CASCADE NATURAL GAS CORPORATION®

A Subsidiary of MDU Resources Group, Inc.

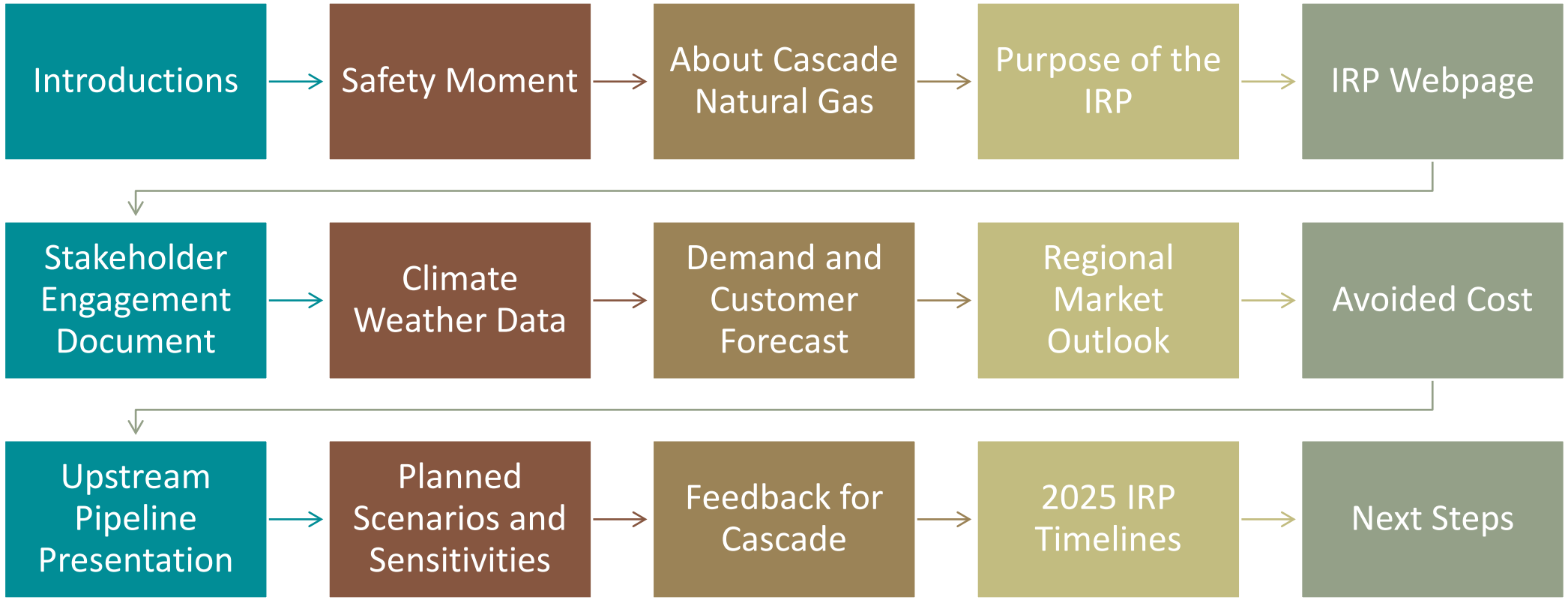
In the Community to Serve®

Integrated Resource Plan Technical Advisory Group Meeting #1

SEPTEMBER 12, 2024

MICROSOFT TEAMS/TELECONFERENCE

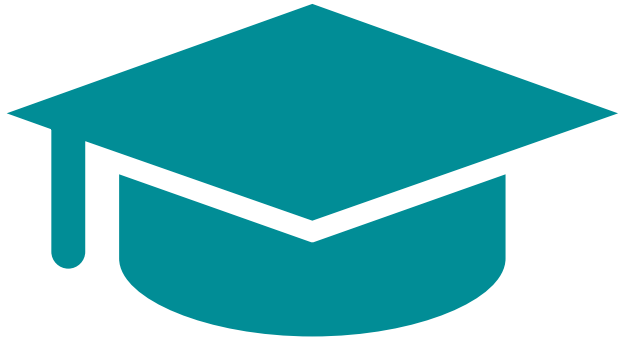
Agenda


Introductions
Safety Moment
About Cascade Natural Gas
Purpose of the IRP
IRP Webpage
Stakeholder Engagement Document
Climate Weather Data
Demand and Customer Forecast
Regional Market Outlook
Avoided Cost
Upstream Pipeline Presentation
Planned Scenarios and Sensitivities
Feedback for Cascade
2025 IRP Timelines
Next Steps

Safety Moment

A Little History Lesson…

- Prior to 1955, natural gas was virtually unheard-of in the Pacific Northwest. Seeing an opportunity, Lester Pettit, Spencer Clark, and Stewart Matthews led a group of associates to form a company that would rise to the challenge. Cascade Natural Gas Corporation was incorporated January 2, 1953.
- In July 2007, Cascade was acquired by MDU Resources headquartered in Bismarck, ND.
  - Founded in 1924 as an electric utility.
  - Core businesses are gas & electric utilities, and pipeline.
  - Approximately 11,000 employees, operating in 43 states.
  - Operates four utilities across eight states:
    - Montana-Dakota Utilities Co.
    - Great Plains Natural Gas Co.
    - Cascade Natural Gas Corporation
    - Intermountain Gas Co.



Today We Are…

Cascade serves more than 316,800 customers in 95 communities – 67 of which are in Washington and 28 in Oregon. Cascade's service areas are concentrated in western and central Washington and central and eastern Oregon.

Cascade serves a diverse territory covering more than 32,000 square miles and 700 highway miles from one end of the system to the other. Interstate pipelines transmit Cascade's natural gas from production areas in the Rocky Mountains and western Canada.

Purpose of IRP

IRP Guidelines and Content

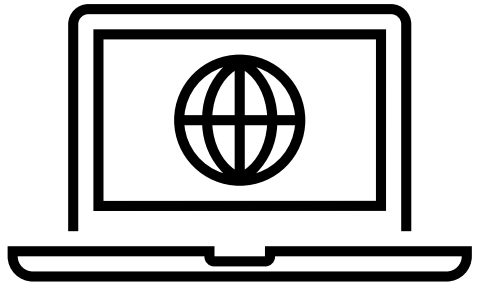
Washington

- IRP Guidelines from WUTC WAC 480-90-238.

Casade's Basic Philosophy

- Primary purpose of Cascade's long-term resource planning process has been, and continues to be, to inform and guide the Company's resource acquisition process, consistent with state regulatory requirements.
- Input and feedback from the Company's Technical Advisory Group (TAG) is an important resource to help ensure that CNGC's IRP is developed from a broader perspective than Cascade could have on its own.
- As the scope of the IRP continues to expand, Cascade is committed to securing and supporting the appropriate internal and external resources necessary to work with all stakeholders to produce an Integrated Resource Plan that meets the requirements of Washington and Oregon.

IRP Webpage



What, Who, How?

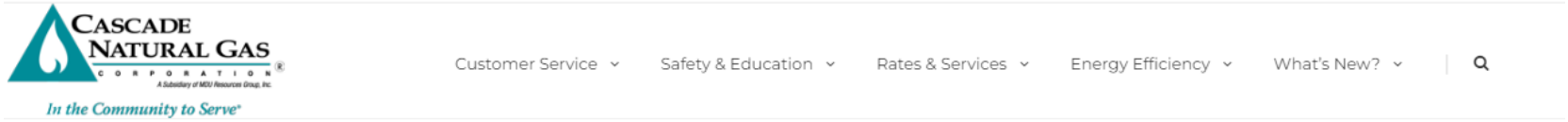
Information on Cascade's IRP can be found on the Company's webpage.

Stakeholder Engagement Design Document

Pre- and Post-IRP Feedback Report

IRP Timeline

Previous IRPs



Cascade Home » Rates & Services » Rates & Tariffs » Washington Integrated Resource Plan

WASHINGTON | CASCADE NATURAL GAS | NATURAL GAS – INTEGRATED RESOURCE PLAN

The What: Cascade's Integrated Resource Plan describes the two- to four-year and twenty-year expectation of how Cascade expects to safely serve customers' energy needs at the lowest reasonable and safe cost. The analyses in this 12–18-month process includes existing and potential new pipelines and natural gas supply contracts (among others) as well as benefits of energy efficiency to customers. The IRP provides comprehensive and transparent insight into how Cascade plans for customers' energy future. To view what an IRP looks like, please see Previous Years' IRP at the bottom of the page. The Executive Summary and Key Points are designed to provide a quick, but descriptive, explanation of the process and plan.

The Who: Customers and the general public are invited to participate in a series of meetings on the variety of topics contained in the IRP, including energy efficiency and carbon emission reductions. Together, customers and the general public participating in the IRP process are called Stakeholders. Stakeholders also include the professional analytical staffs of the state utility commissions and groups representing residential and industrial customers. Community-based organizations and independent experts also attend the series of meetings.

How it works: The IRP process begins with a kick-off meeting to lay out the 12-18 month schedule of four to six meetings as well as provide an overview of what issues will be covered. These meetings are called Technical Advisory Group meetings or TAGs. Links are available to the TAG presentations, minutes, and written responses to Stakeholder's requests and comments.

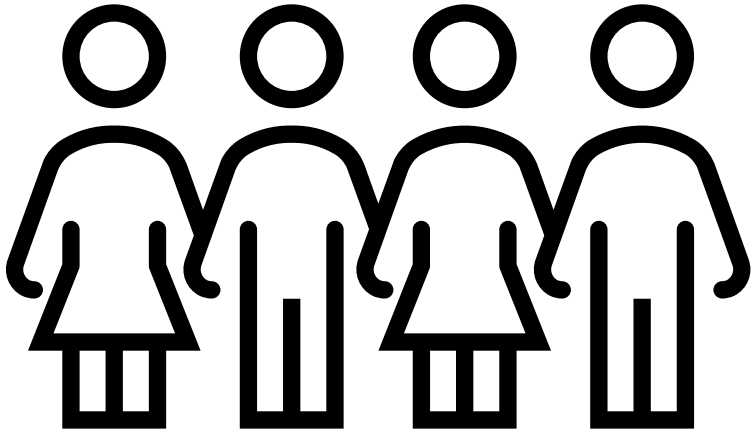
What to expect: Expectations of participants and tips for the best way for Stakeholders (including customers and the general public) are described in Cascade's Stakeholder Engagement Design Document. This is a "living document" and suggestions for improvement are welcome.

Sign up! Join Cascade's distribution list. You may participate in multiple ways, ranging from attending the TAG meetings (either in-person or remotely) and receiving the agendas/presentations to opportunity to comment. Do so by contacting the Supervisor of Resource Planning, Brian Robertson at either Brian.Robertson@cngc.com or (509) 221-9808. You may also contact the Company's IRP email address at irp@cngc.com. Cascade uses MSTeams as its means to connect participants remotely. MSTeams is a free application to be used by Stakeholders including customers and the general public.

Accommodations: As shown as point #1 on page 2 of the Stakeholder Engagement Design Document, Cascade will provide reasonable accommodations for people with disabilities. Additionally, the Company will reasonably accommodate items such as requests for meeting locations, audio and visual capabilities, and other items requested by external stakeholders. If you have a request for accommodations, please reach out to one of the contacts listed above and the Company will gladly coordinate any reasonable requests for accommodations.

Pre- and Post-IRP feedback report:

Washington Integrated Resource Plan - Cascade Natural Gas Corporation (cngc.com)



Stakeholder Engagement Document

"Cascade seeks to employ best industry practices and recognizes external participation can add incremental improvements.

Cascade recognizes stakeholders have a multitude of projects before them. This Design Document is intended to assist in optimizing participation by interested parties to yield a solid IRP to the benefit of customers and the Company."

