

Gas Draft Portfolio Results

2023 Gas Utility IRP

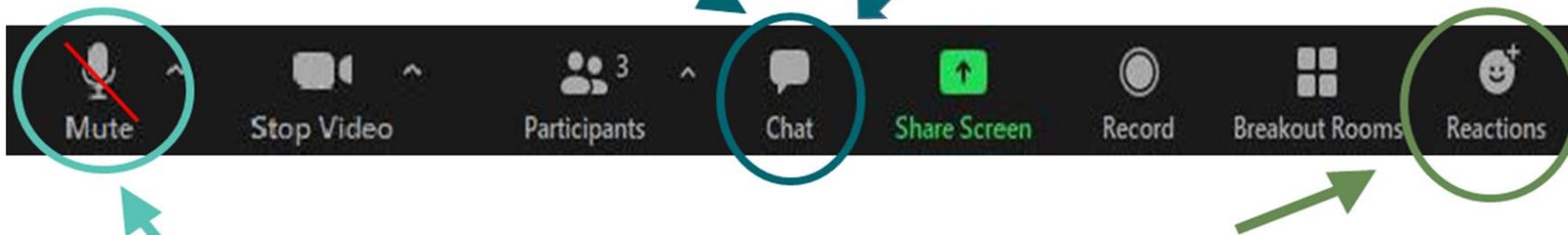
January 17, 2023



Welcome to the Webinar!

If you want to type a question regarding the presentation, insert “Slide X followed by your question” in the chat box!

If you have a technical issue or a general question, please type it in the chat box.



Please keep yourself on mute unless you are speaking.

If you want to ask a question verbally, click the 'Reaction' button and click on the 'Raise Hand' option and we will call on you.

Facilitator Requests

- Engage constructively and courteously towards all participants.
- Respect the role of the facilitator to guide the group process.
- Take space and make space.
- Avoid use of acronyms and explain technical questions.



Safety Moment

Flood Safety Tips

- Flooding is the most common natural disaster in WA State
- Plan an evacuation route if you're in a flood-prone area
- Do not walk or drive through flooded areas
- Stay away from downed power lines
- Visit Washington Emergency Management Division's [website](#) for more tips

Agenda

Time	Agenda Item	Presenter
1:00 p.m. – 1:10 p.m.	Introduction and agenda review	Sophie Glass, Triangle Associates
1:10 p.m. – 1:30 p.m.	Gas IRP Introduction	Phillip Popoff, PSE
1:30 p.m. – 2:10 p.m.	Gas IRP Foundations	Elizabeth Hossner, PSE
2:10 p.m. – 3:05 p.m.	Resource Plan Modeling Results	Gurvinder Singh, PSE
3:05 p.m. – 3:15 p.m.	Break	All
3:15 p.m. - 3:55 p.m.	Electrification Analysis	Gurvinder Singh and Elizabeth Hossner, PSE
3:55 p.m. – 4:00 p.m.	Next Steps	Sophie Glass, Triangle Associates
4:00 p.m.	Adjourn	All

Today's Speakers

Phillip Popoff

Director, Resource Planning
Analytics, PSE

Elizabeth Hossner

Manager, Resource Planning and
Analysis, PSE

Troy Hutson

Director, Energy Equity, PSE

Sophie Glass

Facilitator, Triangle Associates

Gurvinder Singh

Consulting Energy & Resource
Planning Analyst, Resource
Planning and Analysis, PSE

Gas Utility IRP Introduction

Phillip Popoff, Director, Resource Planning and Analysis, PSE

January 17, 2023



Extensive Equity Commitments Require a Robust Response

Building a new energy equity function to lead and manage compliance with the regulatory commitments

Developing and implementing a 3-year strategy to operationalize equity across the enterprise

Developing an energy equity framework that aligns equity with key enterprise business and financial objectives

Energy Equity in the Gas Utility

- No specific guidance exists today to inform how equity should be incorporated into the gas IRP process.
- Expect CCA and resulting rising natural gas costs will disproportionately impact historically marginalized communities.
- GRC settlement includes commitment for a targeted electrification pilot that prioritizes highly impacted communities and vulnerable populations.

Considering Equity in 2023 Gas IRP and Beyond

Current

Incorporated equity (vulnerable populations) considerations in the Conservation Potential Assessment

Future

Initiate conversations with the Equity Advisory Group



Apply lessons learned from CEIP



Identify desired outcomes



Commit to improving how to consider equity in gas planning



Gas Utility IRP Foundations

Elizabeth Hossner, Manager, Resource Planning and Analysis, PSE

January 17, 2023



PSE Gas Utility

- More than 800,000 customers in Washington State depend on PSE for safe, reliable and affordable natural gas services.
- PSE's gas sales need is driven by peak day demand, which occurs in the winter when temperatures are lowest and heating needs are highest.



Infrastructure Reliability

Natural gas transportation and distribution systems are not designed to include redundant capacity, so PSE builds flexibility and resiliency into the system:

A conservative planning standard

- Peak day design standard based on extreme cold temperature for service territory

Diverse transport resources

- PSE built gas transport portfolio that intentionally sources gas equally from north and south of service territory to preserve flexibility during supply disruptions

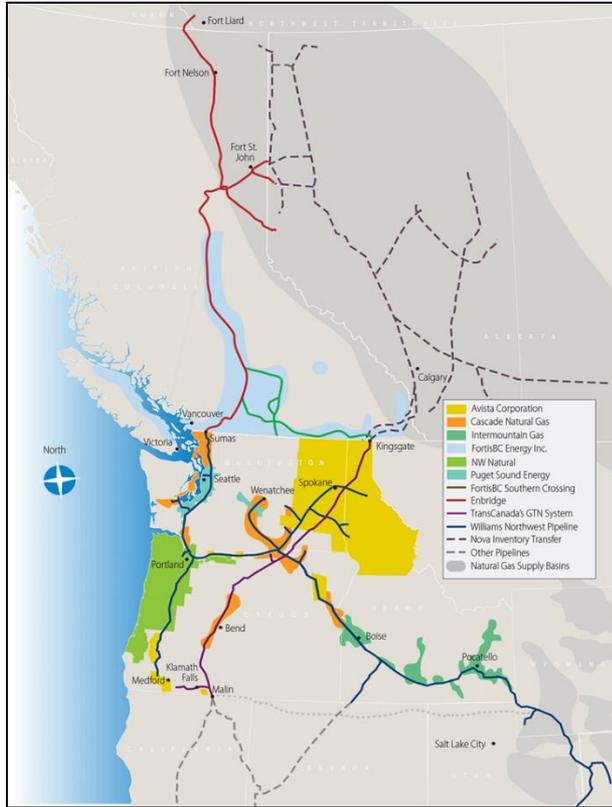
Gas storage

- Contributes to flexibility and resiliency
- Minimizes the need and costs associated with relying on long-haul pipelines
- Allows PSE to purchase more gas in the less expensive summer months
- Can provide supply in the event of pipeline disruption

Cooperation with regional entities

- PSE is a member of the Northwest Mutual Assistance Agreement (NWMAA)
- Members pledge to work together to provide and maintain firm service during emergencies

Regional Overview: Gas Basins and Pipelines



Supply basins and hubs:

- BC-Station 2
- BC-Sumas
- Alberta- NIT (AECO)
- Alberta at Stanfield
- Rockies- including Clay Basin Storage

Pipelines

- Northwest
- Westcoast
- GTN/Foothills/NGTL
- Cascade

There are 91,503 miles of gas pipeline in the region (Washington, Oregon and Idaho).

