 2021, the U.S. rejoined the pact under President Biden. It is likely President Trump will withdraw from the Paris Climate Agreement after he takes office on January 20, 2025.

Within Cascade's service areas, the City of Bellingham and Whatcom County in Washington, and the City of Bend in Oregon have developed GHG reduction goals. A summary of those commitments is provided below. Also, Snohomish County, which overlaps Cascade's service area, created an ad hoc Climate Advisory Committee in 2019 to provide recommendations that encourage adoption of policies, programs, and practices to reduce GHGs, address climate change, protect public health, and preserve the natural environment within the county. Cascade is running sensitivity analyses in this IRP that reflect new limitations applied to natural gas use in the City of Bellingham. Those limitations are discussed further below.

There are other areas adjacent to Cascade's service areas adopting similar commitments, such as Tacoma, Seattle, and Edmonds in Washington, Multnomah County and Portland in Oregon, and Vancouver in British Columbia. Cascade has also observed adoption of energy action plans to switch from gas to electric in the cities of Ashland and Eugene in Oregon.

1. **City of Bellingham, Washington**

   The City of Bellingham passed a resolution pertaining to GHG Reduction and Renewable Energy Targets in March 2018. The resolution updated emission reduction targets for municipal facilities and operations to reduce emissions 85% below 2000 levels by 2030, and 100% below 2000 levels by 2050, making the city facilities and operations carbon-neutral. Bellingham also included a target to reduce community-wide emissions 70% below 2000 levels by 2030, and 85% below 2000 levels by 2050. Specifically, the goal is to obtain energy from all renewable resources and remove the use of fossil fuels within the city, including transportation.

   The City created the Climate Action Task Force (CATF) to explore and recommend how the city and community could meet these new targets. The CATF included community members with backgrounds in renewable energy, energy conservation, land use, energy/resource economics, community engagement, transportation, and finance. Energy utility representation and public transportation representatives were identified. However, the City did not allow more than one utility representative at the table and Puget Sound Energy (PSE) was chosen by the City to represent utilities on the task force. Cascade worked together with PSE to include Cascade's input. Minimal input was accepted from Cascade, and efforts seemed primarily focused on electrification to the exclusion of other decarbonization strategies that utilize offsets and RNG as pathways to carbon reduction.

   The CATF first met on September 5, 2018, and continued to meet regularly through late 2019. On December 2, 2019, the task force finalized a report of GHG reduction recommendations. City staff reviewed the CATF's recommendations and narrowed them down to those most likely to be integrated successfully and discussed the results with the City Council. City staff used a tiered ranking system for this evaluation, considering such factors as whether the measure has already been implemented, needed further research and analysis, or tabled for future review. The measures then went through a triple bottom line "plus" assessment before adding to the City's Climate Action Plan (CAP) and the City determined which of the CATF's recommendations should be integrated into the CAP. Ten recommendations were vetted, including encouraging the State to ban

internal combustion engine vehicles, expanding weatherization efforts, and disallowing the use of natural gas in new homes and buildings.

On February 7, 2022, the Bellingham City Council passed an ordinance requiring electric space and water heating equipment for new commercial and large (4-plus story) multifamily buildings. The ordinance also requires incremental improvements in energy efficiency (building envelope, lighting, insulation) and solar installation or readiness in new buildings. The electric-only mandate for space and water heating does not apply to single family construction, detached houses, duplexes, townhomes or row houses. The ordinance took effect on August 7, 2022.

Cascade is running sensitivity analyses in this IRP based on the City of Bellingham's limitations on use of natural gas in new buildings. Cascade pulled historical data from 2017-2021 to see which customers would have been affected if this ban took place earlier and determined this impacted approximately 50 customers per year. Cascade decremented commercial customer counts by 50, cumulatively, each year for the forecast for this sensitivity. However, it should be noted that the changes to Bellingham's allowed uses of natural gas may be redundant to the state energy code that was later passed by SBCC. It is unclear at this time if such limitations to the use of natural gas will be maintained given the passage of Washington Initiative 2066. Cascade will continue to monitor potential outcomes and impacts as they develop.

2. Whatcom County, Washington

Whatcom County, in which the City of Bellingham is situated, has committed to the "Ready for 100" campaign that the Sierra Club is advocating and has established goals through a county ordinance. The "Ready for 100" campaign website recommends a goal of 100% renewable electricity by 2035 and 100% renewable for all other energy sectors by 2050, but participants can target less stringent goals. Whatcom County has chosen to commit to 100% renewable electricity for county operations by 2035 and has also applied the goal within the larger Whatcom County community.

Whatcom County established a Climate Impact Advisory Committee, which provides review and recommendations to the Whatcom County Council and Executive on issues related to the preparation and adaptation for, and the prevention and mitigation of, impacts of climate change. On July 27, 2021, Whatcom County voted to ban the construction of new refineries, coal-fired power plants and other fossil fuel-related infrastructure. These new requirements do not constitute a gas ban but may potentially impact Cascade's plans for distribution system enhancement projects in Whatcom

County. The Climate Impact Advisory committee continues to meet monthly on climate and energy policy.

3. City of Bend, Oregon

The City Council of Bend (City), Oregon passed Resolution 3044 in 2016 establishing voluntary GHG emission reduction goals for City facilities and operations of 40% reduction of 2010 baseline year emissions by 2030 and 70% reduction of 2010 baseline year emissions by 2050. The City Council passed another resolution, Resolution 3099, which created a Climate Action Steering Committee (CASC). The CASC provided recommended actions to the City Council that encourage and incentivize businesses and residents, through voluntary efforts, to reduce GHG emissions and fossil fuel use considering the voluntary goals.

Cascade was appointed to the CASC, and actively supported the development of decarbonization pathways that balanced the City's economic vitality, reliability of its energy supply, and environmental goals. The CASC authored a plan recommending a set of strategies to guide both the City and the surrounding community in achieving its goals.

On December 4, 2019, the Bend City Council approved the Climate Action Steering Committee's (CASC) recommendations concerning a pathway to reducing its fossil fuel use by 40% by 2030, and by 70% by 2050. Cascade publicly supported the recommendations presented to the City. Cascade engaged with Bend City staff and other members of the community to identify ways to help the City meet its targets. Possible pathways identified at that time included partnerships on the integration of biogas (e.g. biodigester) and possible carbon offset programs. Since that time, Cascade has moved forward with a renewable natural gas project at the Knott Landfill in Bend, and has received recent regulatory approval for a voluntary renewable natural gas tariff in Oregon.

The City's current Environment and Climate Committee (ECC) has begun the work of exploring the role of gaseous fuels as part of a decarbonized future. Example ECC policies and programs mentioned in recent presentations to the Economic Dev committee include:

- Incentivizing electrification
- Disincentivizing non-electric technologies
- City level commitments around operations and city facilities
- Supporting statewide policy
- Decarbonizing natural gas supply with alternative fuel sources

- Restrictions and requirements

The timeline for decision making is:

- Nov-Dec: Define resource needs and implementation plan for short term actions to be included in council goal setting for GY 25-27 & determine stakeholder engagement group and process
- Jan-April: Deep dive analysis on prioritized policies
- May-July: Stakeholder meeting and developing recommendations
- August 2025: Council check in- analysis, results and recommendations to council

ECC staff has indicated there will be a project website with status updates and opportunities for feedback. In the meantime, Cascade has had the opportunity to meet with City staff regarding preliminary ECC proposals, and to provide feedback on potential decarbonization and electrification pathways. It is Cascade's understanding that City staff has also met with other stakeholders in the energy, economic, and environmental sectors. We appreciated their continued efforts to gather feedback on their positions.

While this planning is taking place, Cascade continues to actively review opportunities to support the City in reducing the carbon intensity of our delivered fuels. Cascade has also held discussions with various members of Bend government, business, and labor to help determine viable decarbonization pathways for natural gas distribution.

Consistent with Cascade's commitment to explore this option for the City, the Company is pleased to have officially filed a Voluntary RNG tariff in the State of Oregon to allow eligible customers seeking to reduce their carbon emissions may choose to purchase one or more Program blocks, where each block is equivalent to four (4) therms of renewable thermal credits (RTCs) derived from renewable natural gas (RNG) and retired on the customer's behalf. This Program is effective as of November 1, 2024, and available to Bend customers on our Residential and Commercial Rate Schedules. Cascade looks forward to coordinating with the City of Bend to help determine how this program can best serve their needs.

Cascade is also in the process of pursuing a dual-system pilot in Bend which will pair electric heat pumps with existing natural gas furnaces in the homes of 24 Cascade customers. The pilot will help the Company better understand the interaction of these technologies for carbon reduction and demand response. Pilot implementation is planned for 2025 heating season through 2026.

An additional opportunity for Cascade to assist with area natural gas distribution decarbonization came about in late 2021 when Deschutes County announced an opportunity for interested parties to submit bids for developing an RNG project at the Knott Landfill. Cascade, in partnership with an engineering firm, submitted a proposal to the County and was awarded the project. The project is expected to begin producing RNG by the end of 2025. Cascade is exploring other RNG opportunities for the City as well.

Finally, Cascade has been invited to participate in discussions pertaining to the development of a potential Oregon Thermal Energy Network (TEN) bill to be explored during the 2025 Legislative Session. Cascade is in process of reviewing the early draft language of this proposal and looks forward to continuing our engagement.

Natural Gas Industry Emissions

From a review of EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990-2022, in 2022 the oil and gas sector emitted about 14% of the total GHG emissions from all industries. Natural gas distribution facilities and operations contribute to GHG emissions generally through fugitive methane emissions and leaks from pipeline infrastructure, as well as from combustion of fuel used in compressors. The EPA's emissions estimates indicate approximately 4% of oil and gas sector emissions are from natural gas distribution infrastructure.