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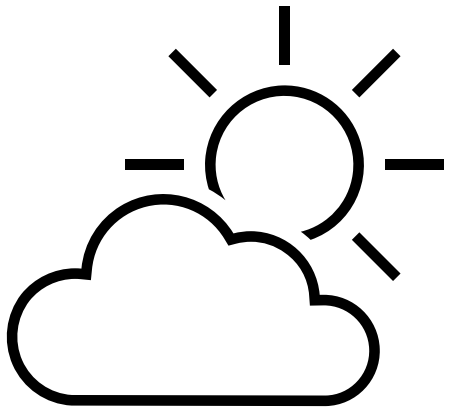
CASCADE NATURAL GAS STAKEHOLDER ENGAGEMENT DESIGN DOCUMENT

Abstract

This document contains the rational, assumptions, and explanation behind the Stakeholder Engagement process of Cascade's IRP Process



Climate Weather Data

Climate Science Background

- 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.
- **Probabilistic projections** draw on an ensemble of models to capture a fuller range of potential future climate conditions.

Representation of gridded earth system to represent downscaling from GCMs. Source: Encyclopedia of the Environment

Future Climate Scenarios

- Cascade developed climate projections under **multiple future emissions scenarios and a large ensemble of GCMs** to account for uncertainty in future greenhouse gas emissions and climate response.
- The most recent climate projections use **Shared Socioeconomic Pathways** (SSPs) emission scenarios:
  - **SSP2-4.5** represents a **more likely** scenario assuming meaningful greenhouse gas emissions reductions by mid-century.
  - **SSP3-7.0** represents a **less likely** scenario assuming greenhouse gas emission increase throughout the century.

Possible Emission Futures Under CMIP6

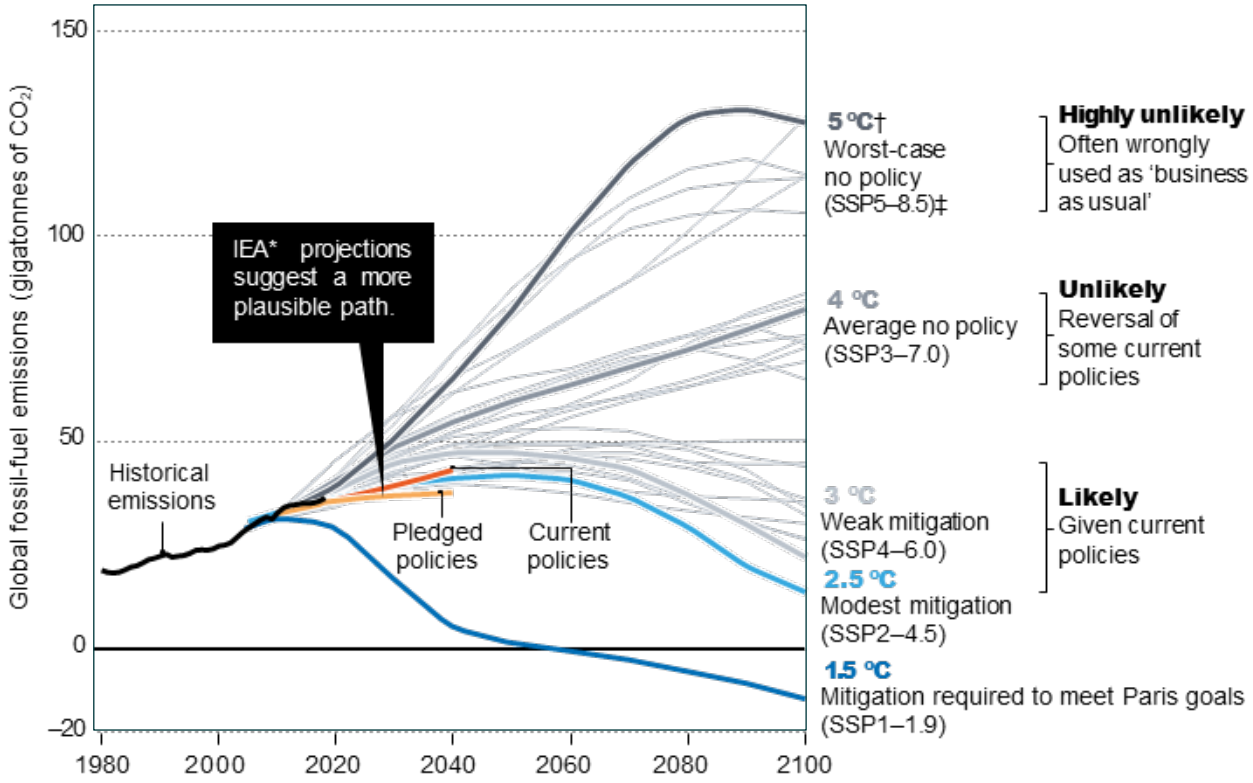
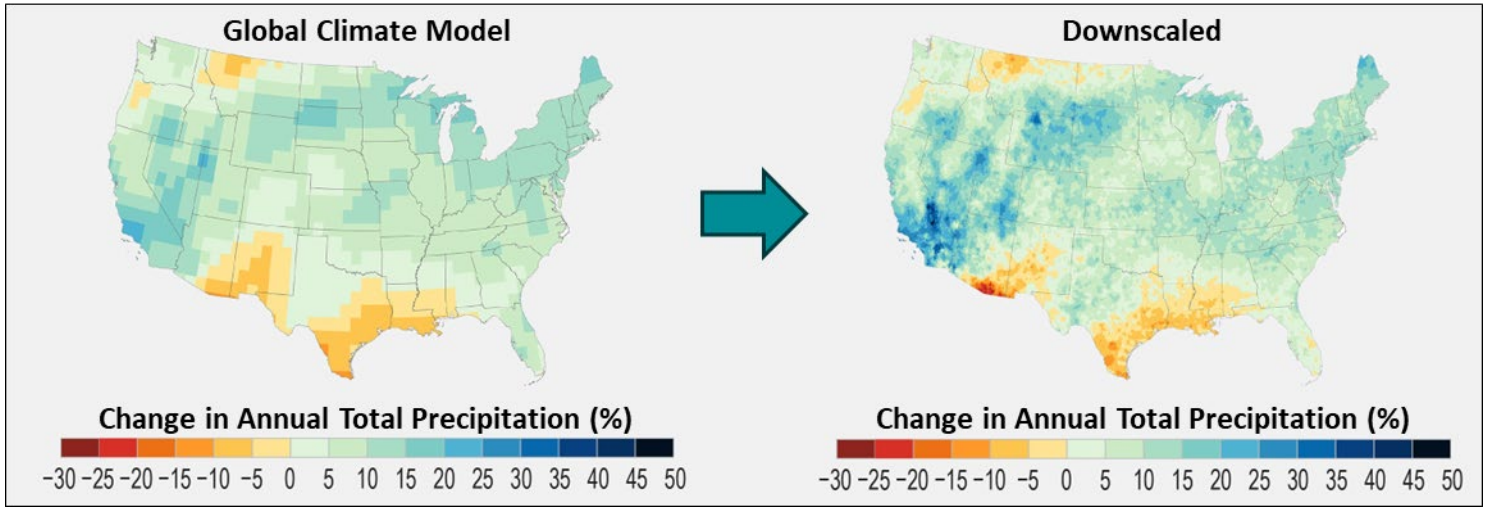


Illustration of SSP emissions scenarios and associated likelihoods. Source: Zeke Hausfather & Glen P. Peters.

Methods

- Cascade leveraged **Localized Constructed Analogs Version 2** (LOCA2)[1] downscaled temperature projections to developed custom **heating degree day** (HDD) projections for weather stations across the service area.
  - **Peer-reviewed and used in landmark climate assessments** (e.g., Fifth National Climate Assessment).
  - **Supports 22** common models between **SSP2-4.5** and **SSP3-7.0.**
  - **Downscales projections** to a 6km resolution across the service area to better resolve temperature extremes.
- Cascade paired LOCA2 projections with observational time series to **correct historical biases** relative to observations and better resolve local climatology



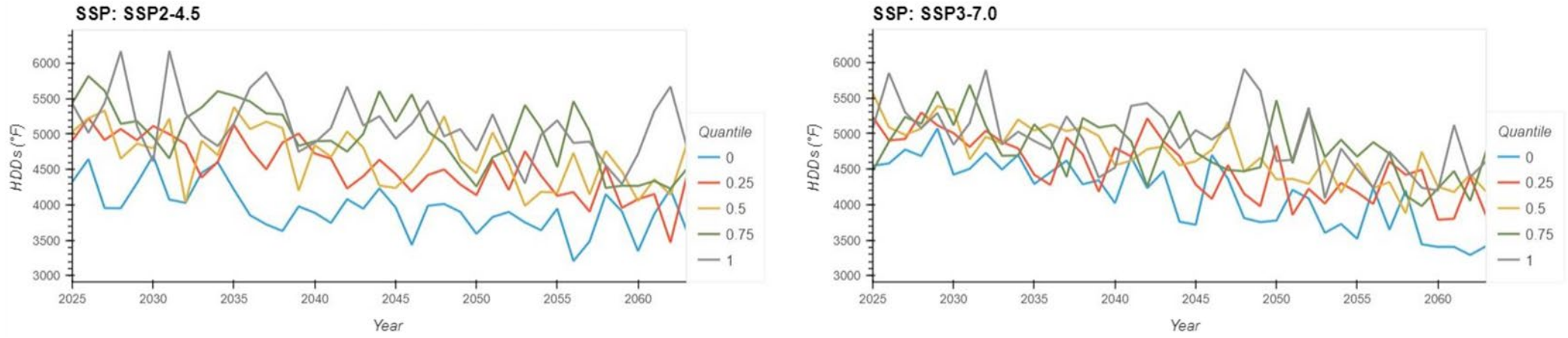
Localized Constructed Analogs Version 2 (LOCA2)

Illustration of LOCA2 statistical downscaling of percent change in total annual precipitation from 1985-2014 to 2071-2100 for an example GCM under SSP5-8.5 across the Continental United States.
Source: Adapted from 5th National Climate Assessment.

Results: HDD Projections

- Projections for **both SSP2-4.5 and SSP3-7.0** show potential **decreases in HDDs** across the service area during the 2025-2064 period.
- The **SSP3-7.0** model ensemble has more agreement on the potential for a **greater decrease** in HDDs than is shown by the **SSP2-4.5** model ensemble.
- Future projected HDDs under both scenarios show **significant interannual variability** with some models representing cooler climate futures than other models.

System-Weighted Annual HDDs



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Results: Cold Weather Qualitative Analysis

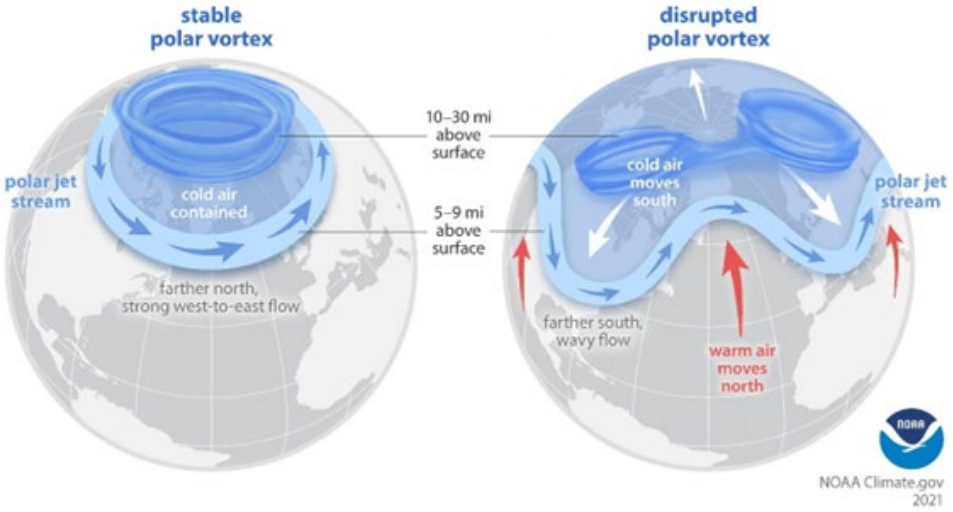
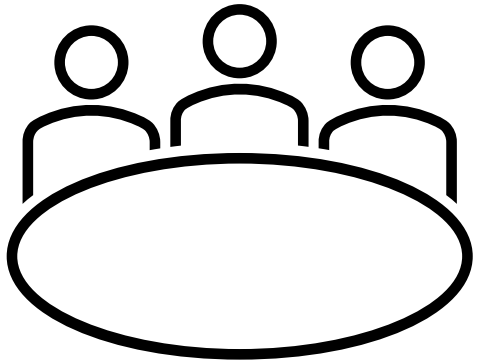


Illustration of a stable and unstable polar vortex and how each scenario impacts temperature at lower latitudes. Source: NOAA.