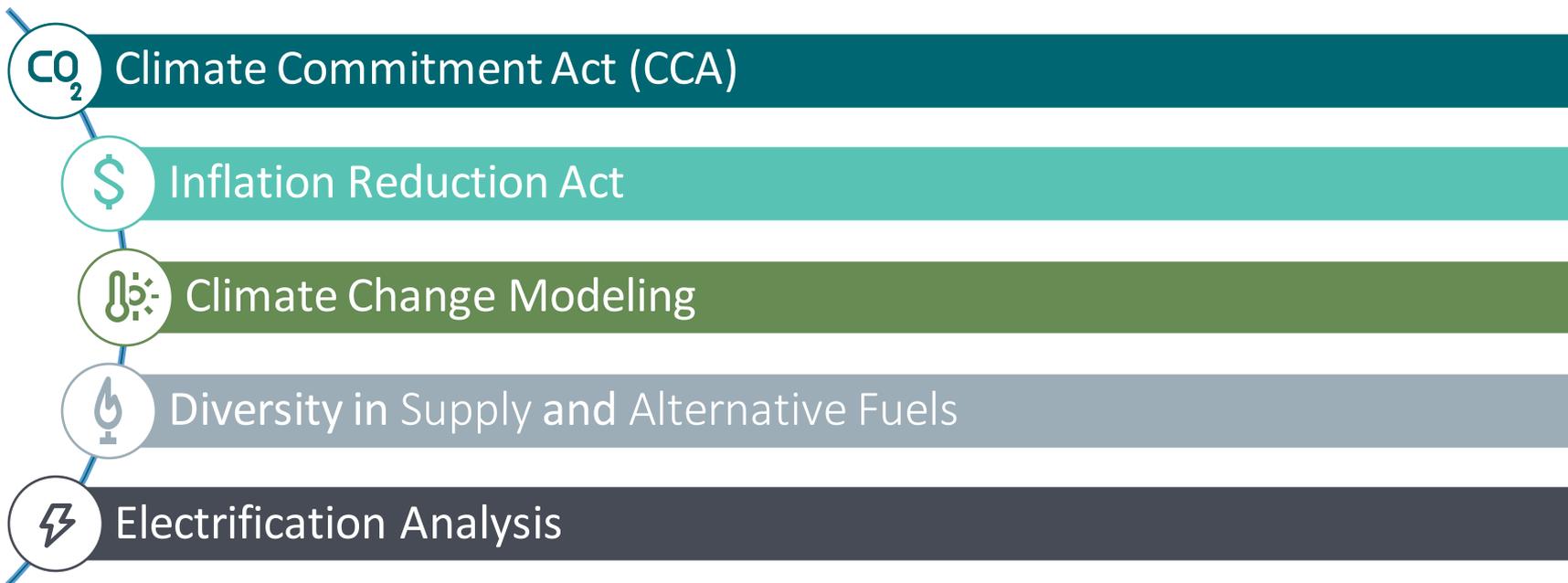
Alternative Fuels:

- Renewable Natural Gas
- Hydrogen

Resource Planning Foundations

- ◆ Meet Climate Commitment Act (**CCA**) requirements
- ◆ The future of energy is a **diversified portfolio of non-emitting resources** providing energy security and reliability for all customers
- ◆ Ensure **infrastructure reliability and supply adequacy**

New Challenges and Opportunities



How Public Participation Shaped our Work

- ✓ Incorporated climate change data
- ✓ Considered alternative fuels
- ✓ Incorporated Inflation Reduction Act*
- ✓ Conducted electrification analysis
- ✓ Examined no growth scenarios
- ✓ Examined State Energy Strategy (SES)

Questions



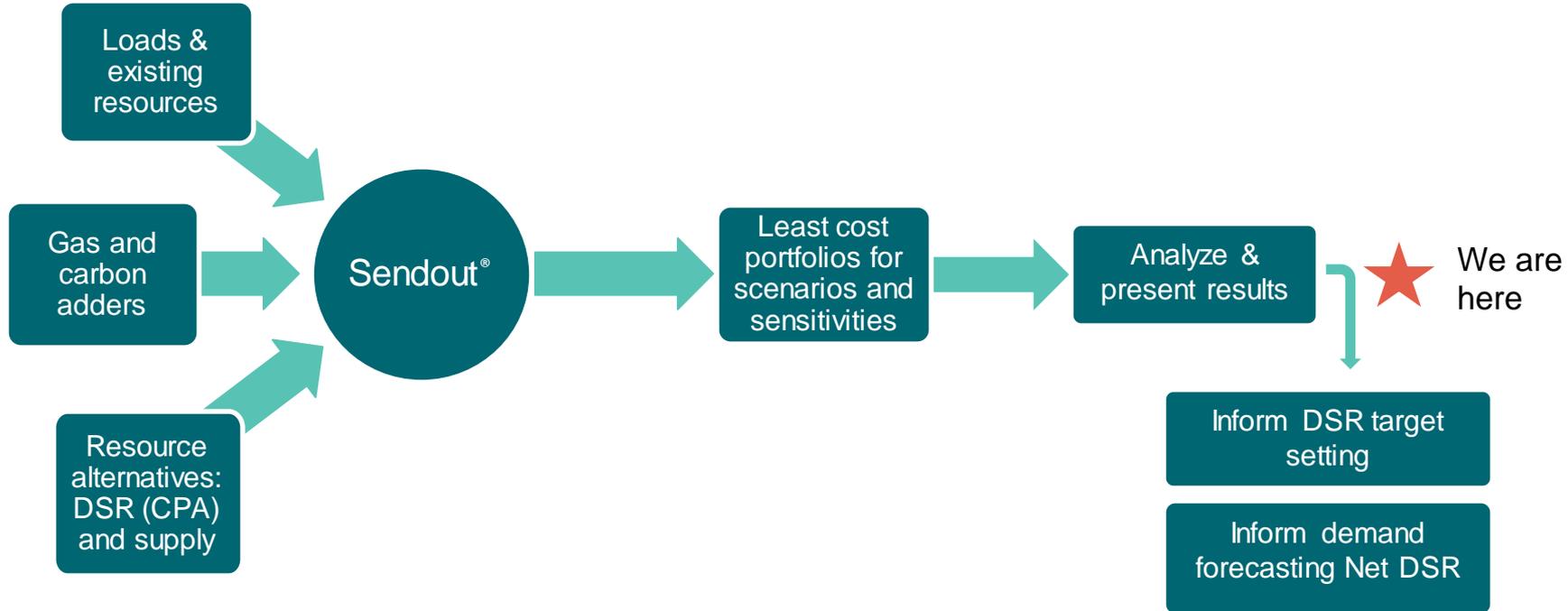
Resource Plan Modeling Results

**Gurvinder Singh, Consulting Energy & Resource
Planning Analyst, Resource Planning and Analysis,
PSE**

January 17, 2023



Analysis Overview



2023 Gas IRP: Scenarios

Scenario #	Scenario Name	CCA				Typical Gas IRP Parameters		
		Carbon Constraint Parameter	Allowance Price	Renewable Fuel Source Location	Heating Load Shift	Demand	Gas Growth?	Gas Price
1	Reference Case	Price	Mid	PNW	Economic	Mid (F22)	yes	Mid
2	Electrification - State Energy Strategy (SES)	Follow SES line	Floor	PNW	Force in Cadmus Electrification Results	Zero by 2050 - Mid	no yes	Mid



★ Scenario will have an electric analysis modeled in Aurora

Some CCA Allowance Price Related Terms:

- Ceiling - an allowance issued by Ecology at a fixed price to limit price increases.
- Floor - the minimum price at which bids are accepted during an auction
- Mid - hybrid pricing scheme; the pre-2030 period based on forecast from Ecology and post-2030 period leverages are linked to the California Energy Commission 2021 forecast, modeling the future connection between the two carbon markets.

2023 Gas IRP: Sensitivities

	Sensitivity Name	CCA		Renewable Fuel		Typical Gas IRP Parameters	
		Carbon Constraint Parameter	Allowance Price	Renewable fuel source location	SCGHG Added?	Demand	Gas Price
1	Reference Case	Price	Mid	PNW	No	Mid (F22)	Mid
A	Allowance Price High	Price	Ceiling	PNW	No	Mid (F22)	Mid
B	Allowance Price Low	Price	Floor	PNW	No	Mid (F22)	Mid
C	Limited Emissions	Free Allowance line	Floor	PNW	No	Mid (F22)	Mid
D	Alternative Fuel Location WA	Price	Mid	North America	No	Mid (F22)	Mid
E	Alternative Fuel without SCGHG	Price	Mid	PNW	Yes	Mid (F22)	Mid
E	HHP Policy	Price	Mid	PNW	No	Mid (F22) - policy driven HHP adoption	Mid
F	No gas growth	Price	Mid	PNW	No	Zero gas growth after 2026	Mid
G	High Gas Price	Price	Mid	PNW	No	Mid (F22)	High



Sensitivity will have an electric analysis modeled in Aurora

Note: 'No' on SCGHG adder = no penalty

Changes Since Sept. 22nd Stakeholder Meeting

- ◆ CCA Final rules released --
 - ◇ Clarification on rules regarding sourcing of RNG, changed base assumption to regional
 - ◇ Based on this clarification regarding SCGHG we removed Sensitivity E, Alternative Fuel without SCGHG does not add value
- ◆ Hybrid Heat Pump Market – No Electric Portfolio Analysis
 - ◇ Scenario 1, Reference Case, did not pick the hybrid heat pump as a conservation measure; therefore, PSE did not evaluate with electric portfolio (no load impacts to model)
- ◇ WA State Energy Strategy Electrification Scenario – Mid Demand
 - ◇ Scenario 2, Electrification Scenario, did not have a conservation supply curve based on zero growth demand, hence we used a mid-demand assumption in this scenario

Draft Gas IRP: Key Findings

Building Code Council

- Analyzed a zero gas growth sensitivity to address stakeholder feedback
- Reduces cost effective conservation slightly
- Codes included: 2018 WSEC update, city gas bans, WA statues make codes tighter
- Codes not included: 2021 WSEC code changes – approved in 2022, effective in 2023

Non Renewal of Pipeline Capacity

- Needle peakers and conservation appear more cost-effective than some baseline pipeline contract renewals
- Not all loads convert to electric – some residual pipeline stilled needed even in the electrification scenario.