Cascade is required to report annual facility GHG emissions to the EPA, the Department of Ecology, and the UTC. These emissions are described further below, under the discussion on Cascade Operational GHG Emissions and Emission Reductions. Cascade began reporting Oregon facility and infrastructure GHG emissions to the Oregon Department of Environmental Quality in 2021. However, Oregon emissions do not meet the 25,000 metric ton CO_2e threshold for annual reporting to the EPA.

Cascade Customer Emissions from Natural Gas Combustion

GHG emissions are generated by Cascade's customers due to combustion of natural gas. Over time, the Company's sales of natural gas have grown to accommodate customers' demand for natural gas, and therefore, GHG emissions have increased from customers' combustion of natural gas.

The total annual emissions from Cascade's core customers are in the range of about 1.3 million metric tons of CO_2e. Emissions from non-core customers have totaled in the range of about 3.5 times higher than total emissions from core customers, depending on the year and whether customers switch from non-core to core customer rate arrangements. Note that these total emissions are slightly different than Cascade's CCA compliance obligations since some large customer EITEs have their own compliance obligations and military facility emissions are exempt.

a. Energy Efficiency Program Greenhouse Gas Emission Reductions

Cascade's conservation programs help reduce GHG emissions by providing incentives to customers for a comprehensive set of prescriptive and custom energy efficiency upgrades designed to more efficiently use natural gas, thus reducing their overall carbon footprint. Space, water heating, and weatherization incentives drive lowered energy consumption and positive energy behavior in customers' homes and businesses. This leads to lowered demand, bill reductions, and overall GHG emission reductions in the communities.

As seen in Figure 6-2, Cascade's energy efficiency, conservation programs, and demand-side savings in Washington over the past three years have resulted in about 627,941 to 1,243,223 therm savings annually, equivalent to about 3,459 to 6,597 metric tons of CO_2e /year. Savings in Oregon, through a partnership with Energy Trust of Oregon, have saved over half a million therms and 2,966 metric tons of CO_2e /year on average since 2021.

Figure 6-2: Historical DSM Savings

Annual EE and Conservation/DSM Savings	WA		OR	
	Therms	MT CO2e	Therms	MT CO2e
2021	1,243,223	6,597	525,372	2,788
2022	627,941	3,459	508,067	2,799
***2023**	912,782	5,028	601,036	3,311

*2023 figures are preliminary and pending WUTC approval

Washington conversation targets are set biennially in collaboration with the UTC and a Conservation Advisory Group through a Conservation Potential Assessment. Cascade strives to continue maximizing cost-effective conservation savings through continual process improvements, community outreach, customer

education, and enhancing the portfolio of DSM offerings. The Company is poised to adaptively manage as state goals and savings opportunities evolve alongside technological improvements and consumer behavior in the industry. Please see Chapter 7, Demand Side Management, for additional details.

b. Renewable Natural Gas and Hydrogen

Low carbon fuels, such as renewable natural gas and hydrogen, will be critical in meeting the dual goals of decarbonizing the energy pipelines while maintaining the benefits provided by our distribution system. Renewable natural gas and hydrogen supply are other methods of reducing emissions associated with the Company's customer use of natural gas. In the past few years, Cascade has expanded the Company's internal and external resources to support development of RNG options for its customers and to comply with decarbonization requirements in Washington and Oregon.

The Biden administration has made a focus to set up funding to advance hydrogen technologies and clean hydrogen production to decarbonize the energy system. Cascade is not involved in hydrogen projects; however, we are following various projects that are underway in case they provide opportunities in the future.

Cascade also continues to explore ways the Company can support technology development and pilot project opportunities to further explore delivery of hydrogen for customers on the gas distribution system. See more information on Cascade's RNG procurements and project involvement, as well as discussion of hydrogen as a future energy resource for customers, in Chapter 4.

Cascade Operational GHG Emissions and Emission Reductions

Certain operational emissions from Cascade's operations and infrastructure in Washington are subject to emissions reduction requirements through the Climate Commitment Act (CCA) and are reported to the EPA and Ecology. Reported GHG emissions include combustion emissions from Cascade's Mount Vernon compressor engine and fugitive methane emissions from distribution mains, service lines, and meter-regulating stations. Emissions from these sources totaled just over 27,000 metric tons of CO_2e for the 2023 reporting year. These emissions have been quantified since 2010 and have remained fairly consistent over time as default nation-wide emissions factors are required to quantify most of the emissions.

Emissions not required to be reported to Ecology in the values above include methane emissions from excavation damage, natural force damage and other outside force damage, corrosion, and equipment/weld issues. However, per HB 2518, these emissions are required to be reported to UTC annually and have been reported since 2021 (2020 calendar year emissions). In the March 2023 report, Cascade's 2022 reported emissions to the UTC were 4,186 metric tons of CO_2e and in the March 2024 report, the 2023 reported emissions were 1,721 metric tons of CO_2e. These reductions were accomplished by implementing company procedures that accelerated the timeline for fixing leaks and no longer allowing Grade 3 leaks to continue to leak indefinitely.

Cascade's other operational emissions (blowdowns, pressure relief/venting and routine maintenance, meters, and smaller combustion equipment) are also not required to be reported to the EPA or Ecology but is compiling these emissions for our corporate GHG inventory. Cascade is also exploring the use of advanced mobile leak detection (AMLD) technology to help quantify methane emissions as well as to identify leaks and help prioritize company repair efforts. Cascade is committed to reducing operational emissions.

Cascade has realized GHG emissions reductions in implementing operational changes and capital projects required through federal Pipeline and Hazardous Materials System Administration (PHMSA) regulatory requirements as well as through changes in field operations procedures. The Company is anticipating utilizing the AMLD technology mentioned above to help quantify these emissions reductions going forward.

1. Fugitive Methane Emissions Reductions

The EPA has focused on reducing fugitive methane emissions from the oil and gas sector but has not applied emission reduction requirements specifically to the natural gas distribution segment. Instead, the agency has focused on sponsoring voluntary programs to encourage commitments to reduce methane emissions from gas distribution companies.

a. EPA Natural Gas Star Methane Challenge Program.

Cascade became a Founding Partner of the EPA's Natural Gas Star Methane Challenge Program in March 2016. As a Founding Partner, Cascade chose to participate in the program under the Best Management Practice (BMP) Commitment – Excavation Damages Prevention within the natural gas distribution sector. The BMP Commitment entails a Partner's commitment to company-wide implementation of BMPs to reduce methane emissions. Involvement in this program also provides a forum for companies to share

knowledge on successfully implementing BMPs and methane emissions reductions. During this commitment, Cascade has conducted incident analyses on excavation damages and reported the relevant data to the EPA.

Specifically, Cascade demonstrates its commitment to this program through implementation of BMPs to promote leak reductions. Cascade has a public awareness and damage prevention manager and coordinators who assist in providing public outreach that focuses on damage prevention and further reducing potential releases of methane from excavation damages. The public awareness and damage prevention department and local utility management and staff also engage directly with contractors and excavators with face-to-face interactions in the field, and through meetings and training events. By proactively engaging with these third parties, Cascade aims to achieve a decreasing trend in overall excavation damages and excavation damage rates, as well as an increase line location requests.

Cascade conducts investigations when damages occur to company natural gas distribution pipeline and infrastructure. Key information, such as location, root cause, type of excavator, type of equipment used and type of work performed, is collected to analyze and trend on a quarterly basis. This data is used to assess ways to mitigate risks associated with excavation and, along with effectiveness surveys, helps utilities assess the success of their programs, outreach strategies and messaging.

Some examples of utility companies' outreach efforts include annual direct mailers to public officials, emergency response organizations, excavators, customers, schools and individuals who live along Cascade's distribution lines; participation in a variety of general public outreach events; development of materials that deliver multifaceted education campaigns, including campaigns via television, radio, online, newspapers, magazines, social media and billboards. Utility companies provide publications in up to eight languages to align with the demographics of their jurisdictions. The Companies also sponsor community events, such as golf tournaments, chamber of commerce events, county fairs and rodeos, and sporting events, where pipeline safety and Call 811 information is displayed and distributed to attendees. The utilities also provide excavation safety and emergency response training upon request.

Additionally, Cascade actively participates in 811, Common Ground Alliance, local underground utility coordinating councils, and damage complaint programs in Washington and Oregon. Cascade continues to explore other voluntary actions which could reduce methane emissions resulting from excavation damage.

Beyond Cascade's commitment to reduce methane emissions from excavation damages, Cascade has completed operational and infrastructure changes to comply with federal requirements which have resulted in lowering methane emissions, and therefore lower GHG emissions in the State of Washington. This has mainly been realized through pipeline replacement projects where newer pipeline materials, such as polyethylene and steel, are used to replace older materials. Since 2012, Cascade has replaced nearly 98 miles of early vintage steel pipe in Washington with new steel or polyethylene pipe, ranging from service lines up to 12-inch mains. Also, Cascade has no unprotected steel pipe and no leak-prone cast iron pipe in its systems.

In 2020, Washington enacted HB 2518, the Natural Gas Transmission bill, requiring natural gas distribution companies to expedite mitigation of hazardous leaks and reduce as practicable nonhazardous leaks, and providing utilities rate recovery to mitigate these leaks. Cascade collaborated with other Washington natural gas distribution companies on implementing methodology for compiling data and estimating emissions. The Company submitted the first annual report in March 2021 to the Washington Utilities and Transportation Commission. Internal tracking to compile data reports for HB 2518 is completed annually ongoing and shows few open leaks on the system and those are scheduled for repair according to Cascade's expedited leak management program. Although companies are permitted by code to monitor smaller leaks for a period of time before addressing, Cascade has instituted a policy to repair all identified leaks as quickly as possible and with a goal to eliminate even the smallest non-hazardous leaks within 15 months of discovery. By expediting leak mitigation, Cascade has reduced leak emissions within the system.