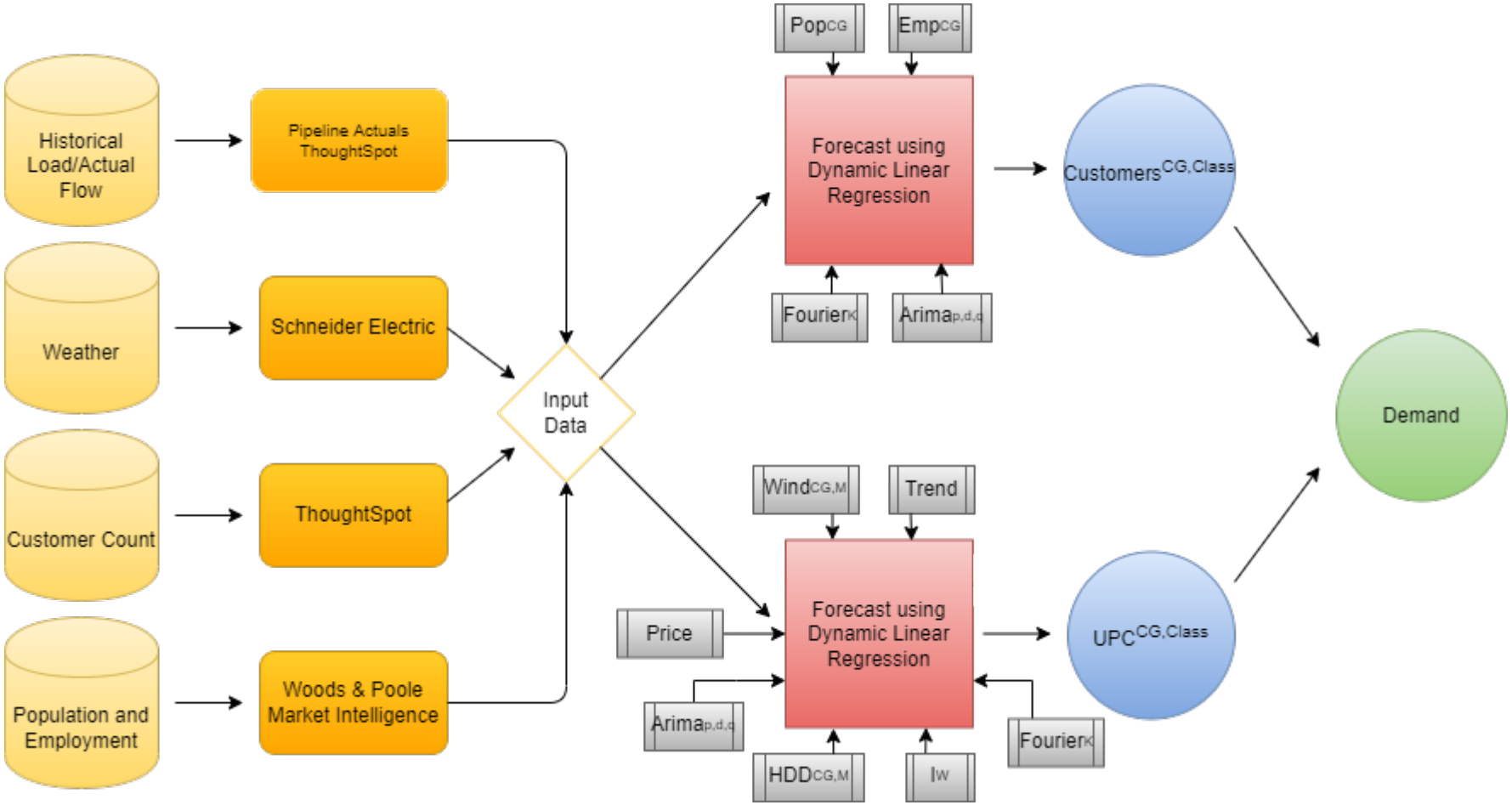
- Cascade Natural Gas' service area has historically experienced extreme cold events, though the magnitude of these extremes varies by region.
- Climate change is projected to continue to **drive warmer temperatures** in the Pacific Northwest, **reducing the overall frequency of extreme cold events** 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.[1]

1 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.

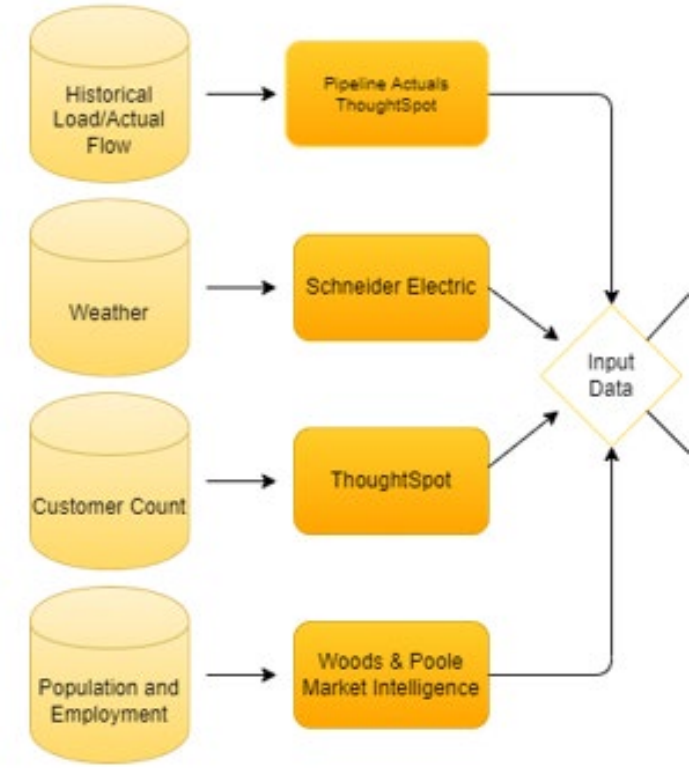


Demand and Customer Forecast

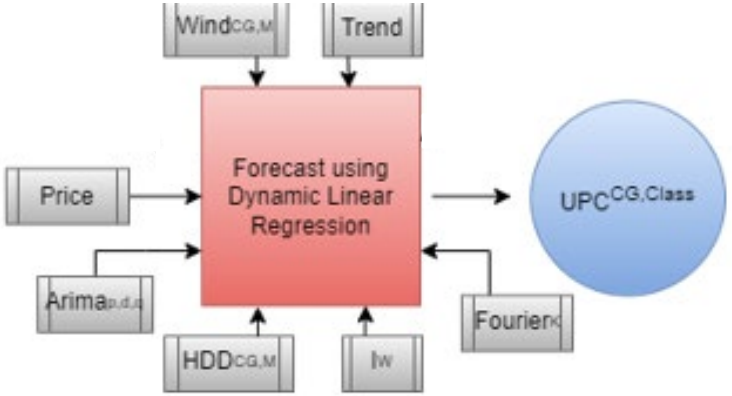
Process


Historical Load/Actual Flow
Weather
Customer Count
Population and Employment
Pipeline Actuals ThoughtSpot
Schneider Electric
ThoughtSpot
Woods & Poole Market Intelligence
Input Data
Pop CG
Emp CG
Forecast using Dynamic Linear Regression
Fourier K
Arima p,d,q
Customers CG,Class
Wind CG,M
Trend
Price
Forecast using Dynamic Linear Regression
Arima p,d,q
HDD CG,M
Iw
Fourier K
UPC CG,Class
Demand

Inputs



- Cascade uses data from various sources:
  - Pipeline actuals at daily/Citygate level.
  - Woods & Poole at county level.
  - ThoughtSpot citygate/monthly allocations
- Market intelligence monthly.
- Unifying inputs is an important part of the forecasting process.

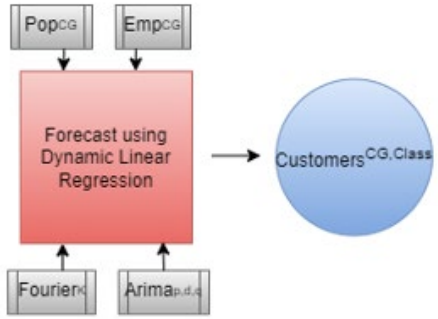


Use Per Customer Forecast

$$Therms/C^{Z,Class} = \alpha_0 + \alpha_1 HDD^{Z,M} + \alpha_2 I_w + \alpha_3 WIND^{Z,M} + \alpha_4 Retail\ Price + Trend + Fourier(k) + ARIMA \in (p,d,q)$$

Model Notes:

- Therms/C = Therms per customer; Z = Zone; Class = Residential, Commercial, Industrial, or Interruptible; HDD = Heating Degree Days; M= Month; I_w = Indicator Variable set to 1 if it is a weekend; T = Trend Variable increasing by 1 for each day forecasted; WIND = Daily average wind speed; Retail Price = Price customers see on their bill.



Customer Forecast

$C^{Z,Class} = \alpha_0 + \alpha_1 HH^Z + \alpha_2 Emp^Z + \alpha_3 \text{Retail Price} + \alpha_4 \text{Income} + \text{Fourier}(k) + \text{ARIMA} \in (p,d,q)$

Model Notes:

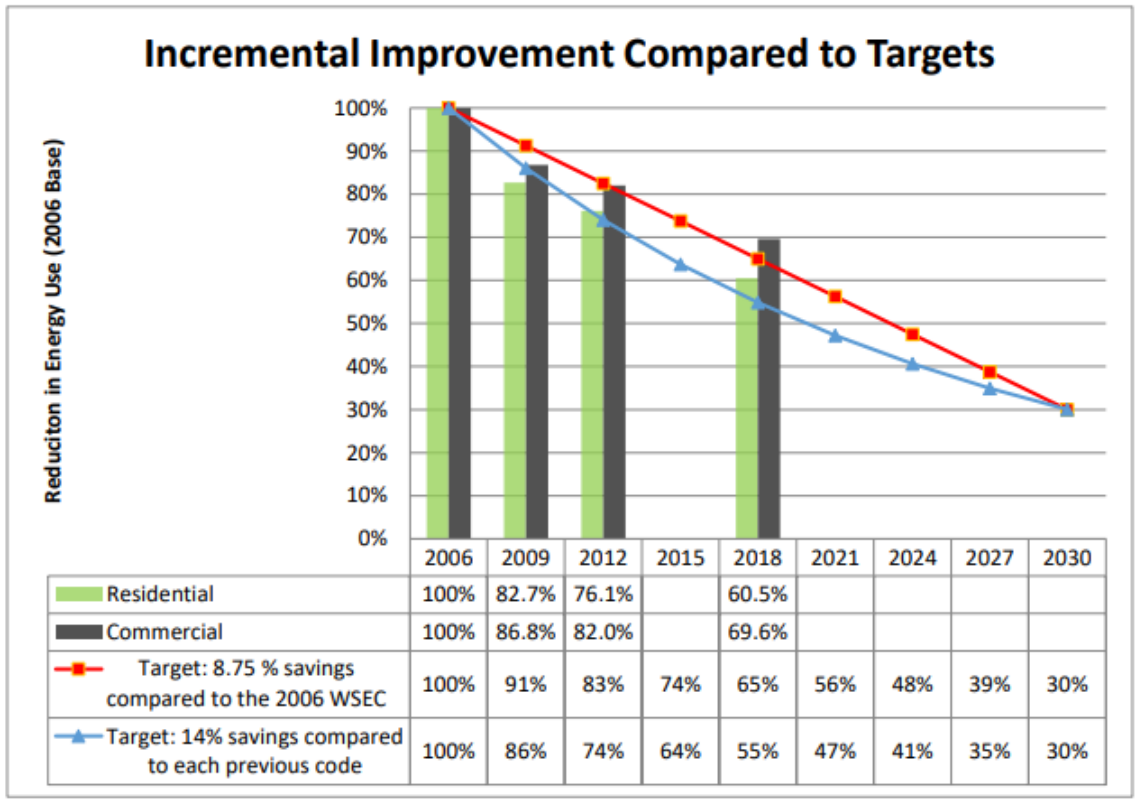
- C = Customers; Z = Zone; Class = Residential, Commercial, Industrial, or Interruptible; ARIMA∈(p,d,q) = Indicates that the model has p autoregressive terms, d difference terms, and q moving average terms; HH = Households; Emp = Employment; Retail Price = Price customers see on their bill; Income = Average income at the zonal level; Fourier(k) = Captures seasonality of k number of seasons.