CCA Impacts

- Emission reduction not significant
- Alternative fuels are costs-effective
- Sourcing nationally helps emissions reductions
- Offsets uncertain and not included
- Allowance costs add significantly to the total portfolio cost

Conservation Impacts

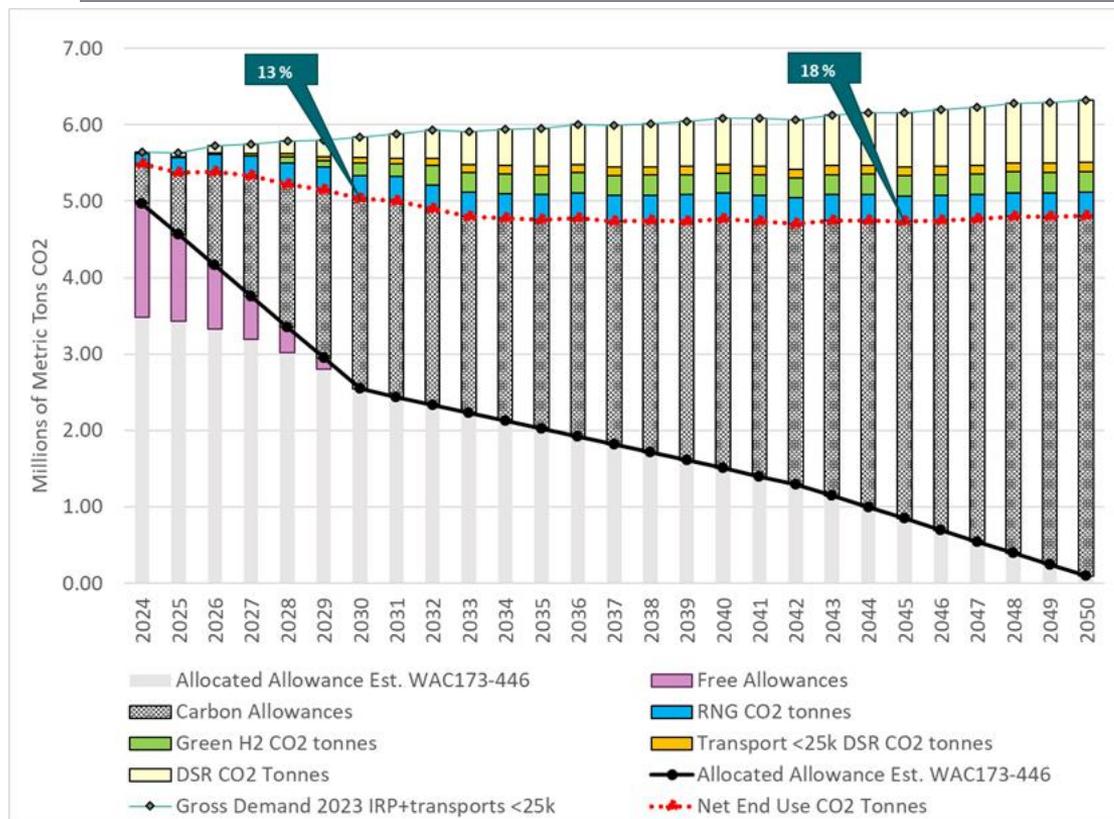
- Conservation fairly consistent across sensitivities (including zero growth)
- Major contribution to emissions reductions

Preferred Portfolio

Resource (MDth/d)	2024	2030	2040	2050
Energy Efficiency	7	61	127	172
Swarr Propane Plant	0	30	30	30
Plymouth LNG	15	15	15	15
Pipeline Renewals	(59)	(120)	(122)	(122)
RNG PNW Regional	3	9	11	10
RNG On-system	0	1	2	2
Green H2 - Gas Blending	0	9	14	14
Net Supply Resources	(44)	(65)	(61)	(60)

- Combination of Ceiling prices and zero gas growth DSR:
 - Allowances demand likely exceed supply = ceiling prices
 - Building codes will likely eliminate gas in new construction – hence slightly lower DSR
 - RNG could benefit portfolio if a wider geographical footprint is used to source
 - Green Hydrogen very cost effective with IRA PTC but limited by blending
- Will result in net reduction in gas supply side resources (forgo some pipeline renewals)
- Conservation in zero growth is only slightly lower than ceiling price (especially in the first 10 years)

CCA Emission under Preferred Portfolio



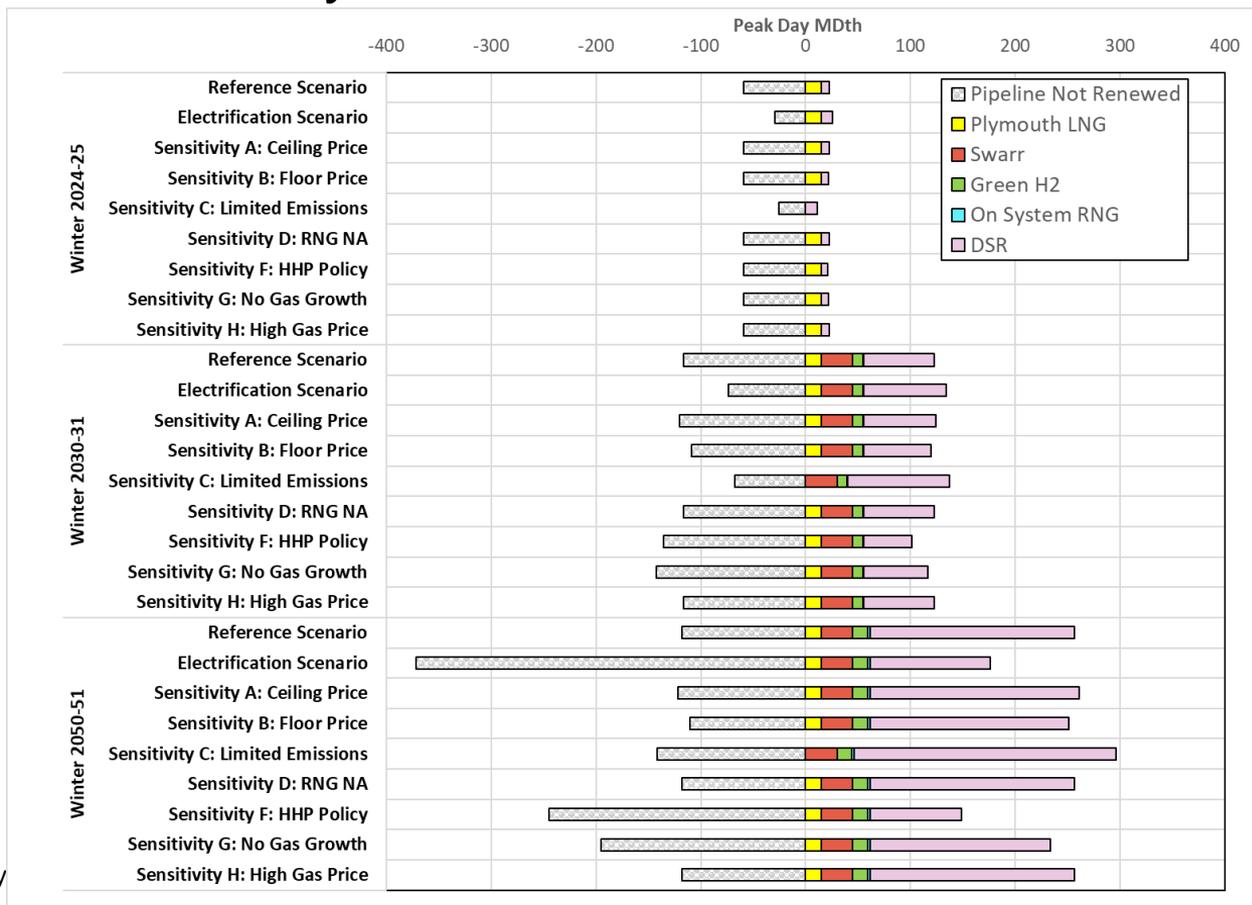
Physical emissions reductions of 13% by 2030 and 18% by 2045.