Cascade became a member of the One Future Coalition in 2024 and has been working with them to understand their protocol. This protocol is more robust, and Cascade is reevaluating the Company's methane intensity with One Future.

Cascade continues to explore additional ways to reduce methane releases that occur within normal operations, including the use of technology that could be used to capture and reinject natural gas from one section of pipe into an adjacent section during pipeline maintenance. By using this technology, Cascade would be able to isolate a section of pipe scheduled for maintenance and minimize the amount of natural gas released to atmosphere from blowdowns.

Cascade is currently piloting an emissions survey using Picarro's AMLD technology in Washington. By using AMLD, Cascade is looking to identify and fix super emitter leaks within its system, as well as identify potential problem areas and prioritize company repair efforts. Cascade also believes that by using AMLD technology to directly measure emissions, it will have a better idea of what Cascade's actual emissions are. On August 27, 2024, the EPA released a request for information asking for comments and information regarding methane quantification technology and its potential use for quantifying methane emissions under Subpart W. Cascade plans to support these efforts.

Upstream Natural Gas Value Chain Emissions

Cascade developed an upstream methane emissions factor for the state of Washington that was used in the 2020 Integrated Resource Plan (IRP) for calculating avoided cost. This has been updated for the 2023 IRP through input of UTC directly and the technical advisory group made up of interested parties, the public, and Commission Staff. UTC Staff provided feedback on the findings and forecasts for the new resource acquisitions in Cascade's 2020 IRP. In the feedback, the staff commented on the methodology assumptions applied in the upstream emissions factor calculation, requesting clarity on certain aspects and additional rigor on others.

In response to the feedback, and as part of the in-progress 2023 IRP planning cycle, Cascade reviewed this calculation, and associated assumptions, against industry standards to determine changes to the assumptions to better align it with current best practices. The review resulted in an update to the upstream U.S. Rockies emissions rate to 1.43% from 1% and Cascade has updated the GWP of methane to 28 from 25. With these updated assumptions, the upstream emissions rate increases to a value of 4,680 CO_2e g/MMbtu from a value of 3,541 CO_2e g/MMbtu in the 2020 IRP, or a 32% increase. Cascade will continue to evaluate upstream emissions rate assumptions and new methane emissions tracking methodology as it is released to support methodology development in future IRP

processes. Additional detail on Cascade's review approach and results can be found in Appendix H.

Conclusion

The predominant requirements impacting Cascade are the Climate Commitment Act which regulated customer and operational GHG emissions, State Building Code Council revisions limiting natural gas usage for space and water heating in new and retrofitted commercial and residential buildings, and a City of Bellingham ordinance requiring electric space and water heat for new commercial buildings and larger multi-family dwellings. These requirements impact the IRP and are included in resource and cost modeling.

To comply with the CCA requirements, Cascade is purchasing allowances and exploring carbon offsets and RNG opportunities. Cascade continues the Company's commitment in reducing fugitive methane emissions and reducing GHG emissions from customer combustion of natural gas through implementation of energy efficiency and conservation programs.

The Company will continue to monitor and engage in Cascade's service area community-driven efforts in adopting GHG emission reduction targets. As state and federal GHG emissions policy and regulatory activity are updated, Cascade will evaluate and incorporate these potential impacts into the Company's IRP process. Cascade will also continue reviewing the Northwest Power and Conservation Council's (NWPCC) Power Plan updates when they are available to inform the Company on regional energy and GHG emissions matters that may impact additional policy development.

Chapter 7

Demand Side Management

Overview

Key Points

- Washington reference case projects energy efficiency savings of 22.9 million therms through 2045.
- This plan is informed by Cascade's Conservation Advisory Group (CAG).
- Cascade examines the Technical, Achievable Technical and Achievable Economic Potential of DSM programs through the LoadMAP model.
- LoadMAP generates targets for the Biennial Conservation Plan (BCP), based on therm savings potential.
- Programs are based on incentives, research, information, outreach, and engagement of key parties – and are designed and implemented to achieve DSM savings targets.

Demand Side Management (DSM) refers to the reduction of natural gas consumption through the installation of energy efficiency measures such as insulation or more efficient gas-fired appliances, or through other load management programs such as demand response efforts that shift gas consumption to off-peak periods. The Company's primary means for reducing load is through energy efficiency programs that provide customers with financial incentives to install energy efficiency measures or appliances. The Company's energy efficiency programs in Washington and Oregon offer incentives to homeowners, commercial customers, industrial customers, and builders to invest in energy efficiency measures. Because the customer must ultimately make the decision to invest in an energy efficiency measure, DSM is unlike other supply side resources which the Company can independently secure. This Chapter presents the methodology used to determine the Company's DSM supply curve through the planning period ending in 2045 and outlines the Company's overall energy efficiency program savings goals and performance.

Chapter 5 outlines the Avoided Cost of natural gas which is the estimated cost to serve the next unit of demand with a supply side resource option at a point in time. This incremental cost serves to represent the cost that could be avoided through energy efficiency programs. The long-term discount rate, tied to the average 30-year mortgage rate, increased from 5.06% in 2022 to 6.09% in 2024. The average nominal system Avoided Cost per therm increased from ~$0.94 in 2020 to ~$1.78 in 2024 representing an average increase of ~47%.

The Company's Energy Efficiency (EE or demand side) resources are acquired from individual customers in the form of unused energy. This chapter is responsive to the Washington Utilities and Transportation Commission's (WUTC or Commission) requirement that natural gas utilities consider cost-effective DSM resources in their energy portfolio on an equal and comparable basis with supply side resources.

In the natural gas industry, DSM resources are EE measures that include, but are not limited to: ceiling, wall, and floor insulation; higher efficiency natural gas appliances, insulated windows and doors, ventilation heat recovery systems and other commercial/industrial equipment. By influencing customers through energy efficiency outreach to reduce their individual demand for gas, Cascade can reduce the need to

purchase additional gas supplies, displace or delay contracting for incremental pipeline capacity, and possibly negate or delay the need for reinforcements on the Company's distribution system.

Energy efficiency involves a mix of technology and behavioral change using less energy to perform the same function. Energy conservation, on the other hand, involves using less energy by adjusting behaviors and habits. By incentivizing efficiency from customers versus conservation to reduce overall system load, the Company can more accurately track load reduction and does not solely depend on customer behavioral change.

Although Washington savings estimates extend to 2050, Oregon savings estimates have a time horizon of 2044 through the Energy Trust of Oregon's (ETO) Resource Assessment model. Cascade targets the saving of approximately 64.5 million therms systemwide through this time period: 22.9 million therms in Washington and 16.1 million therms in Oregon.

Figure 7-1 provides the forecast horizon per state due to limitations of the current forecasting models.

Figure 7-1: Forecast Horizon by State

Service State	Forecast Model	Time Horizon
Washington	LoadMAP	2050[1]
Oregon	Resource Assessment	2044

[1]For 2046-2050, the average annual savings from 2040-2045 is used as a proxy.

DSM Resources

There are two basic types of demand side resources: base load resources and weather dependent resources. Base load resources offset gas supply requirements throughout the year, regardless of weather conditions. Base load DSM resources include equipment such as high-efficiency water heaters and higher efficiency cooking equipment. Weather dependent DSM resources are measures whose therm savings increase during cold weather. For example, a high-efficiency furnace will lower therm usage in the winter months and will provide little to no savings in the summer months. These types of weather dependent measures for space heating offset some peaking or seasonal gas supply resources and are typically more expensive than base load supplies (such as water heating).

Energy efficiency is delivered to Cascade customers through a portfolio of services in Washington and Oregon.

Cascade's Washington Energy Efficiency Program

Cascade delivers energy efficiency services to its Washington core customers through the Company's EE department for the Residential program and a third-party implementer, TRC Companies, for Commercial/Industrial (C/I).

Cascade manages the following Washington Residential incentive programs:

- Residential (Existing and New Home Construction, and some Multifamily)
    - Single family, moderate income, manufactured homes
    - Weatherization, HVAC & water heating equipment
    - Low income

TRC Companies manage the following Washington C/I programs on Cascade's behalf:

- Commercial (Existing and New Construction)
    - Retail, offices, schools, groceries & other associated market segments
        - Weatherization, controls, HVAC & water heating equipment
- Industrial & Agriculture (core customers)
    - Manufacturing facilities, greenhouses
        - Process improvements, HVAC & water heating equipment, operations and maintenance

Cascade's Oregon Energy Efficiency Program

Energy efficiency programs for the Company's Oregon customers are offered through the Energy Trust of Oregon with program planning developed through the Cascade Oregon IRP cycle. (This subsection regarding Oregon DSM is included for informational purposes only to describe different program delivery in Oregon, although with similar methodologies.)

Energy Trust administers the following EE programs in Oregon on Cascade's behalf:

- Residential (Existing and New Home Construction)
    - Single family, moderate income, manufactured homes
        - Weatherization, Heating Ventilation and Air Conditioning (HVAC) & water heating equipment
- Commercial (Existing, New and Multifamily)
    - Retail, offices, schools, groceries & other associated market segments
        - Weatherization, controls, HVAC & water heating equipment
- Industrial & Agriculture (Core Sites)
    - Manufacturing facilities, greenhouses
        - Process improvements, HVAC & water heating equipment, operations and maintenance

Biennial Conservation Planning

On November 15, 2023, Cascade filed its 2024-2025 Biennial Conservation Plan (BCP) identifying the Company's two-year acquisition target in Docket UG-230937.[1] This plan aligns with requirements established as part of House Bill -1257 within RCW 80.28.380 which include:

1. Gas companies must identify and acquire all conservation measures that are available and cost effective.
2. In addition, each company must establish an acquisition target every two years and must demonstrate the target will result in the acquisition of all resources identified as available and cost-effective.
3. The cost-effectiveness analysis required by this section must include the costs of greenhouse gas emissions established in RCW 80.28.395.
4. These targets must also be based on a Conservation Potential Assessment (CPA) prepared by an independent third party and approved by the Commission to become effective as of 2024.