Start with Linear Model

Some are Naïve models

Tests for any collinearity

Building Code Impacts (Cont'd)



	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%

Chart Source: Final Cost Benefit Analysis for the 2021 WSEC-R

- 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 RCW 19.27A.020(2)(a), the enacting legislation resulted from 2009 SB 5854. Therefore, the 2012, 2015, 2018, and 2021 code cycles were all likely impacted by the legislation. This chart provides an explanation of how the SBCC has addressed the more explicit legislative direction of RCW 19.27A.160.

WA State Building Codes

Effective March 15, 2024, the 2021 Washington State Energy Codes[1] went into effect.

Each new dwelling unit in a residential building must comply to the WSEC. Each dwelling must meet the required number of credits (ex. Small dwellings must have 5 credits).

The new building codes have made it impractical for new residential and commercial buildings to use natural gas.

TABLE R406.2
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

1 HTTPS://SBCC.WA.GOV/STATE-CODES-REGULATIONS-GUIDELINES/STATE-BUILDING-CODE/ENERGY-CODE

Oregon Customer Count Impacts

- Oregon has signed on with eight other States to create a Nine States Pledge Joint Action to Accelerate Transition to Clean Buildings[1].
- Under the MOU, these states have set a shared goal for heat pumps to meet at least 65% of residential-scale heating, air conditioning and water heating shipments by 2030 and 90% by 2040 across the participating states.
- The MOU is not legally binding, but it does send a signal that these states have strong targets to increase heat pump and electric space and water heating, effectively reducing the use of Natural Gas.

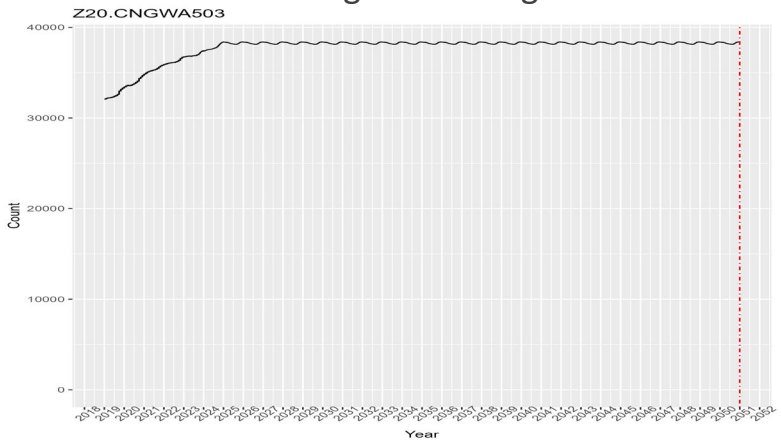
1 HTTPS://WWW.NESCAUM.ORG/DOCUMENTS/2.7.24-NESCAUM-MOU-PRESS-RELEASE.PDF

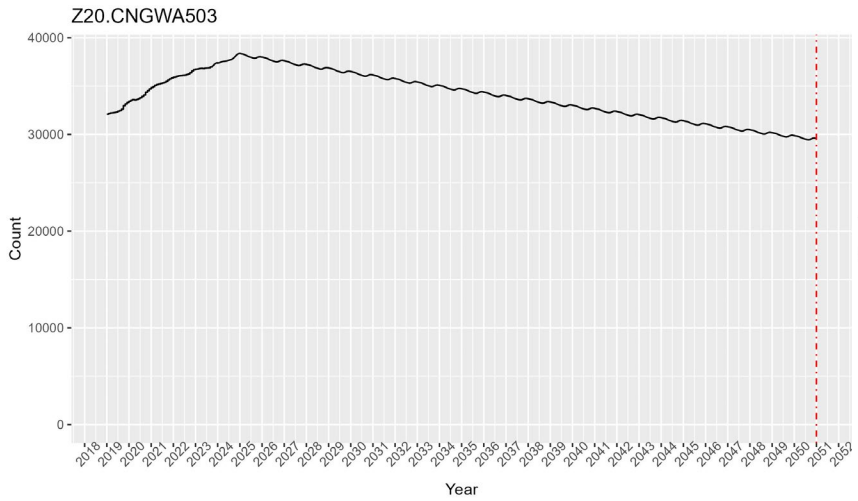
Customer Growth Scenarios

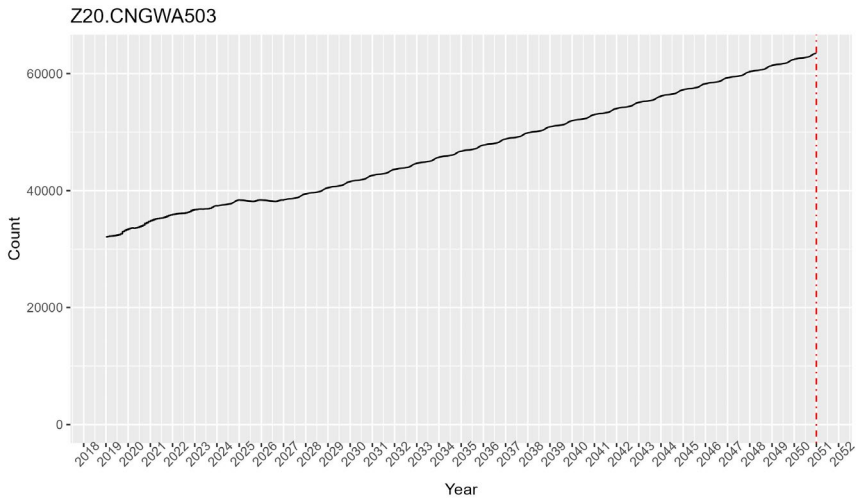
Cascade has a base, high, and low customer growth scenarios

These three scenarios will stress test Cascade's resource planning assumptions under varying customer count scenarios

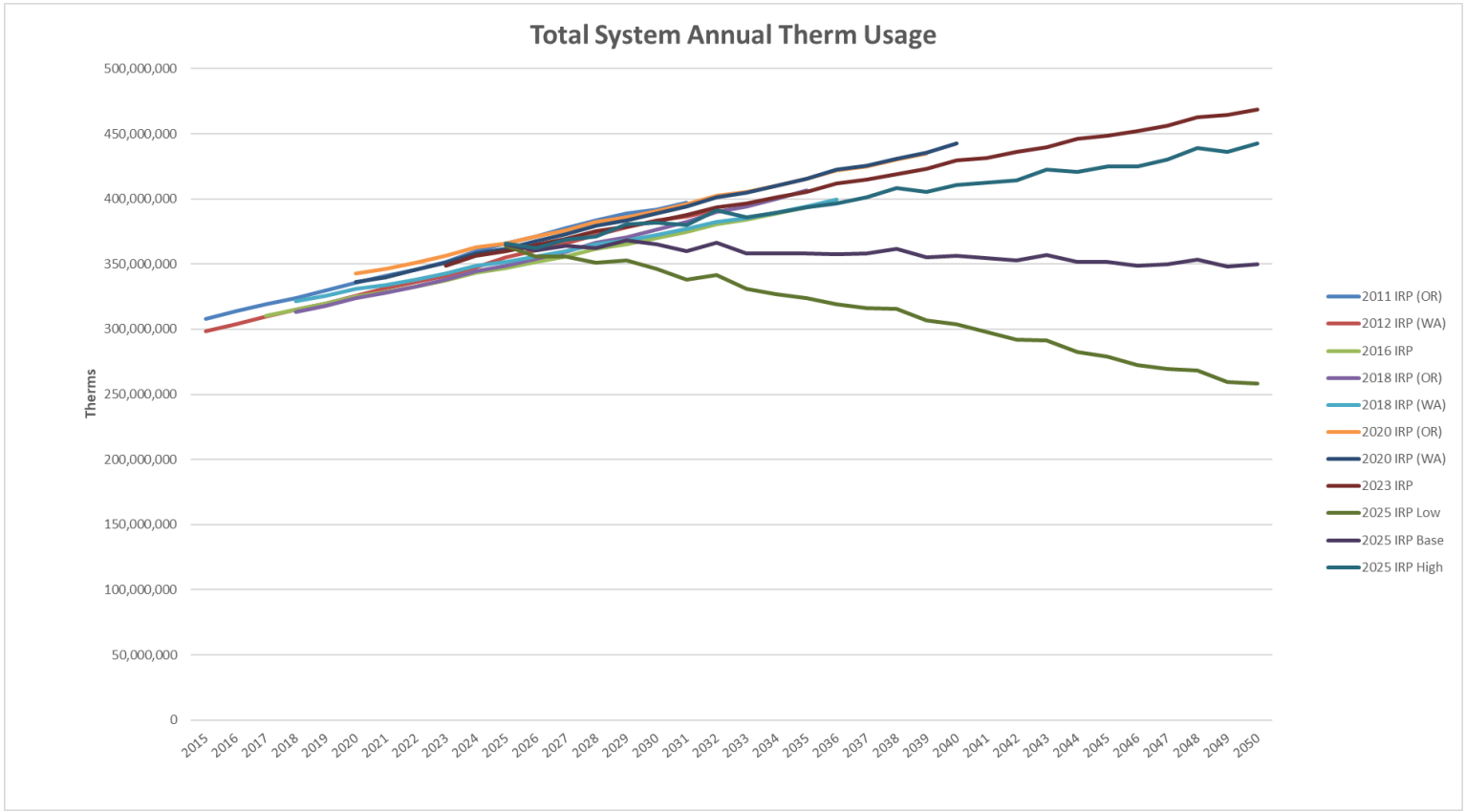
- Base – Washington State Building Code Council rules w/ flat customer growth
- Low - Washington State Building Code Council rules w/ 1.5% decay in building stock attrition
- High - Washington State Building Code Council repealed after 2 years, return to normal growth after







Demand Forecast Results



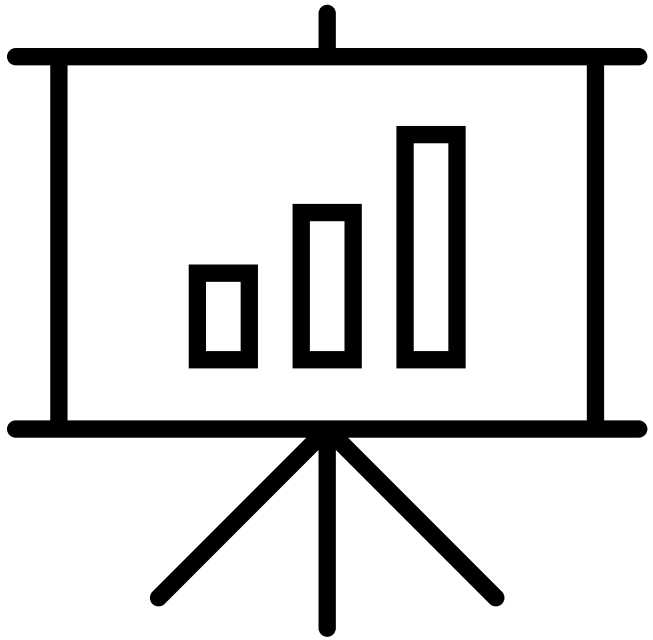
Non-Core Outlook

Non-Core Outlook

- Cascade forecasts the non-core out to 2050.
- Unlike the core, non-core (or transportation) customers are customers who schedule and purchase their own gas, generally through a marketer, to get gas to the citygate. The customer then uses Cascade's distribution system to receive the gas.
- Cascade's transportation customers include all types of industrial customers. It includes farms that may not use any gas during the winter to food manufacturers that average 800,000 therms per month throughout the year.
- Cascade also serves six electric generation customers in Washington and one in Oregon. Those seven customers project to use approximately 598,000,000 therms in 2025.