Emissions reductions from:

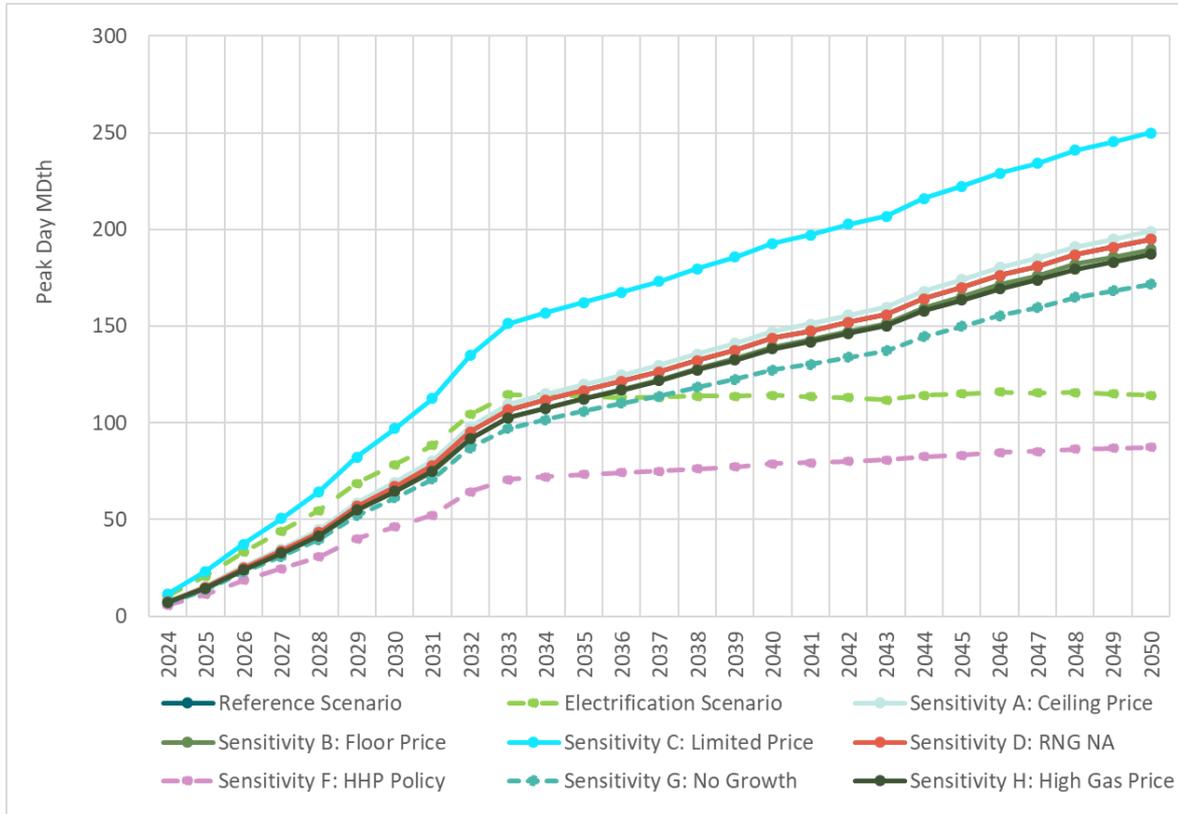
- DSR
- Takes all PNW RNG
- Takes all green hydrogen
- DSR small transport loads
- Most of the CCA requirement met with allowance purchases at ceiling price



Resource Builds by Scenarios and Sensitivities

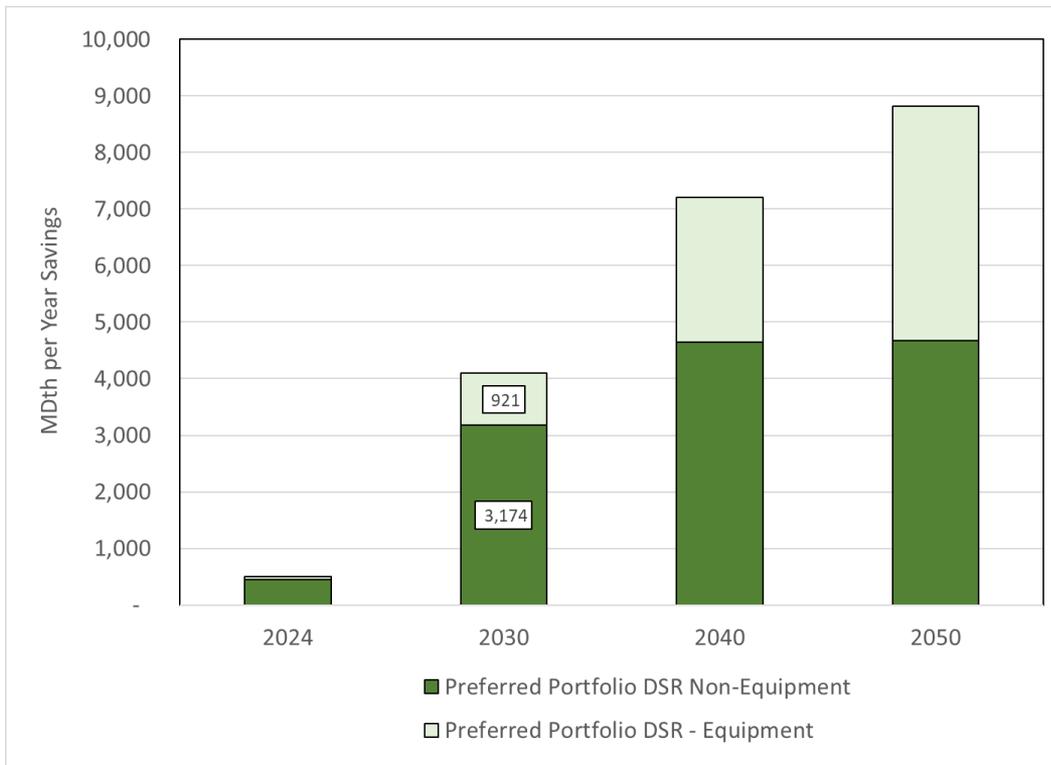


Demand Side Resources – Energy Efficiency



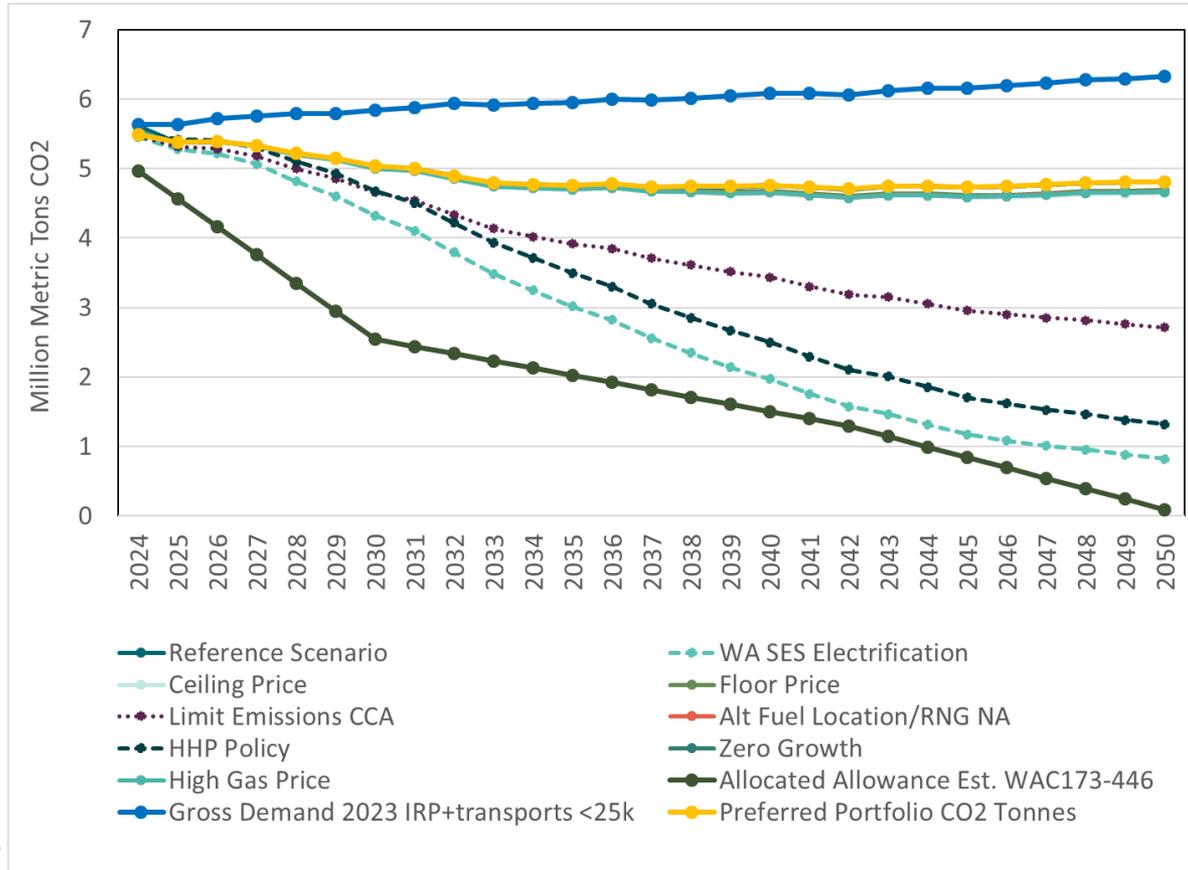
- DSR relatively consistent across most sensitivities
- Electrification and Limiting Emissions forces all DSR
- Zero Gas Growth similar to Reference – especially first 10 years
- Electrification and HHP Policy – diminishing gas load means less DSR