In the BCP, Cascade focuses on near-term conservation and energy efficiency program development as it addresses items noted in the 2023 IRP. Cascade identifies and acquires conservation opportunities through the CPA filed with the Washington Utilities and Transportation Commission.

The BCP also contains program implementation considerations, Washington state energy and building code impacts, an evolution in the program's point-of-sale incentive offering, and outreach plans. Additionally, results of savings potential are presented for the Company's Washington (WA) service territory through 2050 via its Load Management Analysis and Planning (LoadMAP) model tool developed by AEG.

Conservation Potential Assessment

Cascade performs a Conservation Potential Assessment (CPA) biennially. The CPA consists of estimates of potential reductions in annual energy usage for natural gas customers in the Cascade service territory from energy efficiency. Cascade has been filing a new CPA with the Commission in the summer of odd years. Cascade is in the process of adjusting the cadence of future CPAs to move up this delivery date towards alignment with local electric utilities to better inform the IRP through more recent model inputs and outputs.

The CPA process is outsourced to maintain impartial findings and to leverage industry experience and best practices in measure and savings assumptions. Cascade employs a third-party firm, currently Applied Energy Group (AEG), for the development of its CPA.

[1] UG-230937

AEG is an industry leader who developed Cascade's three most recent CPAs and who works with other regional utilities on their assessments. The conservation potential for this IRP is calculated through AEG's forecasting model from a CPA performed in spring of 2023 and was updated in the fall of 2024 for Cascade.[2]

Load Management Analysis and Planning Tool (LoadMAP)

AEG's LoadMAP model is separated into three results modules:

- LoadMAP Baseline takes a units-based approach to stock turnover, tracking equipment installations in each year.

- LoadMAP Potential forecasting module calculates potential savings relative to the baseline projection developed in the previous module. This model begins with the detailed stock accounting results from the LoadMAP Baseline analysis but converts all measures to single line-items for transparency and ease of review.

- LoadMAP Results summarizes modeling outputs from the two prior modules at both a high level and in measure-by-measure detail. This module does not perform any potential estimation calculations but is instead intended to serve as a centralized location for reviewing model outputs and summarizing results.

The model then forecasts efficiency potential in terms of:

- Technical Potential,
- Achievable Technical Potential,
- Achievable Economic Utility Cost Test (UCT) Potential, and
- Achievable Economic Total Resource Cost (TRC) Potential.

AEG's forecasting term definitions for the CPA and LoadMAP:

> ***"Baseline Projection**: Projection of baseline energy consumption under a naturally occurring efficiency case, described at the end-use level. The LoadMAP models were first aligned with actual sales and Cascade's official, weather-normalized econometric forecast and then varied to include the impacts of future federal standards, the 2018 Washington State Energy Code on new construction, which took effect starting in 2021, and future technology purchasing decisions."*
>
> ***"Technical Potential** is defined as the theoretical upper limit of EE potential. It assumes customers adopt all feasible measures regardless of their cost. At the time of existing equipment failure, customers replace their equipment with*

[2] CPA filing docket details

the most efficient option available. In new construction, customers and developers also choose the most efficient equipment option.

Technical potential also assumes the adoption of every other available measure, where technically feasible. For example, it includes the installation of high-efficiency windows in all new construction opportunities and furnace maintenance in all existing buildings with installed furnaces. These retrofit measures are phased in over a number of years to align with the stock turnover of related equipment units, rather than modeled as immediately available all at once."

***"Achievable Technical** Potential refines technical potential by applying customer participation rates that account for market barriers, customer awareness and attitudes, program maturity, and other factors that affect market penetration of conservation measures. The customer adoption rates used in this study were based on the ramp rates developed for the Council's 2021 Plan and adjusted to reflect differences between electric and natural gas energy efficiency resources and Cascade's program experience."*

***"UCT Achievable Economic** Potential further refines achievable technical potential by applying an economic cost-effectiveness screen. In this analysis, primary cost-effectiveness is measured by the UCT, which assesses cost-effectiveness from the utility's perspective. This test compares lifetime energy benefits to the costs of delivering the measure through a utility program, excluding monetized non-energy impacts. These costs are the incentive, as a percent of incremental cost of the given efficiency measure, relative to the relevant baseline course of action (e.g. federal standard for lost opportunity and no action for retrofits), plus any administrative costs that are incurred by the program to deliver and implement the measure."*

Note: Cascade prioritizes the evaluation of cost effectiveness at the portfolio level permitting diversity in measure offerings across climate zones. The individual measure cost-effectiveness threshold at 0.9 functions as a proxy for cost effectiveness measures seen as attractive but not individually cost-effective (e.g. February 1, 2021, 0.30 windows were offered at a UCT value of 0.75). Similarly, certain climate zones may have an overall cost effectiveness below 1.0, but measures may still pass so long as the portfolio remains above this threshold. These examples demonstrate Cascade's response to market forces that require consideration of all portfolio possibilities.

***"TRC Achievable Economic** Potential is similar to UCT achievable economic potential in that it refines achievable technical potential through cost-effectiveness analysis. The TRC test assesses cost-effectiveness from a combined utility and participant perspective. As such, this test includes full measure costs but also includes non-energy impacts realized by the customer if quantifiable and monetized."*

The current LoadMAP model does have some limitations, most notably being originally designed for a 20-year forecast horizon. This falls short of the designated 2050 target year for the Company's sustainability planning and carbon compliance goals which were not originally in scope at the time of LoadMAP implementation. The forecast model for future CPAs will take this extended forecast window into consideration.

AEG was able to modify the LoadMAP model under updated inputs through 2045 with minor adjustments, but these adjustments were unable to be utilized for 2046-2050. For 2046-2050, the average annual savings from 2040-2045 is used as a proxy. Washington specific information in the following sections of this chapter will be truncated to 2045 for this reason.

Energy Efficiency 2050 Horizon Potential Forecast

This IRP provides Cascade's Washington service territory therm savings potential as calculated by AEG in the 2023 CPA filed in June 2023. The 2023 CPA LoadMap model has been updated from the 2020 Phase 2 CPA to align inputs with the rest of this IRP.

These updates included:

- Updates in Avoided Costs to be consistent with Chapter 5.
- The long-term discount rate increased from 3.40% to 5.06%.
- A warming climate assumption with decreasing heating degree days over time.
- Assumptions developed regarding building codes and appliance standards.
- Trends in fuel shares and equipment saturations.

Large scale updates to the model when completing a new CPA are intended to build upon an improved level of transparency and granularity to the Company's planning processes.

These updates by AEG often include:

- Residential annual equipment consumption data based on most recent U.S. Department of Energy (DOE) data.
- Measure achievability ramp rates to improve model alignment with achieved program results.
- Natural gas forecasting methods that work in parallel with the electric-focused Northwest Power and Conservation Council (NPCC) 2021 Power Plan.
- Comprehensive updates to all measure characterizations.
- Update non-energy impacts (NEIs) and values for evaluating potential under the UCT and TRC.
- Reviewed and updated incentives for measures currently active in CNGC programs.

The forecast is categorized by the three customer classes: Residential, Commercial and Industrial. The forecast for each class includes individual savings assumptions, market segmentations, and end uses (Residential weather dependent measures have different savings potential by climate zone). The demand planning assumptions were provided by Cascade's Resource Planning Team (RPT) and, thereafter, the efficiency potential forecast outcome was delivered to the RPT for integration into the IRP demand forecast model.

AEG employs a modeling tool called the "Load Management Analysis and Planning" model, described as follows.

> *"Load Management Analysis and Planning (LoadMAP™) tool was developed in 2007 and was first used for the EPRI National Potential Study. Since that time, LoadMAP has been used to develop end-use forecasts and perform dozens of energy efficiency (EE) potential studies. The LoadMAP model provides forecasts of energy use by sector, segment, end use and technology for existing and new buildings. It can also be used to isolate and estimate savings from DSM measures and programs. LoadMAP was developed by Global Energy Partners, LLC (GEP) under the direction of Ingrid Rohmund. EnerNOC acquired GEP and the LoadMAP model in 2011. In June 2014, AEG acquired EnerNOC's Utility Solutions Consulting Group and the LoadMAP model. AEG supports ongoing enhancements to the model."*[3]

This modeling tool provides the ability to run multiple scenarios and re-calculate potential savings based on variable inputs, such as the customer and demand forecasts, IRP long term discount rate, heating degree days, transmission loss rate and Avoided Costs. Recent annual program performance and measure data collected through energy efficiency programs are incorporated to establish incremental costs reflective of Cascade's service territory. This model provides transparency to all assumptions and calculations for estimating market potential.

Avoided costs are a key input to the potential model. They are variable costs for a unit of energy, or capacity, or both that are avoided through energy efficiency adoption. There is a direct correlation between variable energy costs and savings potential. The higher the variable energy costs, the greater the savings potential when those costs are avoided allowing for more robust energy efficiency options to be offered as cost-effective opportunities. These per therm avoided costs flow through the forecast and are the primary factor in calculating efficiency potential. Average avoided costs have historically followed an increasing trend most recently driven by the inclusion of the Social Cost of Carbon.

The economic merits of the portfolio are gauged through standard industry cost-effectiveness tests. Each test compares the benefits of the energy efficiency savings to their costs defined in terms of net present value of future cash flows.

[3] 2018 IRP, Appendix D

While Technical and Achievable Technical potential are both theoretical limits to efficiency savings, Achievable Economic potential embodies a set of assumptions about decisions consumers will make regarding the cost and benefits of the equipment they purchase. Based on Pacific Northwest regional standard practice, Cascade's EE planning adopts the Achievable Economic UCT potential to set goals under an array of possible future conditions.