Transportation Customers

- Cascade's transportation customer forecast decreased from the previous forecast. The current forecast projects the customer count to be 241 in 2025. Cascade's industrial managers are working closely with potential industrial customers.
- Cascade projects the non-electric gen transportation customers in Washington and Oregon to consume approximately 525 million therms in 2025.
- Cascade is emission responsible for approximately 105 million therms under the CCA and 13 million therms under the CPP for transport customers in 2025.
- Cascade is communicating with the transportation customers on CCA impacts, but it is too early to determine the impact CCA will have on these transport customers.



Regional Market Outlook

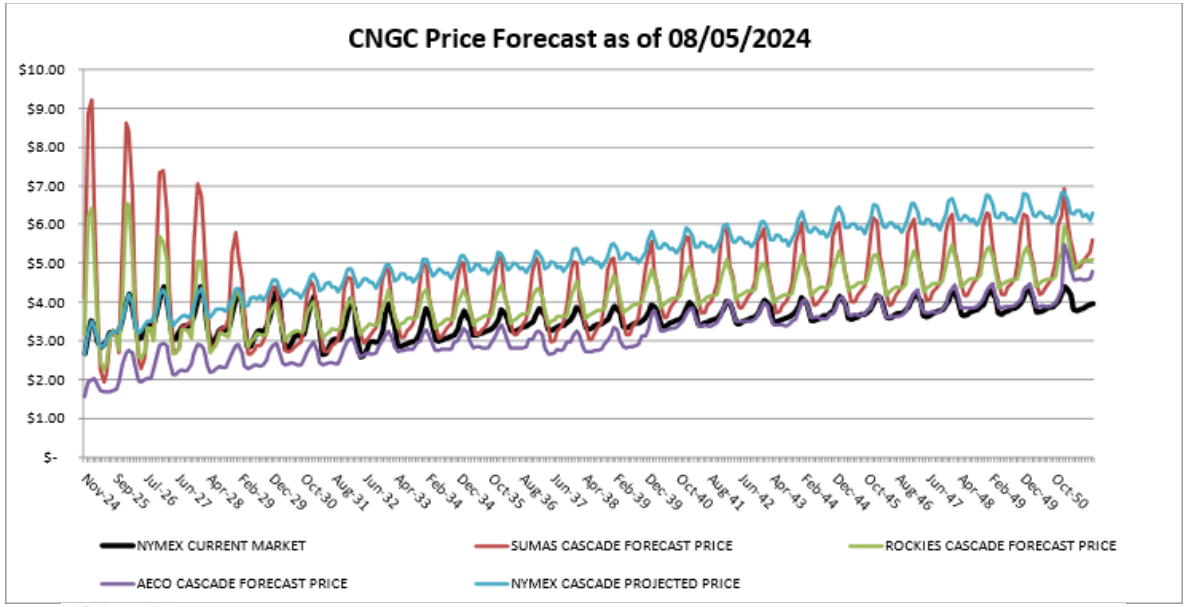
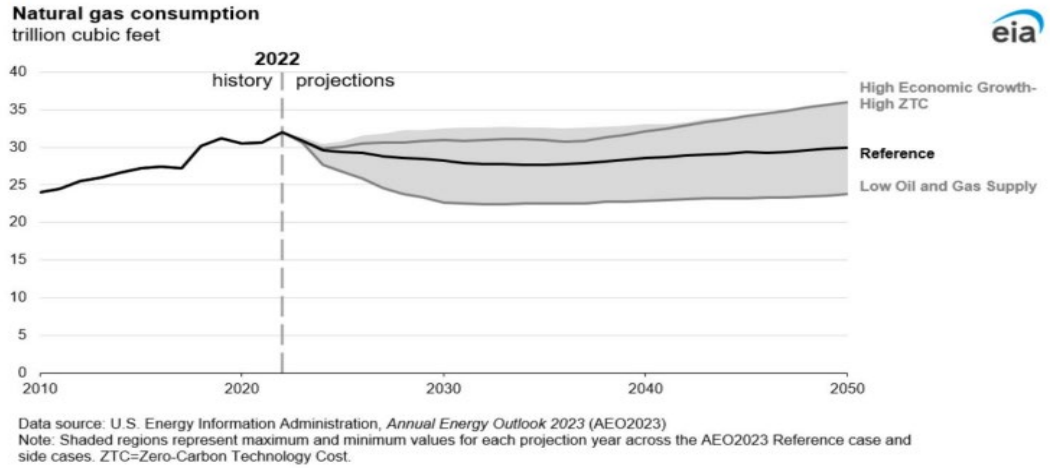


Figure 14.



Data source: U.S. Energy Information Administration, *Annual Energy Outlook 2023* (AEO2023)
Note: Shaded regions represent maximum and minimum values for each projection year across the AEO2023 Reference case and side cases. ZTC=Zero-Carbon Technology Cost.

Regional Market Outlook – Long Term

The EIA's Annual Energy Outlook for 2023 was released March of 2023. In this report, natural gas consumption is highlighted. As electricity generation shifts to using more renewable and battery sources, domestic natural gas consumption for electricity generation is likely to decrease by 2050 relative to 2022, which contrasts with relatively stable growth over the past decade. [1]

According to the EIA's 2023 Annual Energy Outlook, natural gas production increases by 15% from 2022 to 2050, and in all cases domestic production outpaces domestic consumption. [1]

The EIA states that growing international demand for natural gas encourages growth in domestic natural gas production. [1]

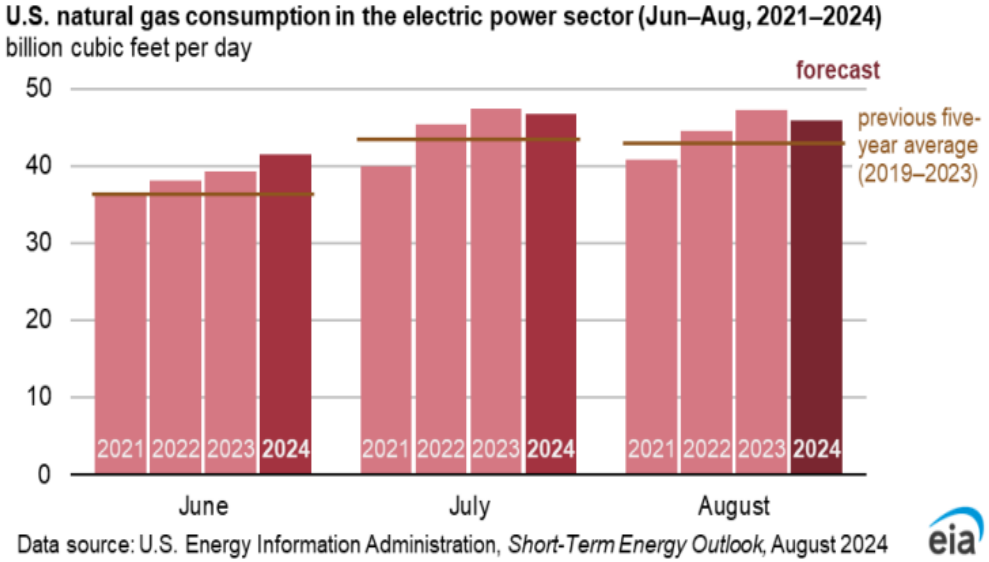
[1] Annual Energy Outlook 2022 - U.S. Energy Information Administration (EIA)

Regional Market Outlook Short-Term

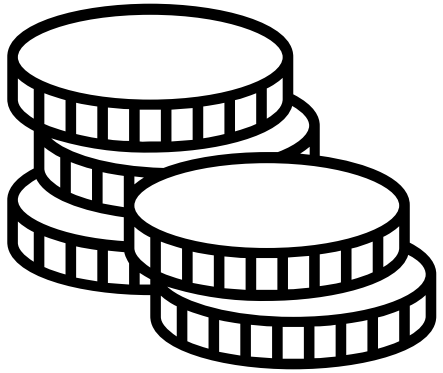
Electric power generation is the primary driver for natural gas consumption during the hot summer months. The electric power sector consumed 13% (5 Bcf/d) more natural gas in July than it did in June because of a heat wave and subsequent spike in natural gas-fired electricity generation.

According to Cascade's hedging consultant, "while comfortable storage levels and steady production point towards a bearish outlook for natural gas prices in the near term, the potential for extreme weather events and increased cooling demand could introduce upward price pressures as the month progresses.

"Record low Henry Hub natural gas prices in 1H24 led producers to curtail natural gas production earlier this year."



[1] Short-Term Energy Outlook - U.S. Energy Information Administration (EIA)



Avoided Cost

Avoided Cost Overview

As part of the IRP process, Cascade produces a 27-year price forecast and 45 years of avoided costs.

The avoided cost is an 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, including environmental impacts, that could be avoided through energy conservation.

The avoided cost forecast can be used as a guideline for comparing energy conservation with the cost of environmental impacts, acquiring, and transporting natural gas to meet demand.

Avoided Cost Overview

For the 2025 IRP, Cascade will continue to use the information learned from prior IRPs to create a transparent and intuitive final avoided cost.

The various elements of the avoided cost will need to be reconsidered with regards to emissions reductions goals.

The Company produces an expected avoided cost case based on peak day and, in the case of distribution system costs, peak hour.

Avoided Cost Formula

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

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

Where:

$AC_{nominal}$ = The nominal avoided cost for a given year. To put this into real dollars you must apply the following: Avoided Cost/(1+Discount Rate)^Years from the reference year.

TC_v = Variable Transportation Costs

TC_F = Fixed Transportation Costs (When Avoidable)

SC_v = Variable Storage Costs

CC = Commodity Costs

E_{Comp} = Environmental Compliance Costs

DSC = Distribution System Costs

RP = Risk Premium

P_{adder} = Preference Adder, 10% as required by Federal statute

Avoided Cost Methodology

Variable Transportation costs are pulled directly from the major pipelines that Cascade utilizes (NWP, GTN, Enbridge, Ruby, Nova Gas Transmission (NGTL) and Foothills).

Fixed Transportation are only included when avoidable (i.e.. potential to offset upstream capacity acquisition)

Storage costs are only captured if there is an avoidable future storage cost (i.e.. On system storage).

Commodity Costs are taken from Cascade's 27-year price forecast.

SCGHG and CCA costs are both included in the avoided cost calculation per U-230161 CCA Policy Statement guidelines.

The Company's distribution system cost calculation looks at forecasted capital expenses related ONLY to growth, and uses the company's load growth forecast to translate these costs to a per therm basis.

Risk premium is calculated as the delta from deterministic and stochastic pricing

Preference Adder, 10% as required by Federal statute

Environmental Compliance Costs

- The following was presented previously in Targeted-TAG 2:

"-In the 2023 IRP, Cascade utilized the Social Cost of Carbon with a 2.5% discount rate, adjusted to real 2021 dollars.

- This is done in accordance with RCW80.28.395 which requires the use of the Social Cost of Carbon to value cost of greenhouse gas emissions resulting from the use of natural gas.

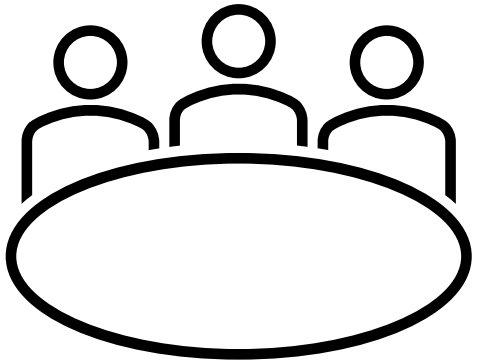
- With the passing of the Climate Commitment Act, Cascade believes it may be more accurate to utilize the company's marginal compliance cost associated with this rule.
  - For example, projected cost of CCA allowances."