Demand Side Resources – Energy Efficiency

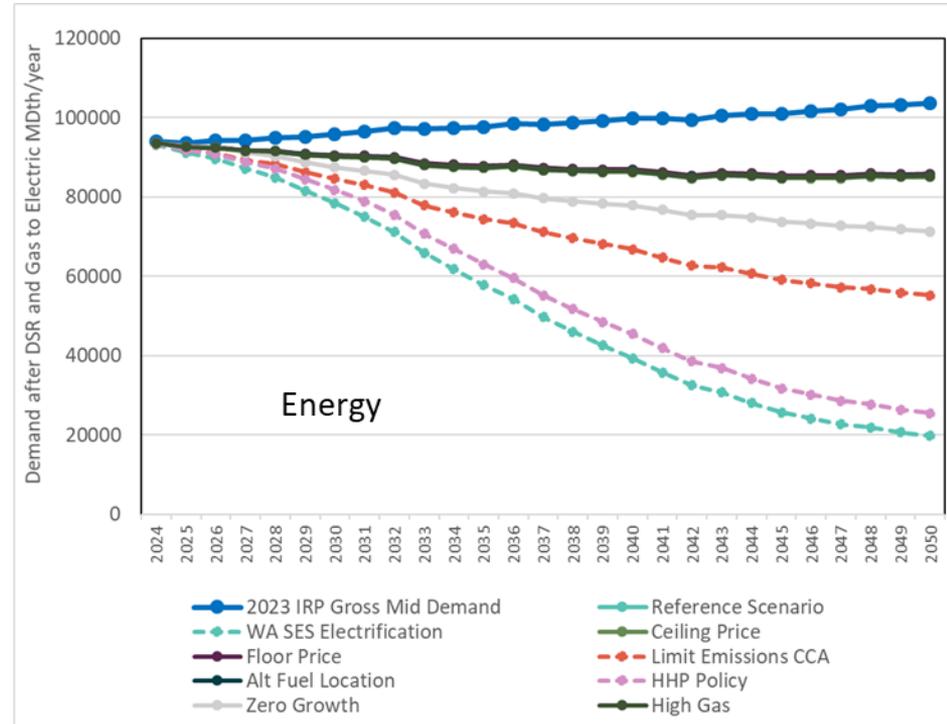
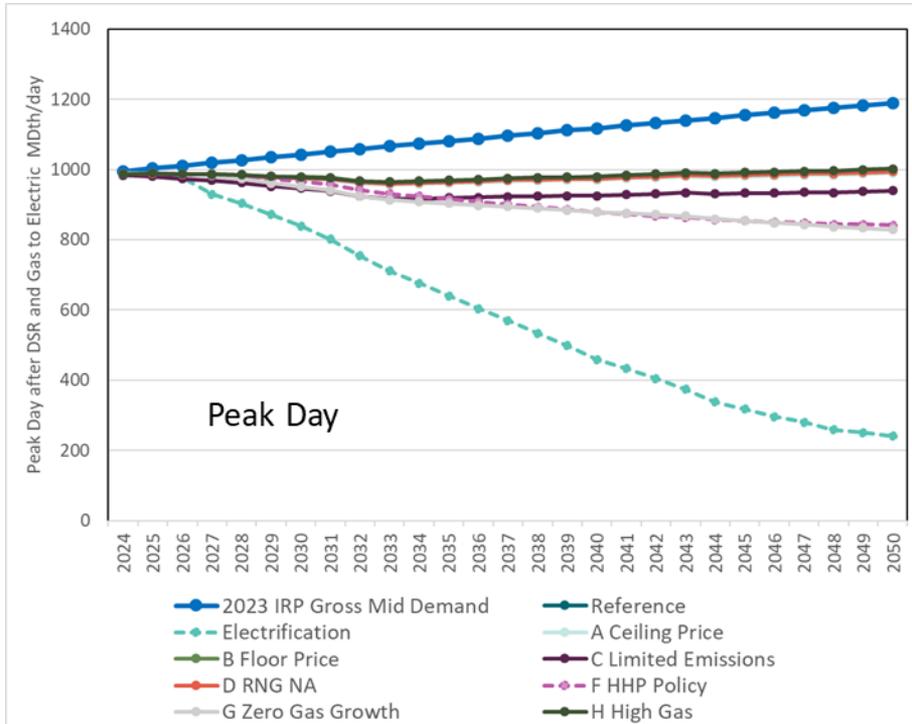


- Preferred Portfolio DSR energy savings by type
- Non-"gas" Equipment measures are fuel neutral
- First 10 years = approx. 80% non-equipment measures savings (retrofits)
- Later period – no retrofit measures, equipment replacement has larger share of savings

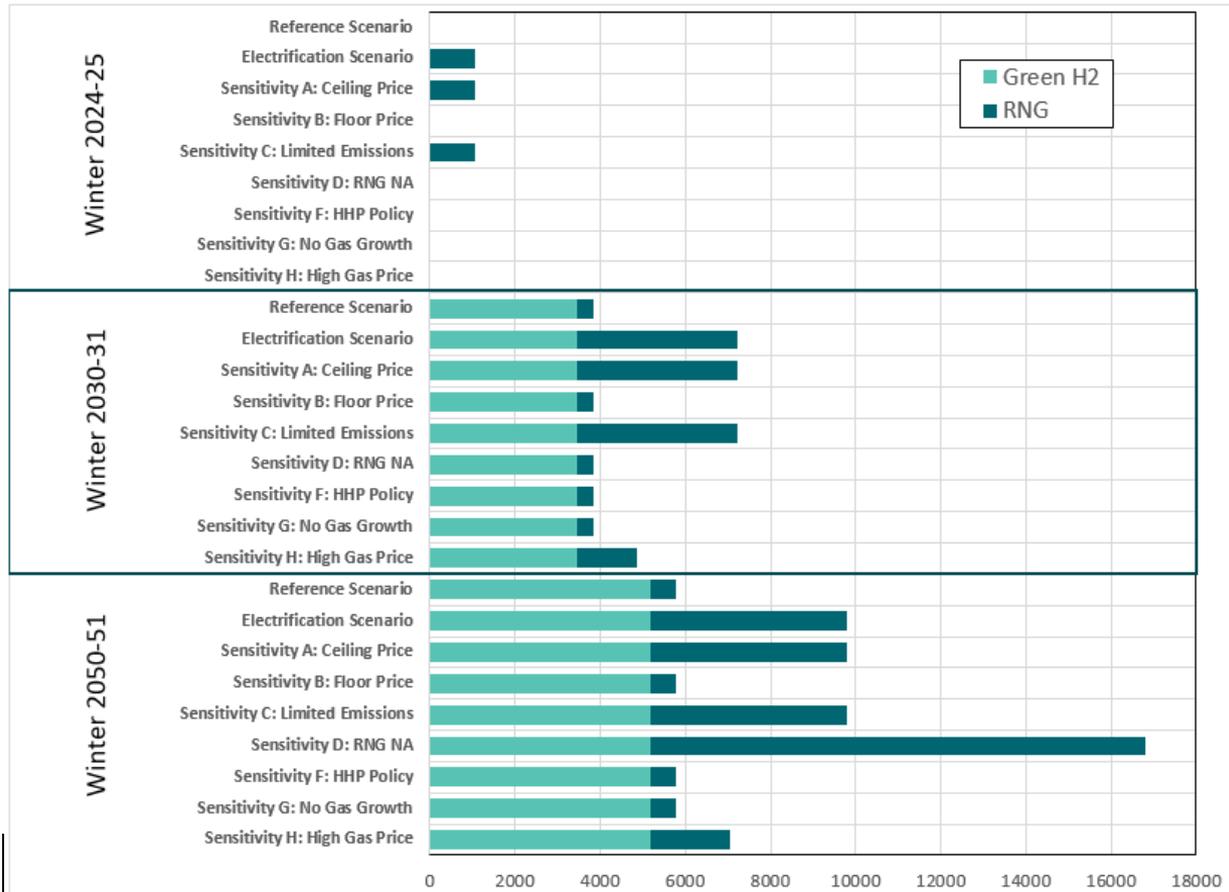
CCA Emissions by Scenarios and Sensitivities