Cascade applies the UCT for evaluating the Benefit Cost ratio across its programs. The Benefits in the UCT calculation are the avoided energy capacity costs for the lifetime of the measure; the costs in this test are the program administrator's incentive costs and administrative costs.

In addition, LoadMAP concurrently runs all scenarios under the TRC for comparison. The cumulative long-term potential under the UCT remains higher at the programmatic level than the TRC, whereas this may not always be the case in the short-term.

Washington Market Segmentation & End Use

An important first step in calculating Cascade's energy efficiency potential estimates is to establish baseline energy usage characteristics and disaggregate the market by sector, segment, and end use.

The Residential market has three Climate Zone segments for Single family and some Multi Family housing stock, resulting in six market segments.

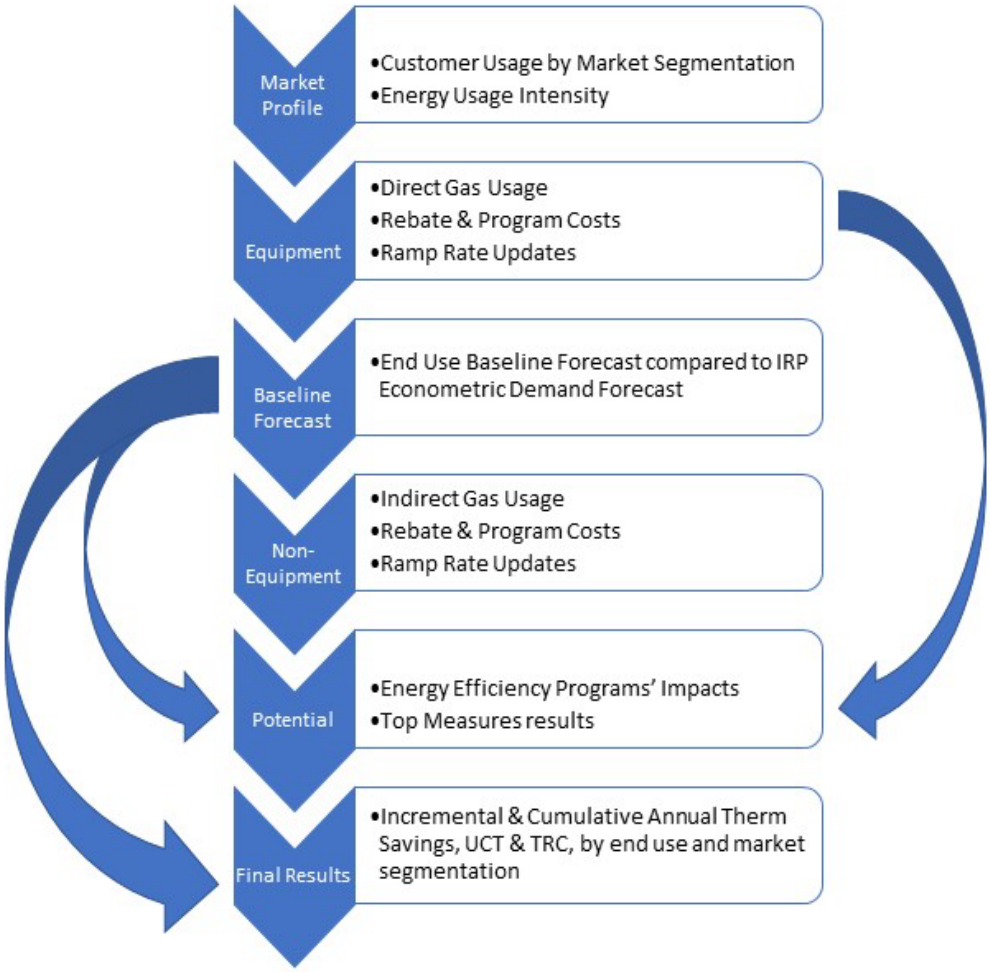
Commercial market segmentation includes: Office, Retail, Restaurant, Grocery, Education, Healthcare, Lodging, Warehouse, and a "Miscellaneous" category.

Industrial market is segmented by: Food Processing, Agriculture, Primary Metals, Stone/Clay/Glass, Petroleum, Paper & Printing, Instruments, Wood & Lumber Products, and an "Other" category.

End use categories include: Space Heating, Water Heating, Secondary Heating, Food Preparation, Appliances, Process Heating, and miscellaneous. All of these are ultimately categorized into baseline and peak load.

Figure 7-2 illustrates the LoadMAP efficiency potential process.

Figure 7-2: Savings Potential Process in LoadMAP



There are six separate workbooks that make up the full DSM forecast for each customer class. These all follow the same order of operation, starting with the Market Profile, which feeds into the Equipment workbook. The Equipment then feeds into the Baseline, which feeds into Non-Equipment. When running the Potential model, the Equipment, Baseline, and Non-Equipment are all imported. The Final Results import the Potential results and the Baseline.

AEG also provides advice on how to update ramp rates based on the NPCC methodology and industry best practices.

Progress to Plan

The Company's DSM efforts for this cycle and associated incorporation into the IRP provides context on the current potential as calculated by AEG in the 2023 CPA.

Company therm savings achievements for the past four biennium compared to the gas conservation targets approved for Cascade Natural Gas Corporation pursuant to RCW 80.28.380 are shown in Figure 7-3. The *Difference* column represents the percent change from goal to actual and the *Growth* column represents the percent change in actual therm savings from one biennium to the next.

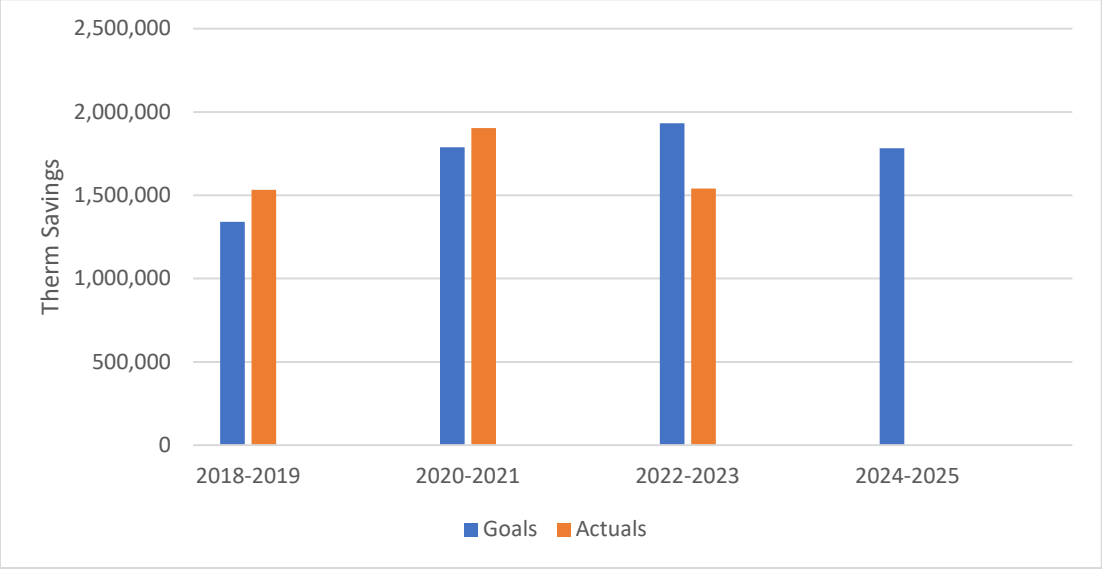
Figure 7-3: Historical Goal to Actual Therm Accomplishments

Biennium	Goals	Actuals	Difference	Growth
2018-2019	1,340,278	1,532,775	**14%**	**37%**
2020-2021	1,788,452	1,902,399	**6%**	**19%**
2022-2023*	1,931,751	**1,540,723**	**-20%**	***-23%***
2024-2025	1,782,212	**TBD**	**TBD**	***TBD***

*2023 Actuals awaiting WUTC Approval

Figure 7-4 visualizes the actual historical performance and the Biennial Conservation Goals.

Figure 7-4: Portfolio Biennium Goals + Actuals



Processing Software

The Company has historically used the "iENERGY DSM Central" software product from Resource Innovations (RI) Inc. as a tool for processing Residential and Low Income (LI) projects and assisting with management of the Trade Allies (TA) program. In 2023, Intermountain Gas Company officially deployed the Enterprise Rebate Application (ERA) for rebate processing. This software solution was designed and programmed through a collaborative effort with MDU's Enterprise Information Technology team and IGC's EE team. Cascade will be migrating over to the ERA for residential rebate processing in 2025 in alignment with Intermountain Gas.

Third Party Measure Level EM&V

In August of 2022, Cascade distributed a Request for Proposals (RFP) for third-party measure level Evaluation, Measurement, and Verification (EM&V) of the program to build on historic internal evaluation efforts as outlined in Section 9c of the Condition's Documents for Docket UG-21083813. CNGC has worked with ADM Associates, Inc. on all filed EM&V and on in-progress studies.

Cascade intends to follow the EM&V schedule, below:

Spring 2023: Commercial Program Impact EM&V
Spring 2024: Residential Equipment Impact EM&V, Full Program Process EM&V
Spring 2025: Residential Envelope Impact EM&V
Spring 2026: Low Income & Full Program Process EM&V

An impact review for commercial program offerings kicked off the first-year schedule of EM&V activities. The final report was delivered and filed under Docket UG-210838 on September 15, 2023. ADM evaluated CNGC's custom, space heating, water heating, envelope, and food service measures between program years 2018 and 2022. Results were very positive. The total verified savings amounted to 1,557,895 therms, showing the program achieving a 94.47% realization rate. This means that for every 100 therms projected, 94.47 therms were estimated to be saved by the program through statistical billing analysis. These verified savings were calculated with 10% precision at the 90% confidence level. This means there is no statistical deviation from a true 100% realization rate. The greatest savings were achieved through Custom projects, Space Heating, and Envelope measures.