- Per U-230161 CCA Policy Statement guidelines, both the Social Cost of Carbon and the Climate Commitment Act costs are now included in the Avoided Cost Calculation.

Avoided Cost Final Results

- The avoided costs in 2025, 2040, and 2050 are $1.38/therm, $2.07/therm, and $2.54/therm respectively.
- 84% increase from 2025 to 2050
- The avoided cost has increased by about 30-40% from the 2023 IRP due to the increase in commodity costs as well as the addition of the SCC to the carbon tax based off WUTCs policy statement.

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
2040	$ 2.066	$ 2.066	$ 2.066	$ 2.066	$ 2.066	$ 2.066	$ 2.066
2050	$ 2.539	$ 2.539	$ 2.539	$ 2.539	$ 2.539	$ 2.539	$ 2.539



Upstream Pipeline Presentation

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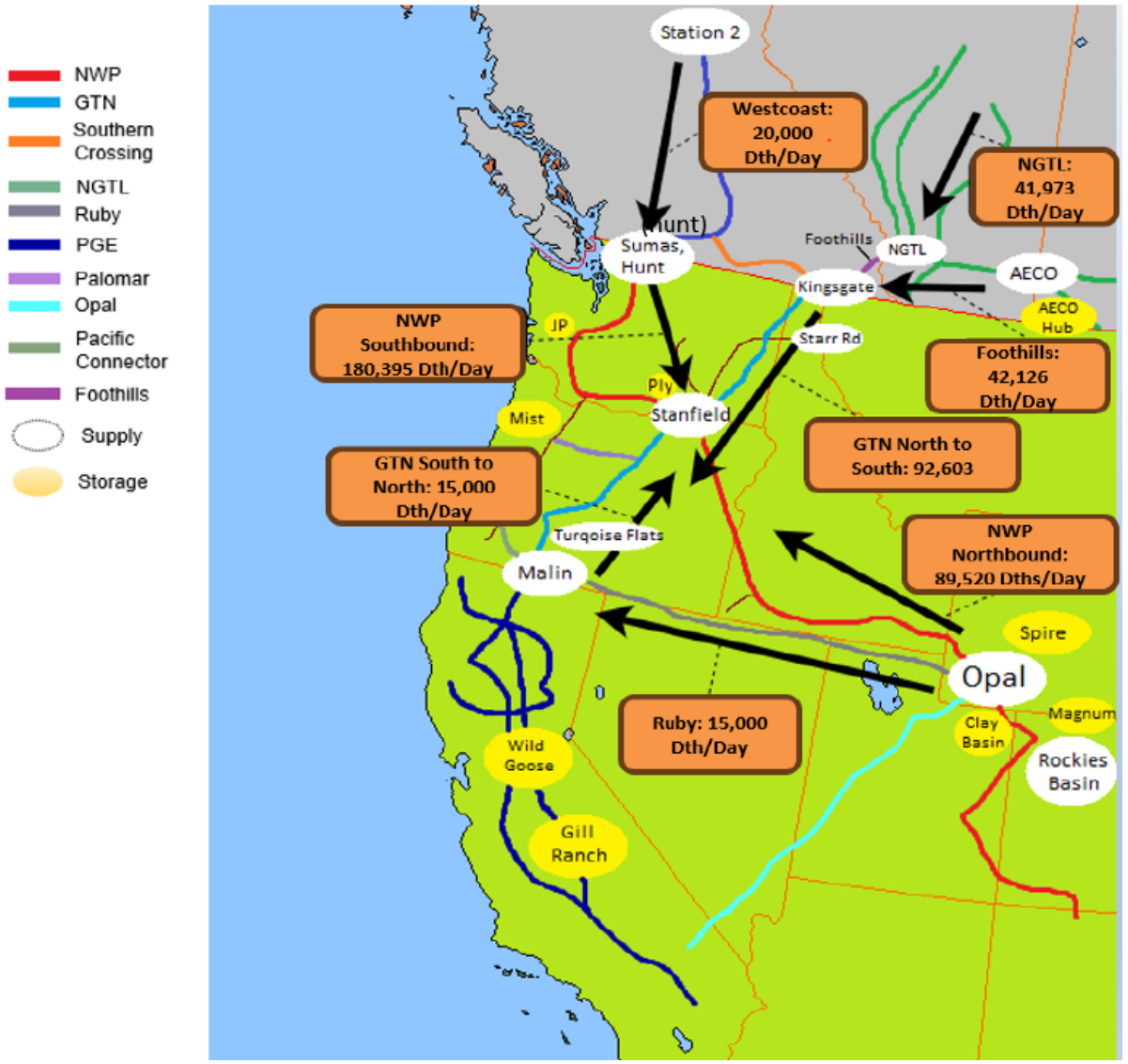
Gas Supply Components

- Transportation
  - Our Portfolio is built around our transportation Resources
- Commodity
  - Physical Gas Purchased on Open Market
  - Commodity Market Hubs
  - Done Via RFP process/ Or direct contact with the Supplier
  - CNG works with 12-15 active suppliers
- Storage
  - Used a hedge and price arbitrage- Summer to winter, Protection against high day market prices.
  - Day to day operations for balancing and entitlement requirements.


Bellingham
Mount Vernon
Bremerton
Washington
Seattle
Wenatchee
Moses Lake
Aberdeen
Yakima
Longview
Sunnyside
Walla Walla
Kennewick
Hermitson
Pendleton
Baker City
Bend
Ontario
Oregon
Service Area
District Offices
Headquarters

System Map



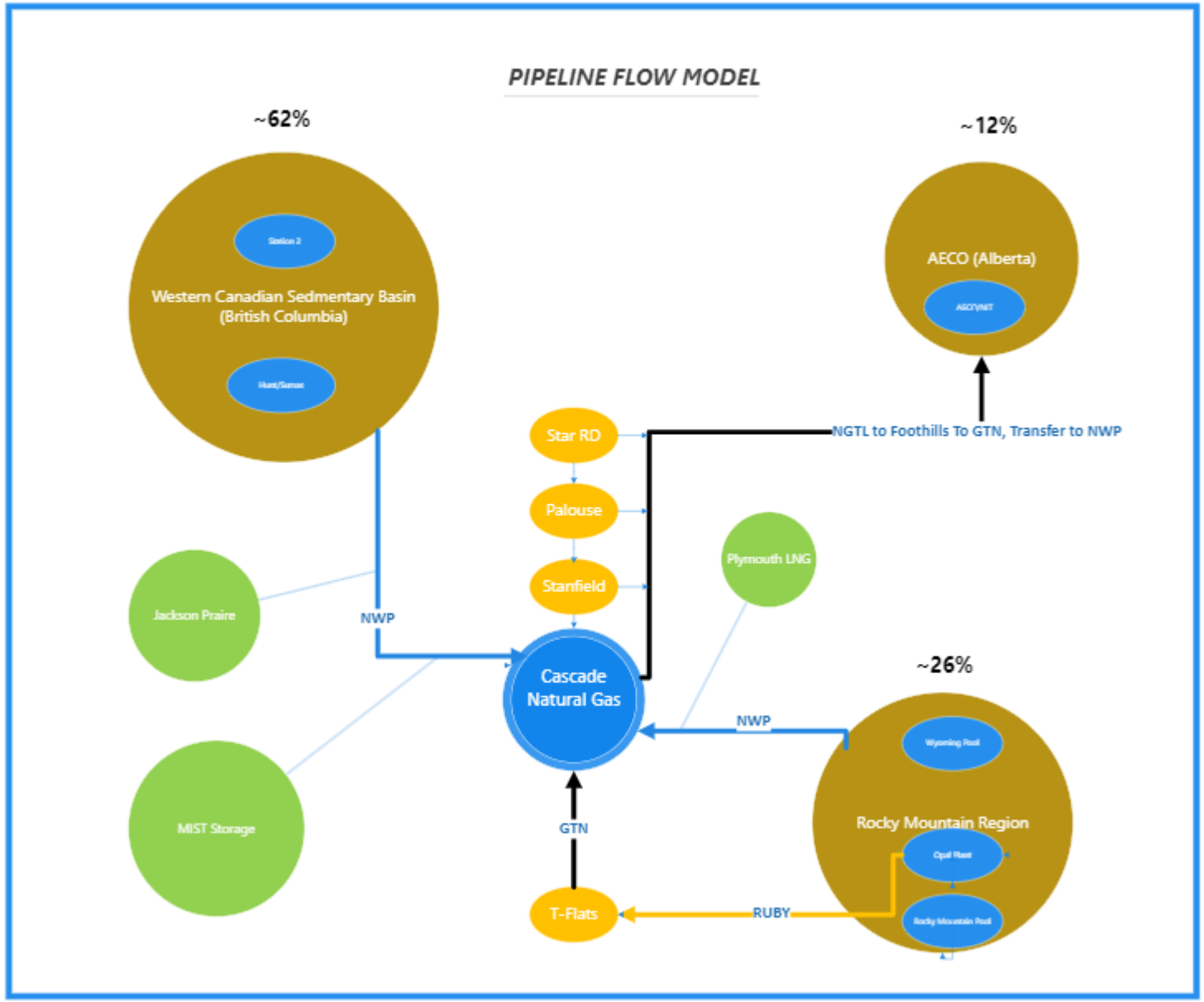
Pipeline transport flow

TRANSPORTATION

Cascade holds transport on 6 Pipelines
- Enbridge
- Williams Northwest Pipeline
- GTN Pipeline
- Nova
- Foothills
- Ruby

End delivery is on 3 pipelines
- Enbridge
- Williams Northwest Pipeline
- GTN Pipeline

Portfolio is arranged around available transport and system demands.



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HIGHLIGHTS FOR THE 2024 PORTFOLIO DESIGN

PORTFOLIO PROCUREMENT DESIGN BASED ON A DECLINING PERCENTAGE EACH YEAR, ACCORDINGLY: Year 1: Approximately 90% of annual requirements; Year 2: 60%, Year 3: 30%.

- 90% allows more flexibility operationally.
- Allows Storage Utilization, with some cushion (Storage capacity is 15% of winter load)
- Allows us to be in the market monthly through First of Month (FOM) purchase or Day Gas purchases.

Hedged Percentages (fixed-price physical) Currently 55% of annual requirements. Second year max is set at 35%, and 20% hedged volumes for year three.

- Cascade's hedging program is flexible and can be adjusted in response to changes in market conditions.
- We review percentages annually and make adjustments as needed

CNGC's Gas Supply Oversight Committee (GSOC) would consider a modification of this plan if the outer year 3 year forward price is 20% higher/lower than the front month over a reasonably sustained period.

Annual load expectation (Nov-Oct) is approximately 37,000,000 dths, consistent with recent load history.

CNG Purchases multiple lengths of contracts from a pool of various counterparties- Purchases line up with available transport from our market points

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Hedge Calculation Table

	Year 1	Year 2	Year 3
Contracted Base Supply Target	90%	60%	30%
Hedge Target Mid	55%	35%	20%
Hedge Target Range	50%-60%	30%-40%	15%-25%
Forecast Annual Usage	36,680,873	36,996,312	37,030,660
Needed Base Supply to Contract	33,012,786	22,197,787	11,109,198
Hedge Target	20,174,480	12,948,709	7,406,132
Current Hedged	18,178,000	10,527,000	906,000
Current Indexed	3,872,500	-	-
Remaining to Hedge	**2,137,551**	**2,182,805**	**6,469,924**
Remaining Indexed Supply Needed	**9,055,578**	**9,078,432**	**3,687,962**

***Forecast**	The Forecast is based on the IRP 20 year forecast
***Contracted Base Supply**	Base Supply is the overall amount of the contracted supply wether indexed or hedged. CNG used 90% in the promt year to allow for storage usage and operational flexibility. The outward years use a ladder scale down to obtain a portion of the portfolio annually.
***hedge Target**	A percentage of the forecasted amount

Renewable Natural Gas

-Cascade is currently flowing RNG on 2 Projects into our system.