Gas Demand After Electrification and Energy Efficiency

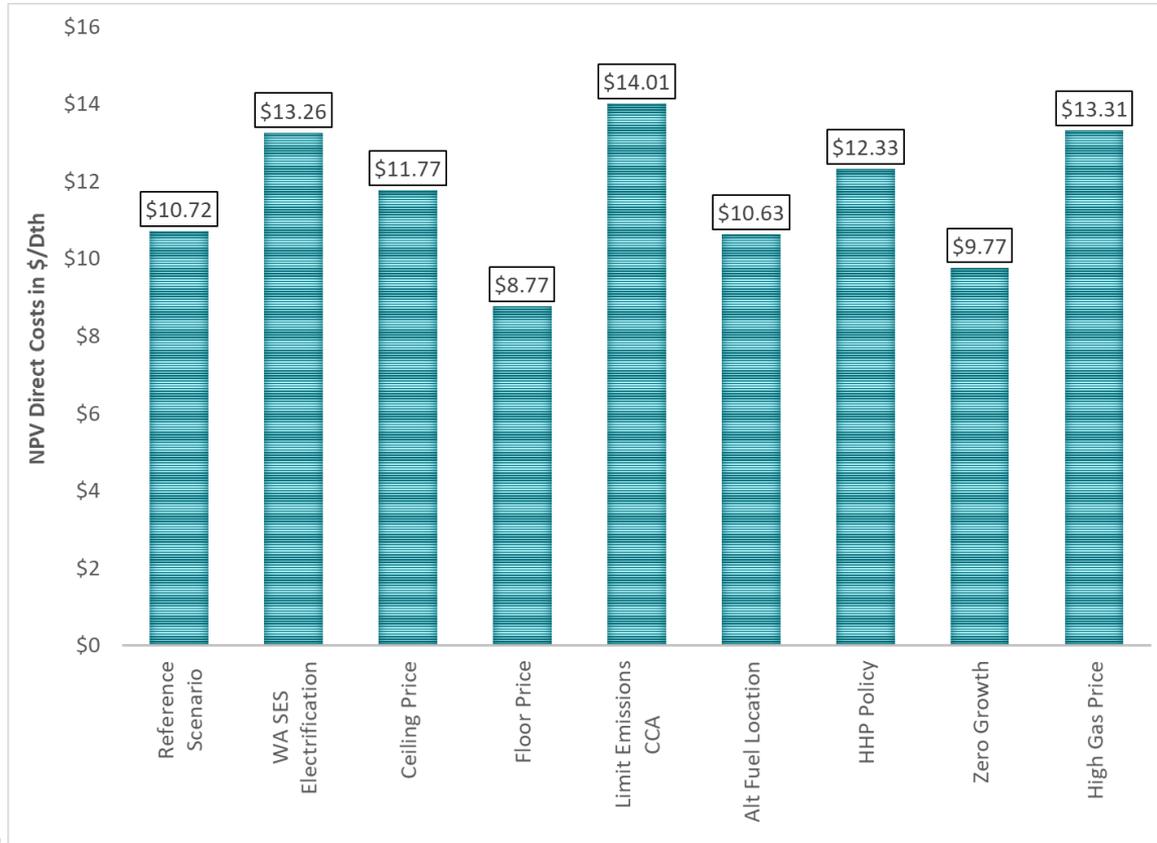


Alternative Fuel Portfolio Additions – Energy in MDth per Year



- Green Hydrogen is cost effective in all
- RNG is carbon price sensitive
- Restricting RNG to PNW:
 - Results in higher emissions
 - Approx. \$100 million higher costs

Gas Portfolio Costs



Questions



Break

Please return in 10 minutes



Electrification Analysis

**Gurvinder Singh, Consulting Energy & Resource
Planning Analyst, Resource Planning and Analysis**

**Elizabeth Hossner, Manager, Resource Planning and
Analysis, PSE**



PSE Electrification Study Demand Impacts by Service Area

PSE Service Area Impacts:

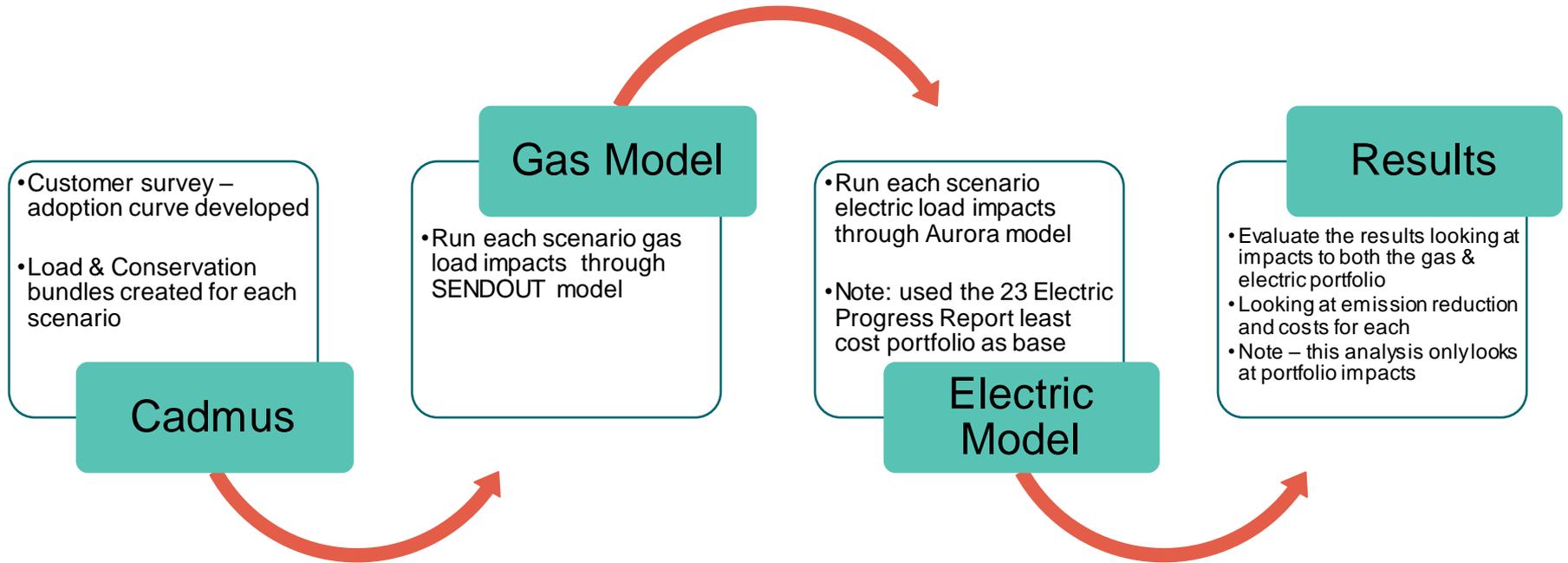
- Electric only – natural gas equipment converts to electric (increases PSE electric load)
- Natural gas only – converted to electric equipment (reduces PSE natural gas load)
- Combination service – converted to electric equipment (increases PSE electric load and reduces PSE natural gas load)



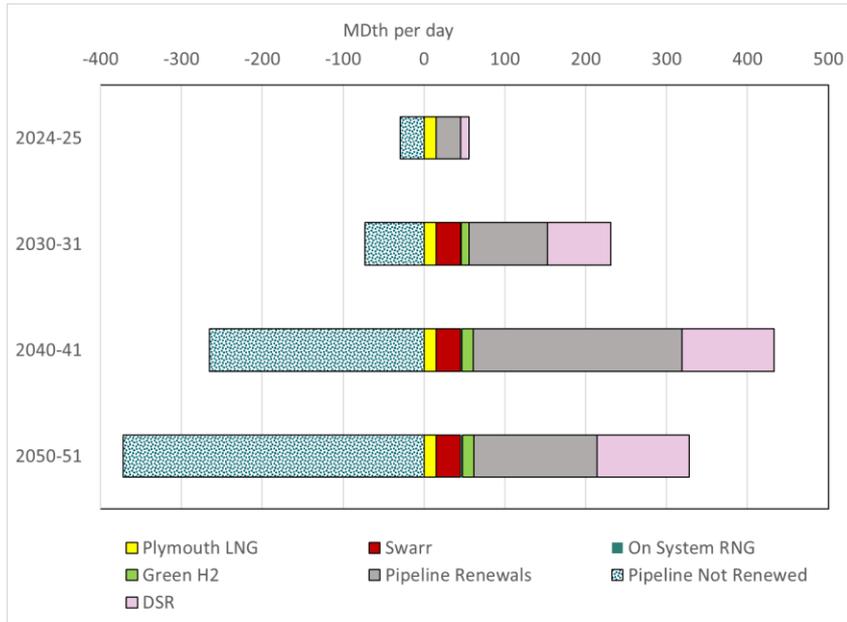
Electrification in 2023 Gas IRP & Electric Progress Report

- Two base technologies in electrification rest in energy efficiency supply curve:
 1. Air Source electric heat pumps in electrification with high efficiency heat pumps included in the energy efficiency supply curve (consistent with the Council's 2021 Plan)
 2. Air source hybrid heat pumps with gas peaking back up
- Tested market and policy approaches
 - Market approach to hybrid heat pumps only in residential space heating
 - Policy includes all customer classes and all end uses - some limits to commercial and industrial loads: 70% in commercial and 30% in industrial application can convert
- Looked at impacts of energy, capacity and costs on the gas and electric systems