The residential equipment impact EM&V along with the program process EM&V were filed under UG-210838 on 9/13/2024. The program process EM&V provided recommendations that will be considered to improve outreach, communication with partners and CAP agencies, along with future incentive offerings.

Once again, results were very positive. The residential equipment impact EM&V showed CNGC had a 121.1% realization rate between the years of 2018-2022, with five measures

having a realization rate of over 100%. ADM also provided multiple program improvement opportunities which will be considered during the upcoming 2025 CPA.

Work has begun on the residential envelope evaluation study that will be filed in 2025. The results of these evaluations will be used to inform future CPA studies along with improving the program.

Low Income

Cascade is committed to increasing participation from Community Action Agencies (agencies) to serve more customers through the Company's Weatherization Incentive Program (WIP).

The WIP provides funds to agencies based on the avoided cost of tariff-eligible weatherization measures installed in a customer's home. Agencies receive 100% reimbursement for all eligible weatherization measures installed. Installed cost includes incidental repair work necessary to the installation of a qualified measure, Incidental cost is a major contributor to Agencies' project deferral. WIP has been instrumental in the agency's ability to continue to serve households who would otherwise go unserved in energy justice communities.

On January 1, 2024, revisions to the WIP/EWIP program took effect, increasing per-project coordination payment by 10%. As a result, Agencies receive 30% per-project coordination and 10% for indirect rate for a total of 40% reimbursement of total project cost. In addition, the Enhanced Weatherization Incentive Program (EWIP) was consolidated with WIP. Under EWIP, participating Agencies were also eligible to receive a rebate designed to bridge the gap between the avoided cost payment and the total installed cost of the approved weatherization measure. Installed cost includes incidental repair work necessary to the installation of a qualified measure, Incidental cost is a major contributor to Agencies project deferral. EWIP has been instrumental in the agency's ability to continue to serve households who would otherwise go unserved in energy justice communities. EWIP is removed as the offering and referenced as WIP for ease of communicating the program as well as for simplified program administrations, both rebates will be offered simultaneously through WIP.

Overall, the WIP program is operating as intended, with increased engagement by the agencies that deliver weatherization services in Cascade's service territory. Though Agencies continue to face supply chain issues and labor shortages, we have seen a steady increase post COVID-19.

Budget to Plan

Cascade sets its administrative budget based on Avoided Costs in place at time of development. Since therm savings offset the costs of administrative investment, the greater the achievement, the more cost-effective the programs. See Figure 7-5 for the goals and budgets for 2024 and 2025 (rounded to the nearest dollar) for reference. These were used in development of the last Biennial Plan. The next BCP will cover budgets for the 2026-2027 Biennium and will be developed based on updated avoided costs and 2025 CPA results. The 2026-2027 budget draft will be submitted to the CAG by September 2025 per the 2024-2025 BCP conditions document.

Figure 7-5: Program Goals & Budgets at a Glance 2024 & 2025 Biennium

	Calendar Year 2024				Calendar Year 2025				Biennial Totals
	Residential	C/I	Low Income	1st year Total	Residential	C/I	Low Income	2nd year Totals	
Cascade Admin Budget[1]	$1,708,246	$1,351,913	$459,191	$3,519,350	$1,742,411	$1,453,405	$517,391	$3,713,207	**$7,232,557**
Therm Targets[2]	426,621	368,700	19,522	814,843	502,044	443,760	21,565	967,369	**1,782,212**
NEEA Natural Gas Market Transformation				$348,908				$651,234	**$1,000,142**
Regional Technical Forum				$31,300				$58,421	**$89,721**
Evaluation, Measurement & Verification				$183,660				$94,340	**$278,000**
Conservation Potential Assessment								$160,000	**$160,000**

[1] *Budgets in this table are estimates and refer to administrative costs for program implementation, not rebates.*
[2] *Therm targets have been developed with LoadMAP through the 2023 CPA Phase*

LoadMAP generated targets are acknowledged in the BCP and programs are managed to ensure cost effectiveness is maintained. If the budget or therm savings upon which the portfolio is built are unrealistic, the Company risks developing a scale-dependent portfolio unable to maintain cost effectiveness.

Energy Efficiency Programs Forecasted Savings – Alternative Modeling

Cascade has re-run the LoadMAP model from the most recent CPA to include additional future scenarios with assumptions on alternative demand forecasts and updated inputs to align with the rest of this IRP. These updates included:

- Updates in avoided costs to be consistent with Chapter 5 including the addition of the Social Cost of Carbon.
- The long-term discount rate increased from 5.06% to 6.09%.
- A warming climate assumption with decreasing heating degree days over time.
- Updated inflation rate and distribution system loss.

Cascade utilizes the UCT to measure the program's cost effectiveness. The UCT Test is the optimal vehicle for valuation of these measures since it is a straightforward and clean calculation of the utility's investment in DSM and does not penalize customers for making independent determinations regarding the cost-benefit of an EE upgrade. The UCT instead treats the rebate from utility run natural gas efficiency programs as a leveraged partnership that drives positive market change and the installation of measures with the potential for long-lived and deeper energy savings.

As recommended by the WUTC, Cascade has input updated avoided costs figures into the LoadMAP model for this IRP due to broad market economic changes since Cascade's CPA was last completed. Additional assumption updates include updates to Customer Demand Forecasts, Heating degree days, inflation rate and distribution system loss.

Therms savings is directly influenced by projected consumption, and the lower demand from the flat growth rate in the reference case forecast creates a net decline in potential savings compared to the Company's most recent CPA models. For example, the lower customer forecast based market growth trends decreases opportunities for strongly cost-effective measures like residential furnaces, water heaters, and fireplaces. However, higher Avoided Costs have increased cost-effective potential in most measures, particularly for lower income customers in the prescriptive residential program which would allow more measures to qualify for the incentive program.

This scenario is referred to as Scenario A in the following summary graphs and tables. Additional scenarios have also been run as outlined in the subsequent "Alternative Modeling Scenarios" section.

Figure 7-6 shows the Residential, Commercial, Industrial cumulative DSM forecast by Technical, Achievable Technical and both UCT/TRC Achievable Economic Potentials for scenario A.

Figure 7-6: Cumulative Residential, Commercial, Industrial Potential Forecasts

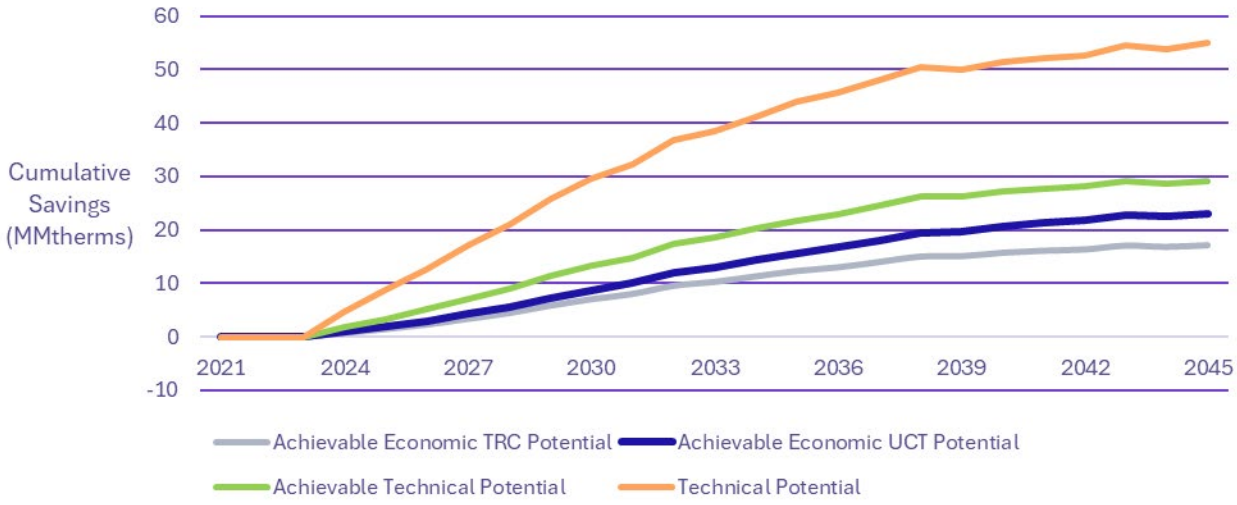


Figure 7-7 shows cumulative savings potential for the Industrial program through 2045.

Figure 7-7: DSM Cumulative Savings Forecast - Industrial

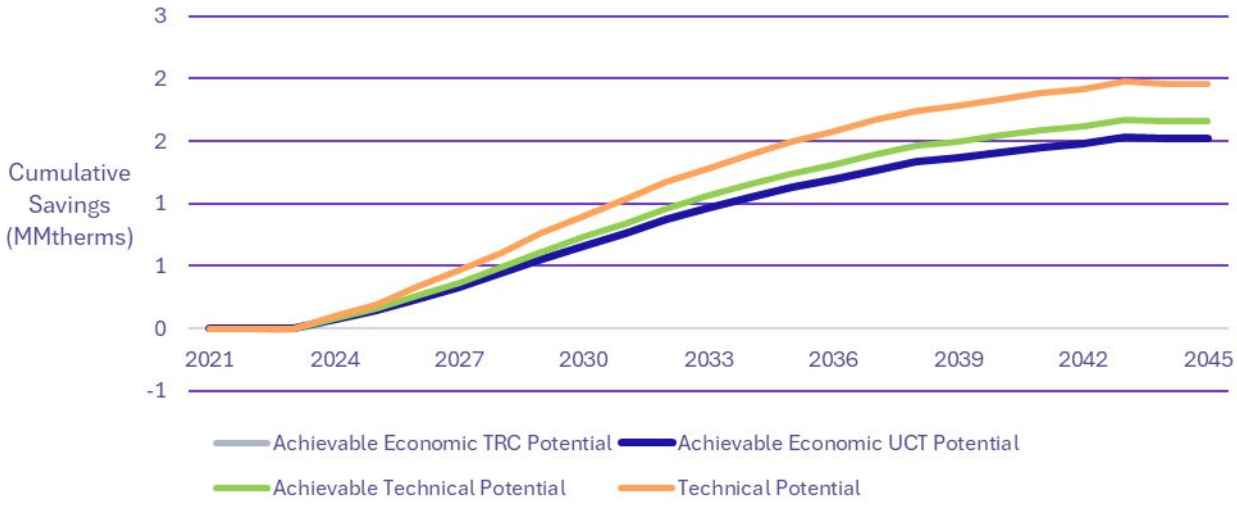


Figure 7-8 shows the Commercial cumulative DSM forecast by Technical, Achievable Technical and both UCT/TRC Achievable Economic Potentials for scenario A.