-One Landfill and One Bio digester

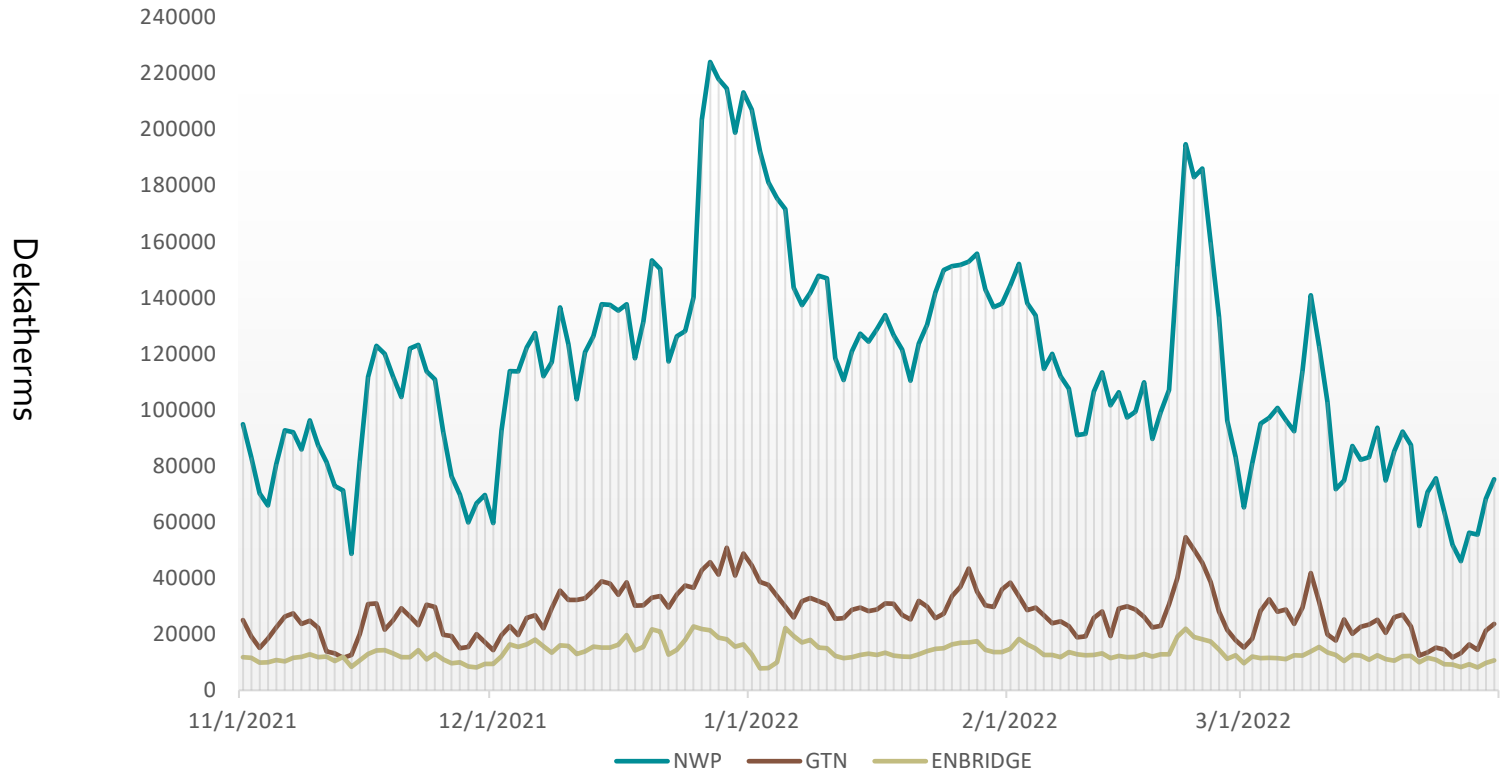
-Upstream resources are off-set by the volumes

-Approximate 900 Dth day

-Cascade's business development department is continuously looking at new RNG opportunities.

-More information on RNG opportunities will be provided in subsequent tags.

Winter Usage Sample



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Storage Resources

Jackson Prairie

- 4 accounts with 1,235,593 dth capacity, 56,366 dth of withdrawal rights
- CNGC targets cycling Jackson Prairie, with pricing and other market and operating conditions considered
- Winter 23/24 was a warmer winter and with less storage cycled

Plymouth

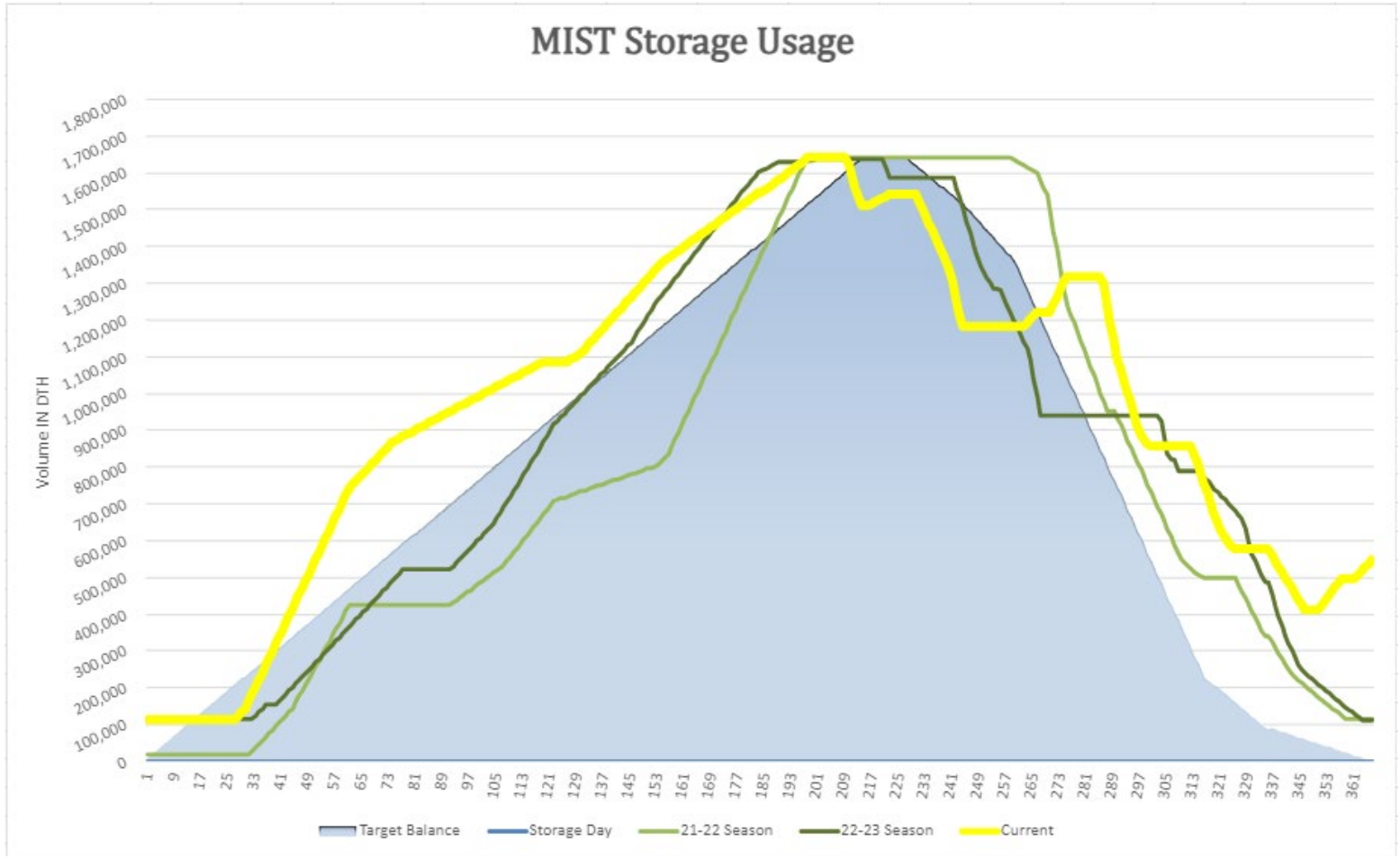
- 2 accounts with 662,200 dths capacity, 78,125 dth of demand
- In addition to above we have TF-2 (Firm Redelivery Transportation) of 10,675 dths
- CNGC remains committed to using Plymouth as a peaking resource.

MIST

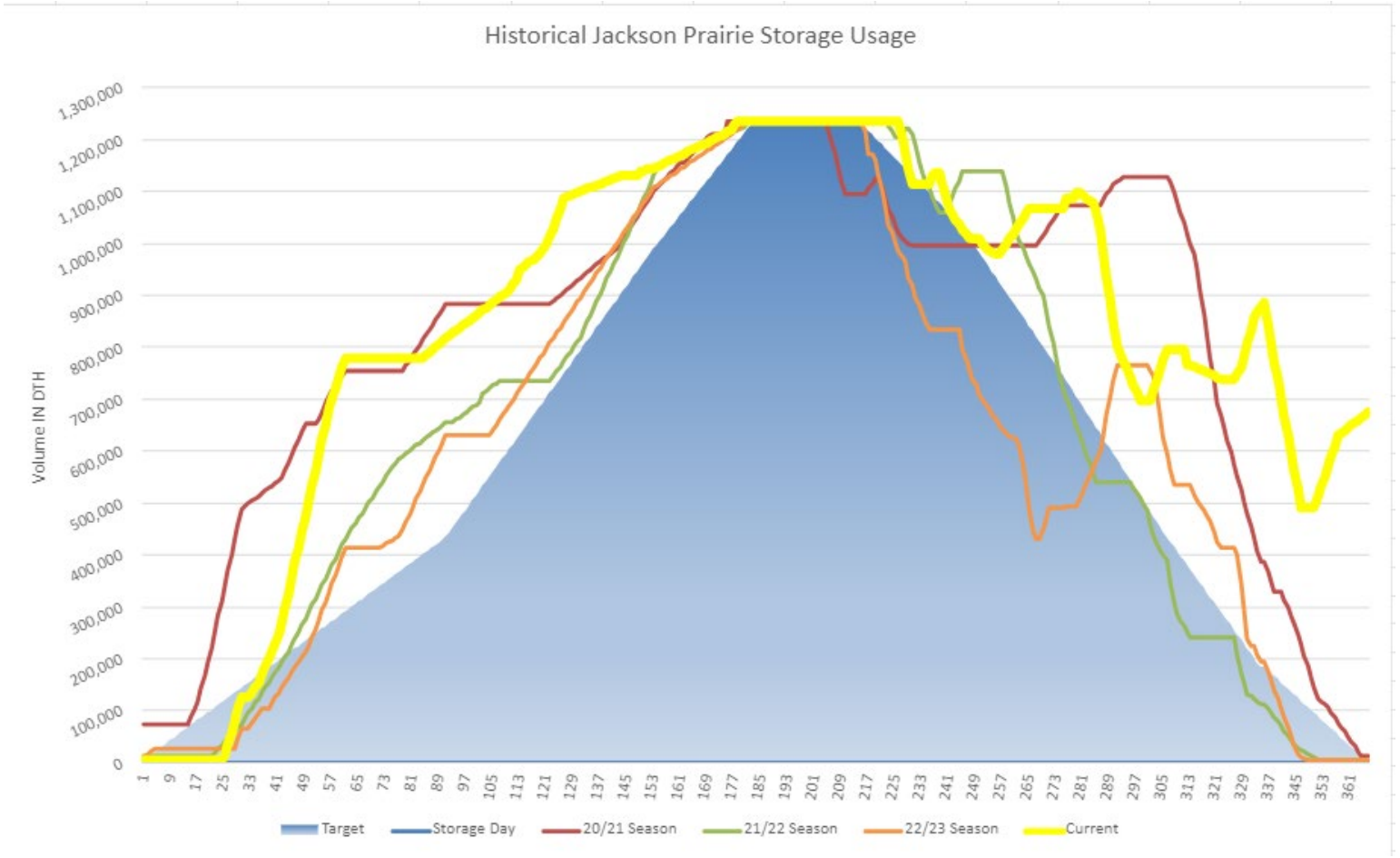
- Added in the spring of 2019, addition capacity and demand added in fall of 2021.
- The added Demand and capacity is a valuable operating resource in winter
- Consolidated to one account of 1,640,000 dth of capacity, 50,000 dth of demand
- CNGC targets cycling Mist, with pricing and other market and operating conditions considered.