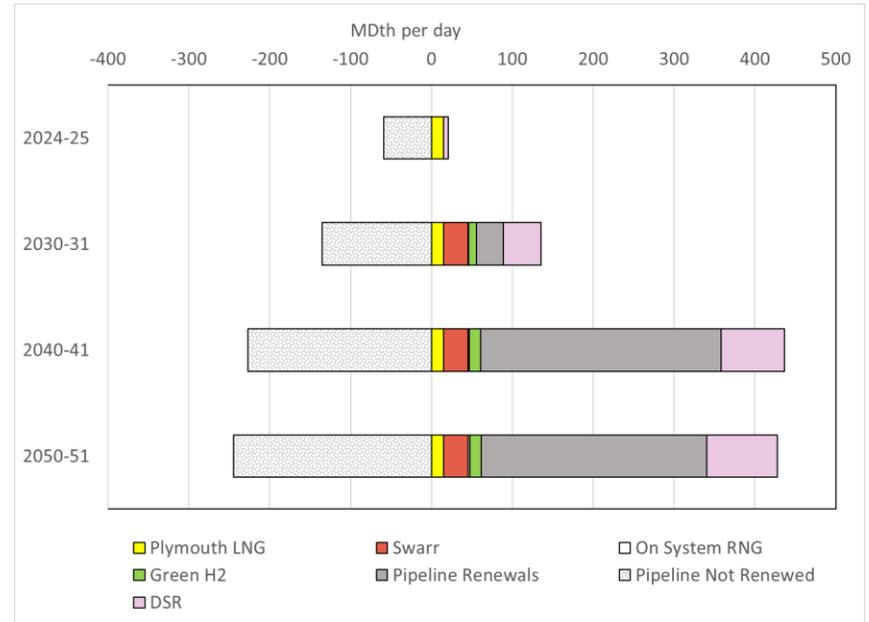
Electrification Analysis Overview



Draft Results - Electrification in the Gas IRP

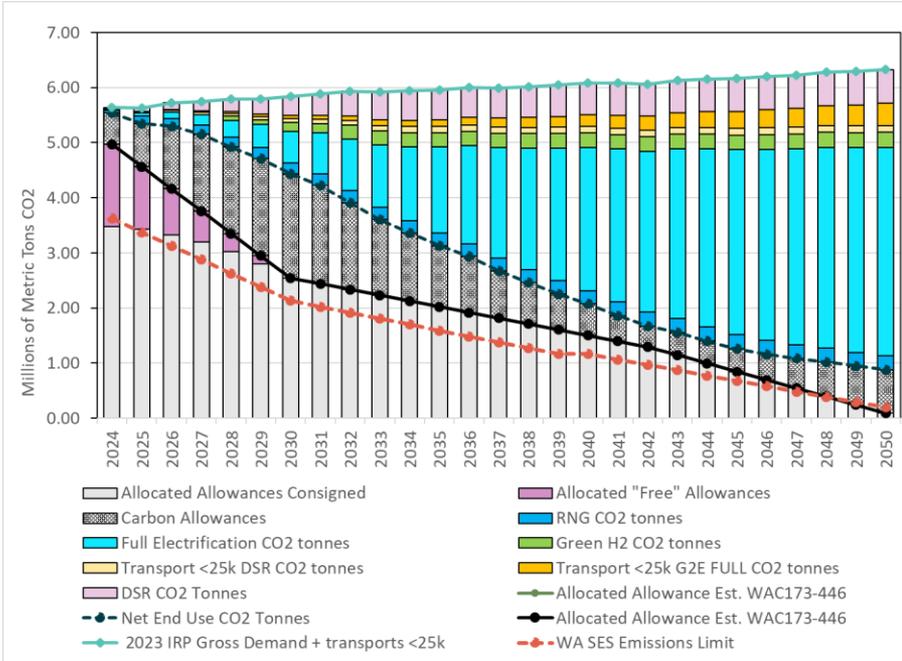


Electrification Scenario

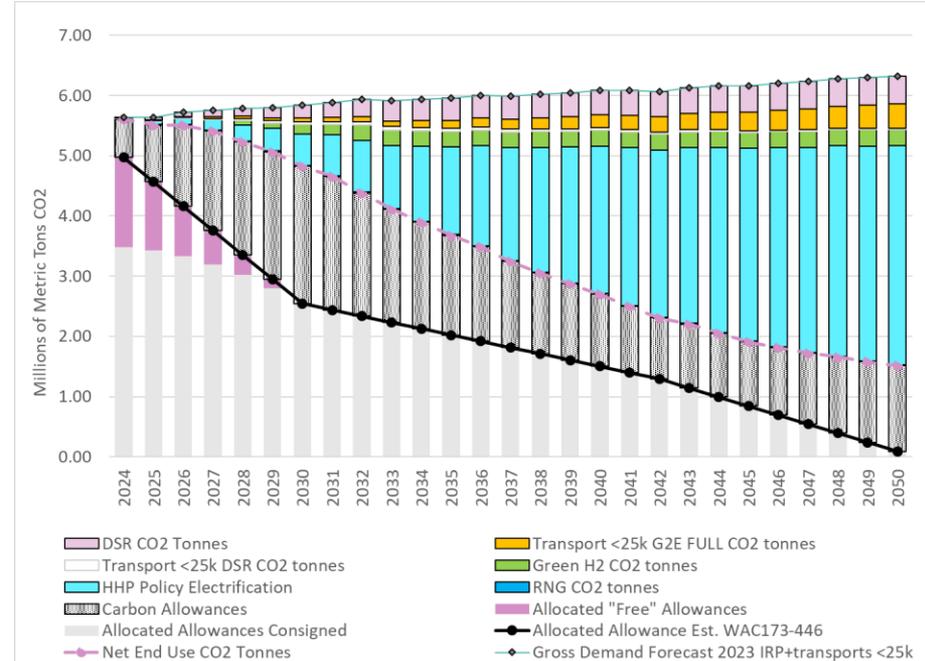


Hybrid Heat Pump Policy Sensitivity

Draft Results – CCA Emissions with Electrification

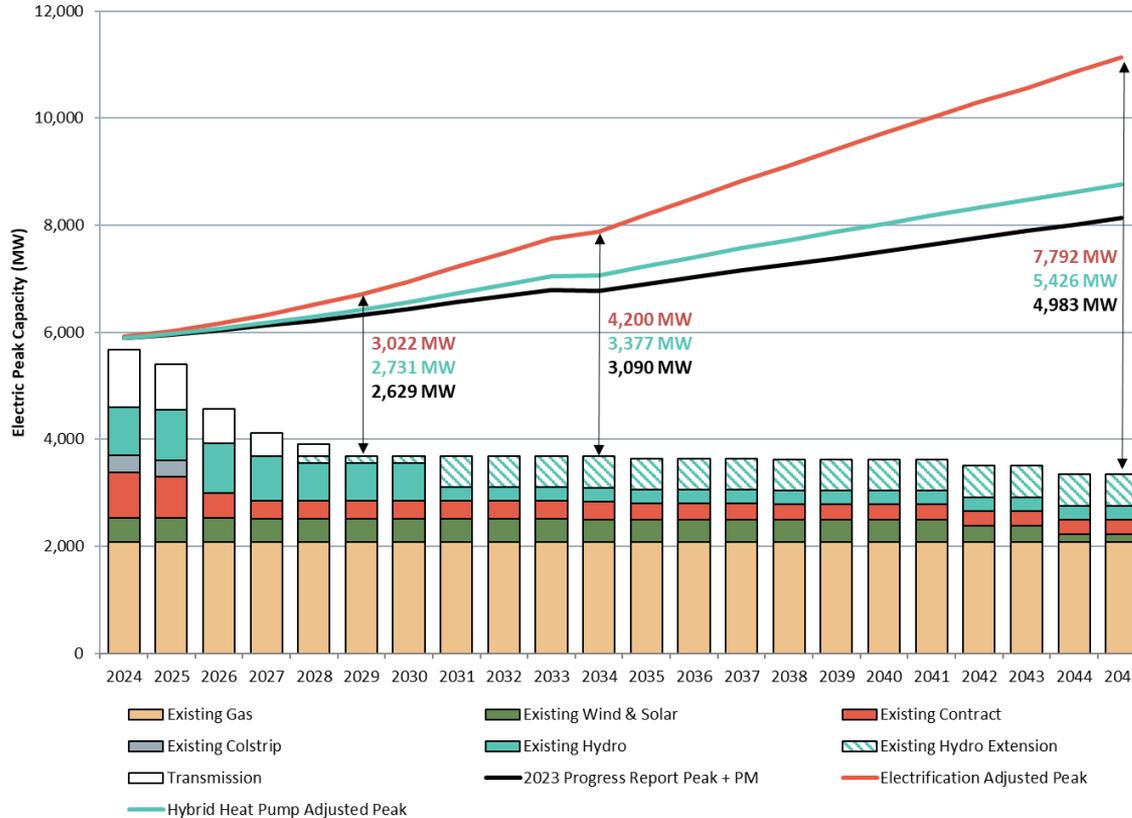


Electrification Scenario



Hybrid Heat Pump Policy Sensitivity

Electrification Peak Load Impacts

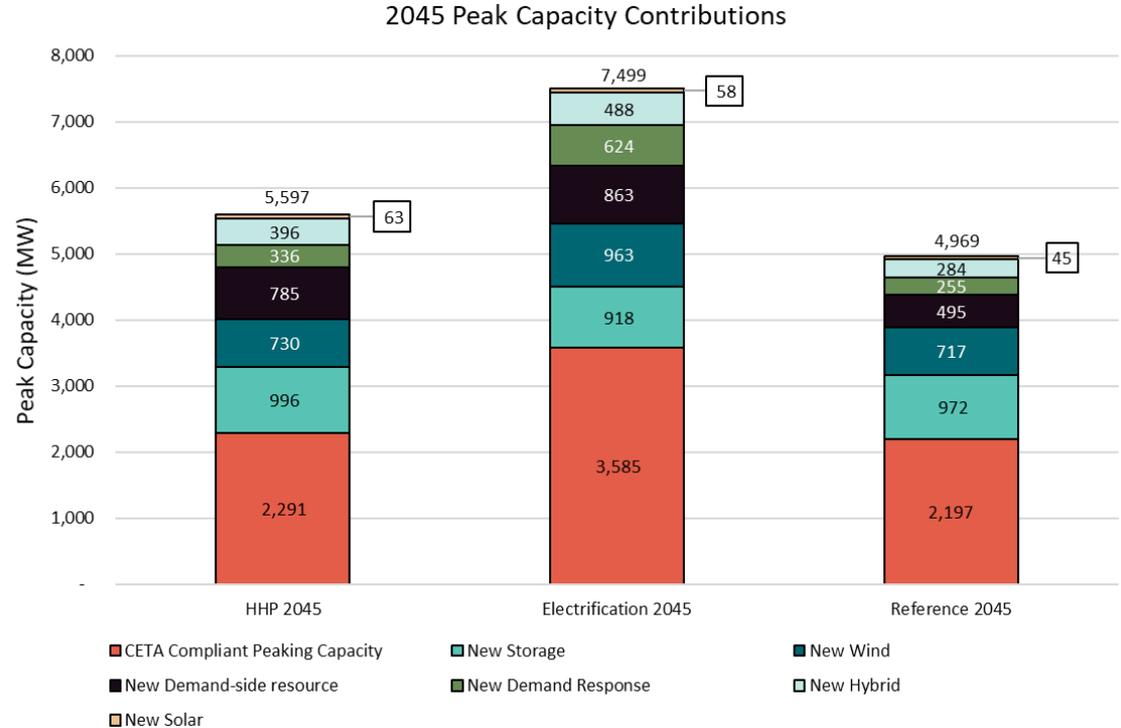


- Electrification scenario increases electric peak capacity deficit by almost 3,000 MW for a total of 7,800 of new capacity needed by 2045
- Hybrid Heat Pump (HPP) scenario increases peak capacity deficit by 500 MW for a total of 5,400 MW of new capacity needed by 2045.



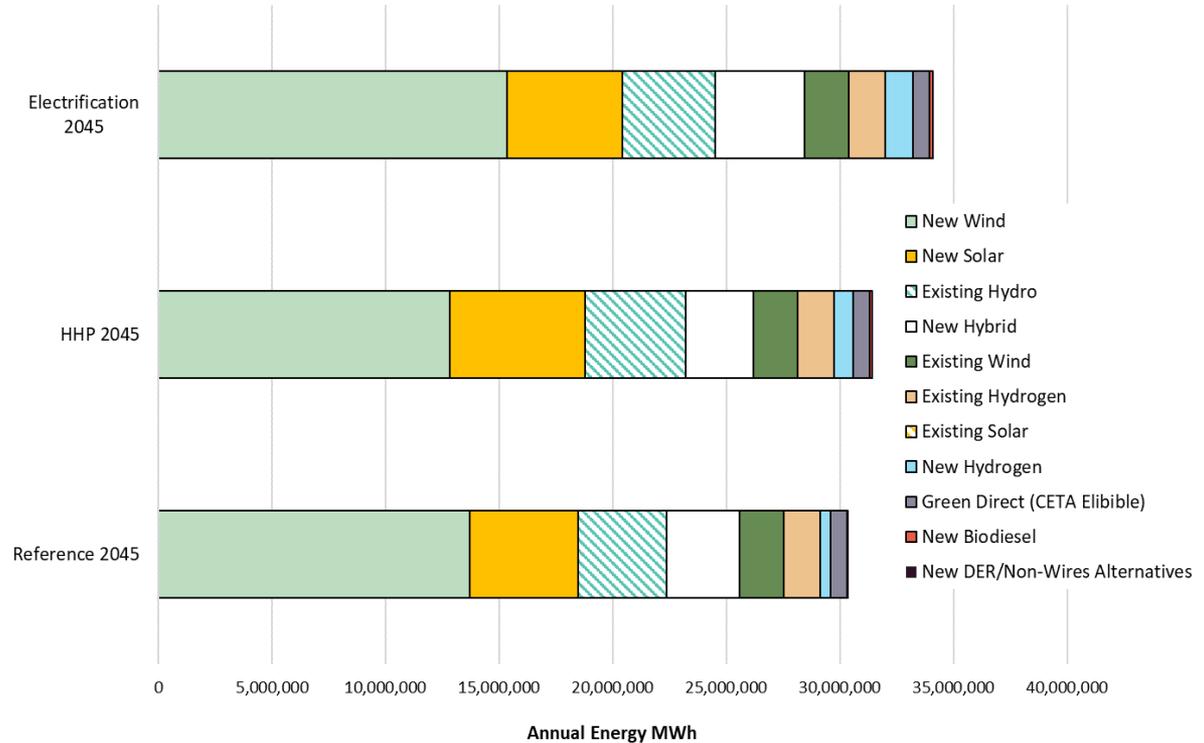
Peak Capacity Contributions

- Electrification scenario adds more resources to meet increase in peak need
 - Almost 1,400 MW of new peaking above reference
 - Increased wind
 - Increased conservation
 - Increased demand response
- HPP scenario has a marginal increase in resources to meet the 500 MW increase in peak need



CETA-Compliant Annual Energy

- The electrification scenario has an increase in the demand forecast of 7.2 million MWh from the reference by 2045. This is met with an increase in
 - Conservation
 - Wind & solar
- The HPP scenario has an increase in demand forecast of 6.9 million MWh. This is met with an increase in
 - Conservation
 - Wind & solar



Electric Portfolio Costs

The increase in costs for electrification is **\$3.63 billion** NPV (2024 – 2045).

The increase in costs for the hybrid heat pump is **\$2.32 billion** NPV (2024 – 2045).

	Reference (least cost)	Hybrid Heat Pump	Electrification
Portfolio Cost	\$17.8 billion	\$19.38 billion	\$20.23 billion
Social Cost of Greenhouse Gases (SCGHG)	\$3.31 billion	\$3.87 billion	\$3.74 billion