Figure 7-8: DSM Cumulative Savings Forecast – Commercial

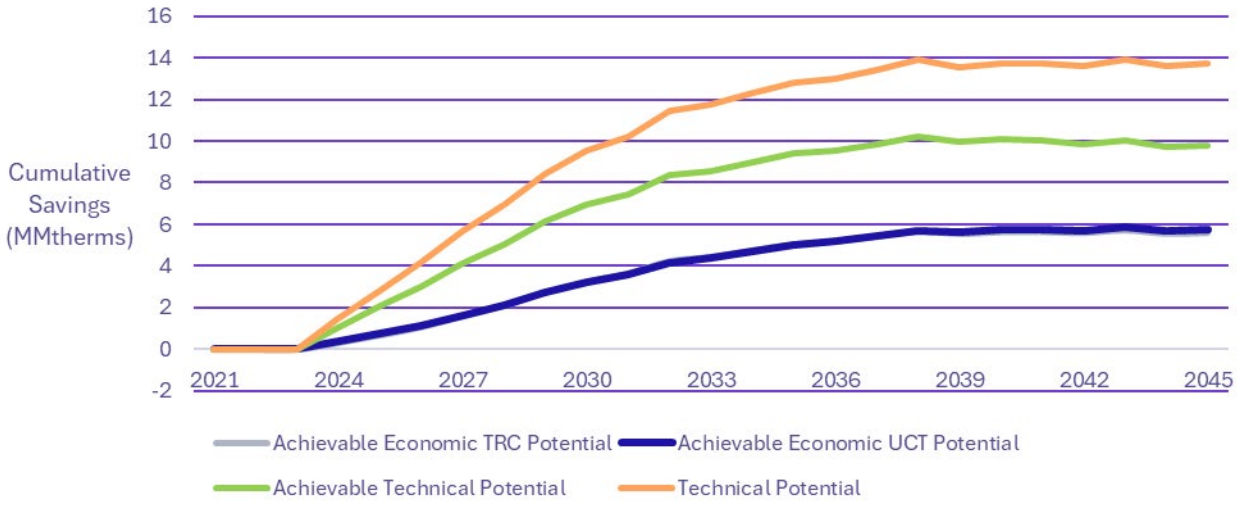
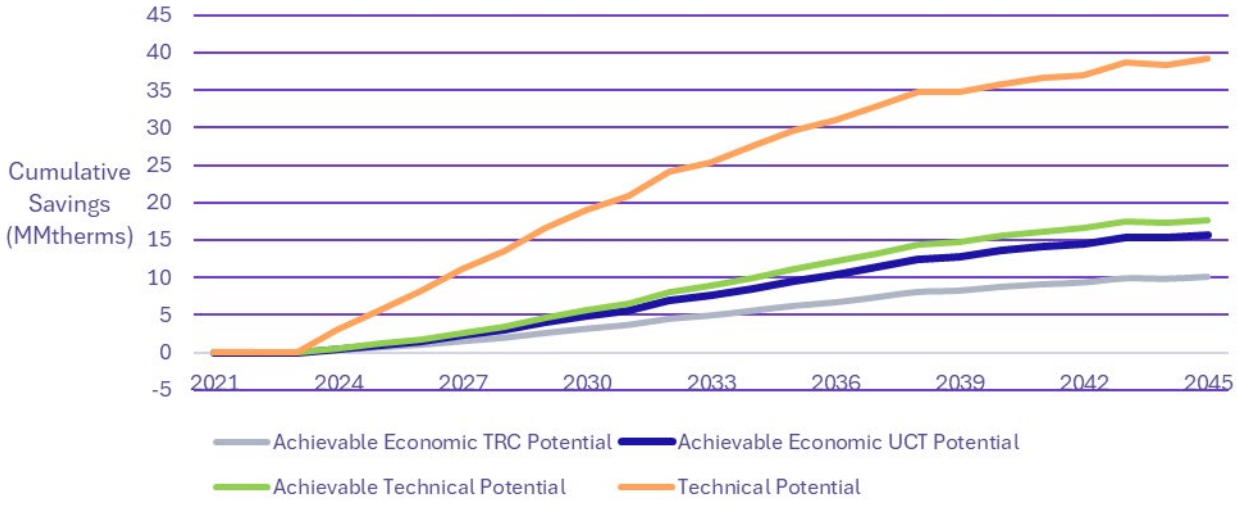


Figure 7-9 shows the Residential cumulative DSM forecast by Technical, Achievable Technical and both UCT/TRC Achievable Economic Potentials for scenario A.

Figure 7-9: DSM Cumulative Savings Forecast – Residential



Figures 7-10, 7-11, and 7-12 show the top 10 measures by sector for Scenario A with the most cumulative potential through 2045. Top ten measures account for more than 90% of all potential across the Industrial and Residential segments.

Figure 7-10 shows the top ten UCT measures for the Industrial program.

Figure 7-10: Top Ten 2045 Cumulative UCT Industrial Measures

Rank	Measure / Technology	Savings (mTherms)
1	Strategic Energy Management	349
2	Insulation - Roof/Ceiling	206
3	Gas Boiler - Insulate Hot Water Lines	186
4	Unit Heater	106
5	Process - Insulate Heated Process Fluids	104
6	Building Automation System	100
7	Gas Boiler - Insulate Steam Lines/Condensate Tank	91
8	Gas Boiler - Stack Economizer	83
9	Gas Boiler - Hot Water Reset	77
10	Gas Boiler - Burner Control Optimization	51

Figure 7-11 shows the top ten UCT measures for the Commercial program.

Figure 7-11: Top Ten 2045 Cumulative UCT Commercial Measures

Rank	Measure / Technology	Savings (mTherms)
1	Insulation - Roof/Ceiling	950
2	Unit Heater	861
3	Insulation - Wall Cavity	739
4	Boiler	366
5	ENERGY STAR Connected Thermostat	330
6	Furnace	237
7	Broiler	236
8	Gas Boiler - Insulate Hot Water Lines	222
9	Range	198
10	HVAC - Demand Controlled Ventilation	192

Figure 7-12 shows top ten UCT measures for the Residential program.

Figure 7-12: Top Ten 2045 Cumulative UCT Residential Measures

Rank	Measure / Technology	Savings (mTherms)
1	Furnace - Direct Fuel	4,449
2	Water Heater <= 55 gal.	2,414
3	Insulation - Ceiling, Upgrade	1,824
4	Fireplace	1,270
5	Insulation - Basement Sidewall	1,004
6	Insulation - Wall Cavity, Installation	995
7	Insulation - Ceiling, Installation	618
8	Ducting - Repair and Sealing	527
9	Insulation - Ducting	414
10	Water Heater - Pipe Insulation	283

As mentioned previously, the current LoadMAP model fully runs these alternative scenarios through 2045. Scenario B assumes a future scenario with high demand growth while Scenario C assumes a future scenario with low demand growth. The 2025 IRP Demand Forecast is overall lower than the 2023 CPA, even in Scenario B, the high demand growth scenario. The exception is in the Industrial sector, where the 2025 demand forecast is higher than in the 2023 CPA, which results in slightly higher Industrial potential in all scenarios. Scenario C, the low demand growth scenario is the only case in which there is a decline for Industrial savings by 2045.

The 2025 IRP has higher avoided costs than the 2023 CPA. This is also coupled with a higher discount rate which blunts some of the impact, particularly for longer-lived measures. In most cases this is insufficient to offset the drop in savings from the decrease in demand. Low Income residential is an exception here – many measures struggled with cost effectiveness in 2023 CPA due to the lower consumption per home in those segments. The higher avoided costs are sufficient to cause more measures to pass, which offsets the population change and leads to higher energy savings potential for lower income participants in the residential prescriptive EE program in all three scenarios compared to the 2023 CPA.

Important to note, the updated IRP Reference case and the Alternative Scenario Models reflect any known changes to federal codes and standards that may have occurred since the 2023 CPA. These forecasts also include known local or municipal natural gas use restrictions at the time of the study. Cascade and AEG will continuously review these

items in the upcoming 2025 CPA to continue improving forecasted baseline and savings estimates.

Figure 7-13 compares the portfolio cumulative achievable UCT potential of Scenarios A, B, and C compared to the original 2023 CPA.