Total Storage

- At 100% of demand, Cascade can meet approximately 67% of Peak Day needs.
- Total storage capacity accounts for approximately 14.75% of winter demand
- Winter demand is approximately 68% of annual demand.



Storage Utilization 4/23-03/24



Storage Utilization 4/23-03/24

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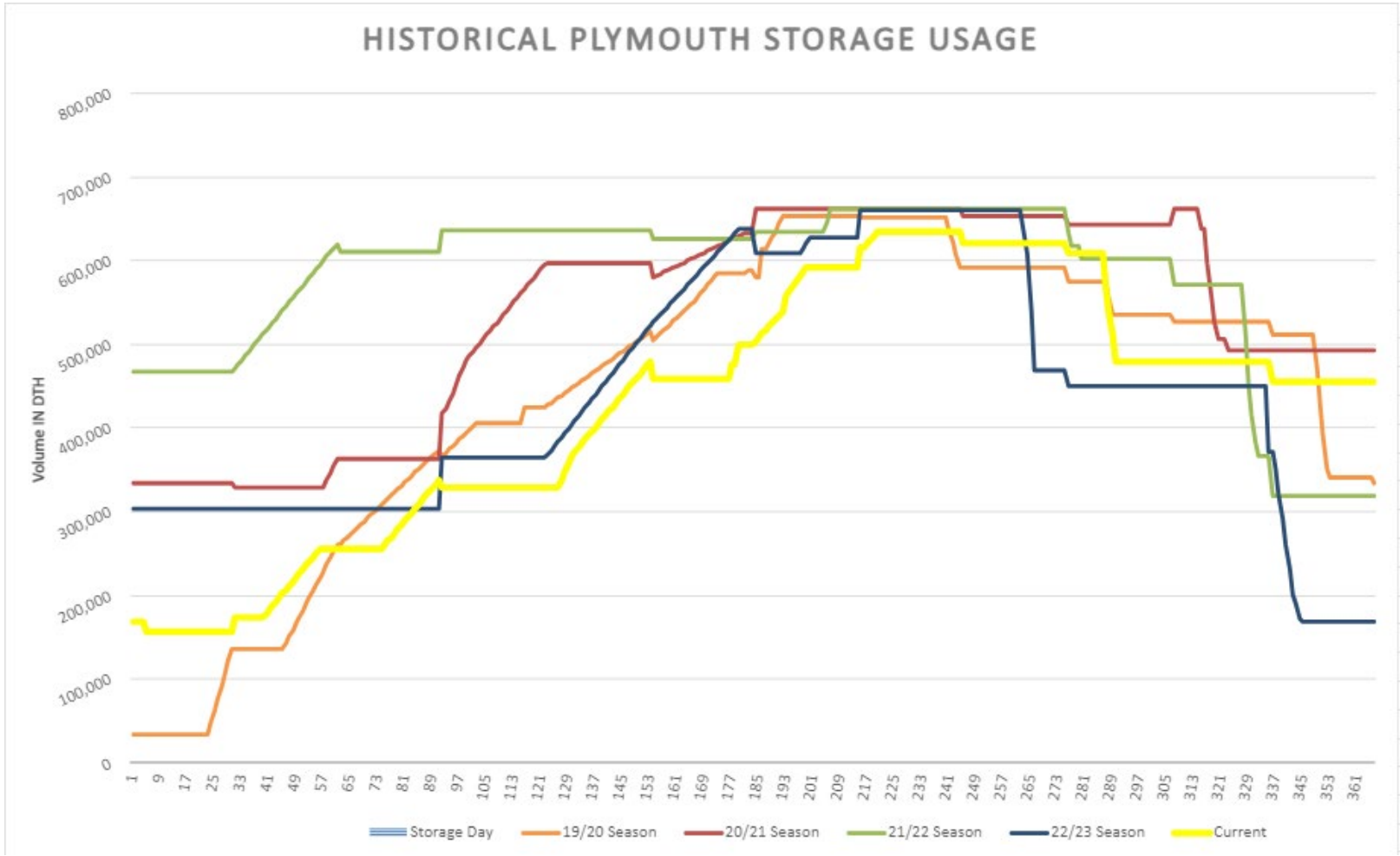

Storage Utilization 4/23-03/24

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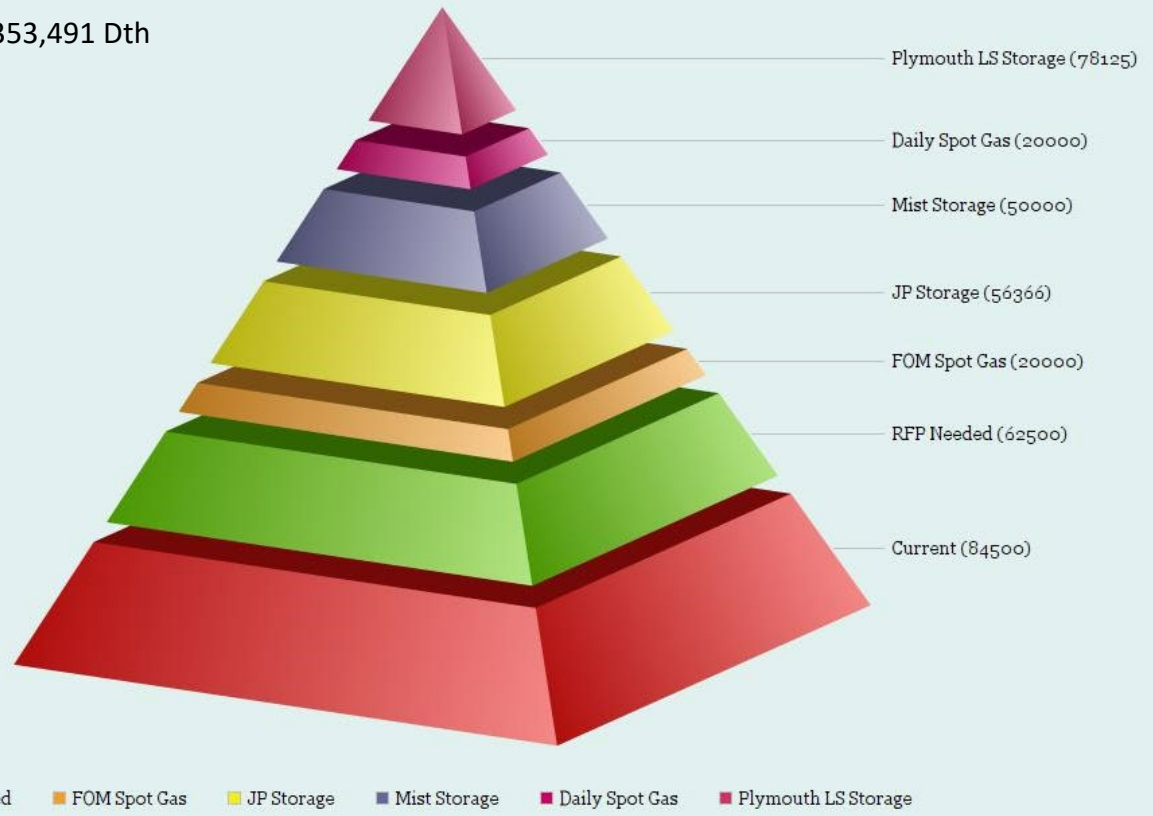
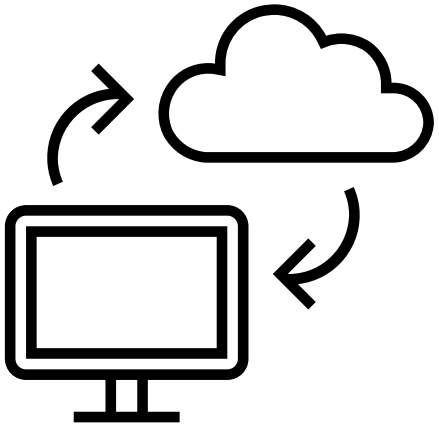
Peak Day Stack Example

Peak Day- 275,000 Dth

Total Resources- 353,491 Dth





Planned Scenarios and Sensitivities

Resource Integration

Scenarios:

- Customer Growth
  - Washington State Building Code Council rules w/ flat customer growth
  - Washington State Building Code Council rules w/ 1.5% decay in building stock attrition
  - Washington State Building Code Council repealed after 2 years, return to normal growth after
- Climate Regulation
  - Climate Commitment Act/Climate Protection Plan
  - Social Cost of Carbon
- Electrification
  - Expected Costs
  - Low Costs
- Weather
  - SSP 2-4.5
  - SSP 3-7.0
- Low Carbon Alternative Fuels
  - Monte Carlo Simulations (100+ draws)

Resource Integration Cont'd

Reference Case:

- Washington State Building Code Council rules w/ flat customer growth
- Climate Commitment Act/Climate Protection Plan
- Electrification – Expected Costs
- SSP 3-7.0 Climate Model
- Low Carbon Alternative Fuels – Reference Case

Stochastic Scenario Modeling:

- Cascade plans to run the combination of growth policies, climate policies, electrification costs, climate models, and low carbon alternative fuels.
- The combination of the three growth policies, two climate policies, and two electrification costs results in twelve scenarios.
- These scenarios will be modeled under both climate models and all 100+ draws of the low carbon alternative fuels.
- This will result in 2400+ draws.

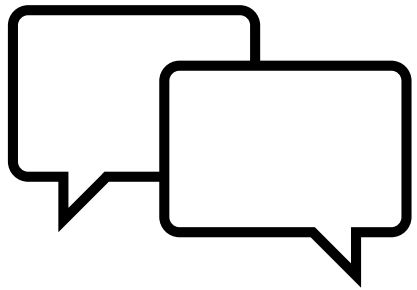
Resource Integration Cont'd

Cascade will utilize the twelve scenarios, as well as the stochastic results from each scenario, to build out the short- and long-term plans for Cascade.

For the long-term plan, Cascade will utilize the stochastic scenario modeling to provide future potential portfolios, providing results on low carbon fuel acquisitions, incremental or offtake transportation, storage, total system cost, demand shortages, carbon compliance, and overall risk to ratepayers.

The two- to four-year action plan will utilize the results of the long-term action plan and implement the portfolio that meets system demand with the least cost least risk mix of natural gas, low carbon alternative fuels, and conservation.

Feedback for Cascade



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Questions/Next Steps

Review Plans for TAG 2 Discussion

- Respond to TAG 1 Feedback
- Alternative Resources
- Price Forecast
- Carbon Impacts
- Energy Efficiency
- Renewable Natural Gas
- Preliminary Resource Integration Results
- TAG 2 is Thursday, October 24

2025 WA IRP Schedule

Process Item	Date	Process Element
Receive feedback on TAG 1	Friday, September 27, 2024	
TAG 2	Thursday, October 24, 2024	Respond to TAG 1 Feedback, Alternative Resources, Price Forecast, Current Supply Resources, Transport Issues, Carbon Impacts, Energy Efficiency, Bio-Natural Gas, Preliminary Resource Integration Results.
Receive feedback on TAG 2	Friday, November 8, 2024	
First Draft	Friday, December 6, 2024	
Comments Due	Friday, January 10, 2025	
TAG 3	Wednesday, February 5, 2025	Respond to TAG 2 feedback, Distribution System Planning, Final Integration Results, finalization of plan components, Proposed new 2- to 4-year Action Plan
Final Draft	Tuesday, March 4, 2025	
Comments Due	Tuesday, April 15, 2025	
TAG 4 (if needed)	Thursday, May 1, 2025	
Final Complete By	Friday, May 16, 2025	
File	Friday, May 23, 2025	

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Integrated Resource Plan Technical Advisory Group Meeting #1

SEPTEMBER 12, 2024

MICROSOFT TEAMS/TELECONFERENCE

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