Incremental T&D Cost	-	\$0.18 billion	\$0.74 billion
Total	\$21.11 billion	\$23.34 billion	\$24.71 billion
Increase from Reference		\$2.32 billion	\$3.63 billion

Questions



Next Steps

2023 Gas Utility IRP

January 17, 2023



Gas Utility IRP Timeline

- **January 19, 2023** – Webinar recording and chat transcript posted
- **January 24, 2023** – Draft 2023 Gas Utility IRP posted
- **January 24, 2023** – Feedback form for Jan. 17 meeting closes
- **February 7, 2023** – Deadline to submit feedback on draft 2023 Gas Utility IRP
- **March 14, 2023** – Final results presentation
- **March 31, 2023** – Final 2023 Gas Utility IRP submitted

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Electric Progress Report Timeline

- **January 24, 2023** – Draft Chapter 3: Resource Plan Decisions of the 2023 Electric Progress Report posted; feedback form opens
- **February 7, 2023** – Deadline to submit feedback on draft Ch. 3 of the 2023 Electric Progress Report
- **March 14, 2023** – Final results presentation
- **March 31, 2023** – Final 2023 Electric Progress Report submitted

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Thank you for joining us!



**PUGET
SOUND
ENERGY**

Common Acronyms

Acronym	Meaning
BCP	Biennial Conservation Plan
CCA	Climate Commitment Act
CEIP	Clean Energy Implementation Plan
CETA	Clean Energy Transformation Act
CPA	Conservation Potential Assessment
DHP	Ductless heat pump
DSR	Demand-side resources
GHG	Greenhouse gas
HHP	Hybrid heat pump
EE	Energy efficiency
IRA	Inflation Reduction Act

Acronym	Meaning
ITC	Investment Tax Credit
LNG	Liquefied natural gas
MMBtu	Metric Million British Thermal Unit
MMTherm	Million therms
PNNL	Pacific Northwest National Laboratory
PTC	Production Tax Credit
RNG	Renewable natural gas
SCGHG	Social cost of greenhouse gas
SES	State energy strategy
MWh	Megawatt hour
WSEC	Washington State Energy Code