Figure 7-13: Cumulative Achievable UCT Potential Scenario Comparison

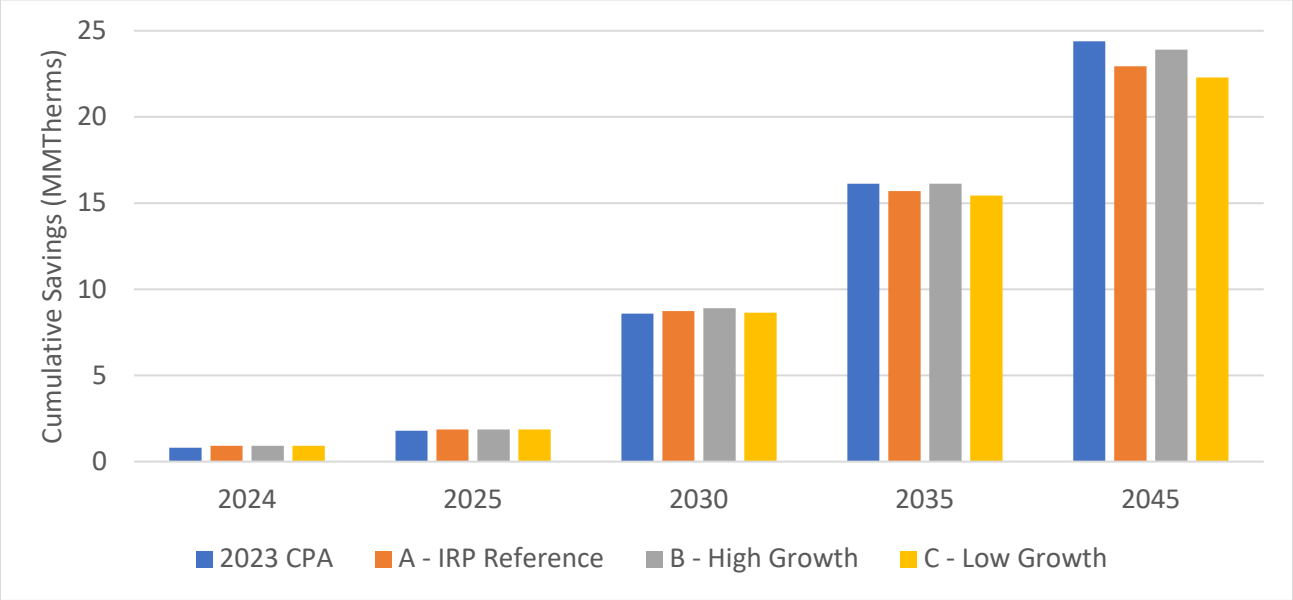


Figure 7-14 provides a comparison of savings potential for these three scenarios against the most recent CPA.

Figure 7-14: Cumulative UCT Potential Scenario Comparison

Scenario	Group	Sector	Sum of 2025	Sum of 2030	Sum of 2035	Sum of 2040	Sum of 2045
2023 Original	**Regular Income**	Residential	341.4	1,863.5	4,264.8	6,520.1	8,036.8
	Moderate Income	Residential	595.2	2,784.3	5,248.5	7,137.4	7,962.4
	Low Income	Residential	33.2	193.6	457.5	688.8	826.5
	Commercial	Commercial	670.3	3,128.5	5,099.4	5,979.6	6,128.6
	Industrial	Industrial	142.1	614.2	1,057.7	1,326.2	1,429.9
2023 Original Total			**1,782.2**	**8,584.1**	**16,127.9**	**21,652.0**	**24,384.3**
Reference - 2025 IRP	**Regular Income**	Residential	347.5	1,863.1	4,071.9	6,122.2	7,425.5
	Moderate Income	Residential	592.1	2,736.1	4,924.3	6,623.0	7,264.2
	Low Income	Residential	48.5	259.3	565.4	831.9	981.1
	Commercial	Commercial	733.0	3,219.1	5,005.3	5,728.6	5,747.3
	Industrial	Industrial	141.3	663.1	1,127.8	1,409.9	1,523.4
Reference - 2025 IRP Total			**1,862.4**	**8,740.8**	**15,694.8**	**20,715.6**	**22,941.6**
Low Growth	**Regular Income**	Residential	346.3	1,833.6	3,987.9	5,968.7	7,196.6
	Moderate Income	Residential	589.5	2,690.8	4,824.1	6,459.6	7,054.0
	Low Income	Residential	48.3	255.6	554.4	811.8	951.6
	Commercial	Commercial	734.6	3,259.2	5,057.3	5,753.5	5,748.6
	Industrial	Industrial	141.5	600.6	1,011.0	1,253.3	1,341.2
Low Growth Total			**1,860.2**	**8,639.9**	**15,434.6**	**20,246.9**	**22,291.9**
High Growth	**Regular Income**	Residential	347.5	1,895.0	4,183.0	6,337.4	7,761.7
	Moderate Income	Residential	592.1	2,781.2	5,049.1	6,842.0	7,573.7
	Low Income	Residential	48.5	263.4	580.2	860.5	1,025.0
	Commercial	Commercial	734.5	3,303.7	5,184.0	5,961.8	6,018.8
	Industrial	Industrial	141.3	663.1	1,127.8	1,409.9	1,523.4
High Growth Total			**1,864.0**	**8,906.4**	**16,124.2**	**21,411.5**	**23,902.7**

Importance of Outreach and Cohesive Messaging

Outreach and community engagement remains an integral tool to reduce energy use and increase program uptake. The EE department frequently reaches out to customers through the various media including:

- Bill inserts to all qualifying Washington rate schedule customers:
  - These are both hard copy and electronic with topics ranging from LI weatherization availability, high-efficiency water heating, whole home weatherization, commercial rebate availability, low cost/no cost savings recommendations, furnaces, combination units, etc.

- Radio campaigns highlighting Trade Ally contractors in select territories to promote the incentive program and general low cost/no cost options for reducing natural gas consumption. Outreach is provided in both English and Spanish.
- Leveraged messaging with community organizations and other utilities.
- Community project engagement:
    - When able the EE Department works with local nonprofit groups including Clean Air Agencies to promote more efficient use of natural gas over alternative heating fuels like uncertified wood burning fireplaces.
- The Company has also expanded its social media, and video streaming outreach in a remote environment.
- Business exposition tabling, community events and exhibitions
- Targeted direct mail and email efforts
- Virtual videos and event participation
- Targeted magazine and newspaper advertising incorporating QR codes for data gathering.

In addition to the standard practices, the Company provides specific details as part of its BCP where additional efforts above and beyond standard messaging are underway to help increase program participation. Examples of outreach can be found in the Company's Biennial Conservation Achievement Report[4].

Regional Efforts and Long-Term Benefits

Cascade is a funding member of the Northwest Energy Efficiency Alliance (NEEA) which provides additional efficiency savings by joining with other regional utilities. This consortium of funding utilities and energy efficiency stakeholders shares a common goal to increase market adoption of energy efficient natural gas products and practices in the future through market transformation, with longstanding effects on future therm saving opportunities.

Community engagement efforts in tandem with regional endeavors like the NEEA Natural Gas Market Transformation Collaborative have longstanding effects on future therm saving opportunities. The goal is to increase market adoption of energy efficient natural gas products and practices in the future.

Cascade's participation with the Alliance continues with efforts specifically centered on the Natural Gas Advisory Committee (NGAC), along with the Natural Gas Committee of the Board and the Board of Directors workshops and meetings. Company investment in NEEA is shown in Figure 7-15.

[4] 2022-2023 Biennial Conservation Achievement Report

Figure 7-15: CNGC NEEA Financial Commitment Schedule

Year	CNGC Washington Commitment
2020	$348,908
2021	$348,908
2022	$348,908
2023	$348,908
2024	$348,908
Cycle 6 Total	**$1,744,540**
2025	$651,234
2026	$651,234
2027	$651,234
2028	$651,234
2029	$651,234
Cycle 7 Total	**$3,256,170**

Additionally, Cascade participates with NEEA on the Regional Building Stock Assessment (RBSA) reports as well as the Commercial Building Stock Assessment (CBSA). These assessments utilize existing building stock to account for regional differences such as climate, building practices and fuel choices and are frequently referenced in the CPA.

Adaptive Management

Economic impacts from COVID-19 are easing as access to labor and equipment improves for both residential and business customers in 2024. However, supply chain shortages and building material costs remain critical for decisions on high-efficiency equipment installations.

The previous biennium involved significant review of Washington state energy code, building requirements, and outlook on the future of energy efficiency in the Pacific Northwest. Cascade committed to staying abreast of environmental headwinds, building standards, and codes which disincentivize natural gas use as a focus of decarbonization efforts. The position of building code specialist was created and filled within the external affairs department to provide the Company with a dedicated code expert. Additionally, Cascade formed the EE West Department, integrating with Montana Dakota Utility Group's Intermountain Gas Company. This collaboration has focused on strengthened program delivery, outreach and education, commission relationships, and customer support which will be of great benefit in 2025 and beyond.

Conclusion

The LoadMAP modelling tool developed by AEG provides a detailed forecast of EE potential. Cascade's EE Department develops strategies to capture this savings potential across its service territory through implementation of programs, outreach, Trade Ally (TA) partnerships, Point of Sale Instant Rebate Program (POS), and the use of its third-party implementer TRC Companies for C/I program delivery. Cascade draws on years of experience to adaptively manage its DSM services and will continue to explore all options to actively capture savings to provide value to CNGC's customers, including potential enhancements resulting from contemplated tax credits, rebates, and new state and Federal incentives.

Cascade will begin implementing an internal rebate software solution in 2025 to improve rebate processing by leveraging information across the utility group. The goal of this software solution is to expedite the processing timeline and reduce friction in the rebate submittal and data storage processes. Additionally, Cascade has placed a continued focus on the TA network, and the POS Program, as these project streams constitute a significant opportunity for the program in the upcoming biennium.

The Commercial/Industrial Program is emerging from a period of supply chain slowdowns and decision delays which pushed project completion dates later than anticipated. The program has placed an emphasis on customer education and outreach to engage in conversations about high-efficiency gas use and the opportunities that are available to C/I customers under current codes and local legislation. There is a strong pipeline of projects going into 2025 with a positive outlook of meeting or exceeding therm savings goals for the program.

An enhanced focus will also be placed upon growing the LI program through revisions in measure offerings and fine-tuning energy savings assumptions. These initiatives along with other improvements in the adaptive management process sets the Residential, Commercial/Industrial, and Low-Income Weatherization programs up for success in the upcoming biennium.