This meeting will be transcribed for notes

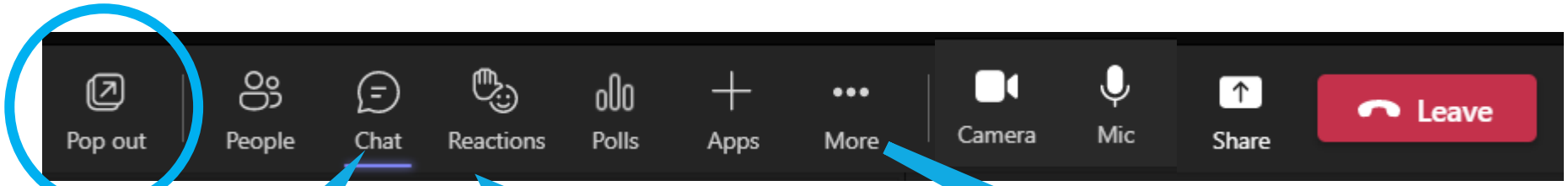
Natural Gas Advisory Committee

Q1 2026: Tuesday, March 3

9:30am – 2:00pm (Pacific)

Virtual

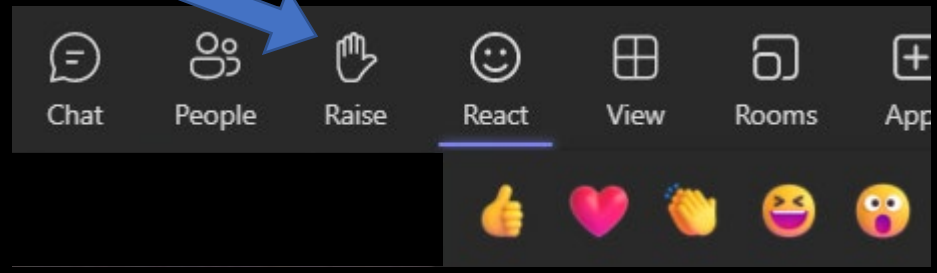
Tools for Today: Engaging on Teams



The chat is not captured automatically.

Do you have any accessibility challenges with this technology today?

Comments/Questions?
Please raise your virtual hand or chime in
Chat & reactions also welcome



"…" More includes:

- ✓ Settings: mic & video
- ✓ Background effects

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Heads Up!

“Spotlighting” Speakers

Reminder of NGAC Purpose & Role

Purpose

…to support Alliance success by **advising** on the **optimal composition of NEEA's program portfolio**, including a **formal vote for program advancement** at three key points in the Initiative Lifecycle, **consistent with the goals and objectives of NEEA's Business & Operations Plans**.

Responsibilities

- Portfolio optimization & program advancement (milestone votes)
- Coordinate downstream marketing
- **Monitor outcomes of relevant workgroups & Cost-Effectiveness Committee (CEAC) meetings**
- Advises NEEA's Executive Director on portfolio decisions

Agenda

All Times Pacific

9:30-9:50	**Welcome, Introductions, Agenda Packet Review**
9:50-10:05	**Housekeeping, Looking Ahead**
10:05-10:25	**Portfolio Update**
10 min	**BREAK**
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1:15-1:45	**Commercial Water Heat Modeling Update**
1:45-1:55	**Public comment, wrap up and adjourn**

New NGAC Member!

Paul Koenig

Washington Utilities &
Transportation Commission

Introductions

- **Name**
- **Organization**
- ***And…***

xx?

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Packet Review & Informational Updates

Tier 1: Agenda Items

- ✓ *Portfolio Update (pg. 3)*
- ✓ *Quarterly Highlights Report (pg. 4-14)*
- ✓ *Dual-Fuel Work Group Updates (pg. 15-17)*
- ✓ *Emerging Opportunity: LLLC + HVAC (pg. 18)*
- ✓ *Commercial Water Heat Modeling Update (pg. 19)*

Tier 2: Informational Updates

- ✓ *Efficient Rooftop Units Program Name Change (pg. 20)*
- ✓ *Enervee NW Online Marketplace (pg. 21)*
- ✓ **NEW* Q4 2025 Market Progress Report (pg. 22-36)*

Tier 3: Additional Resources

- ✓ *Quarterly newsletters, past NGAC meeting materials, NGAC charter (pg. 2)*

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Product Council Updates

Noe Contreras

Ncontreras@neea.org

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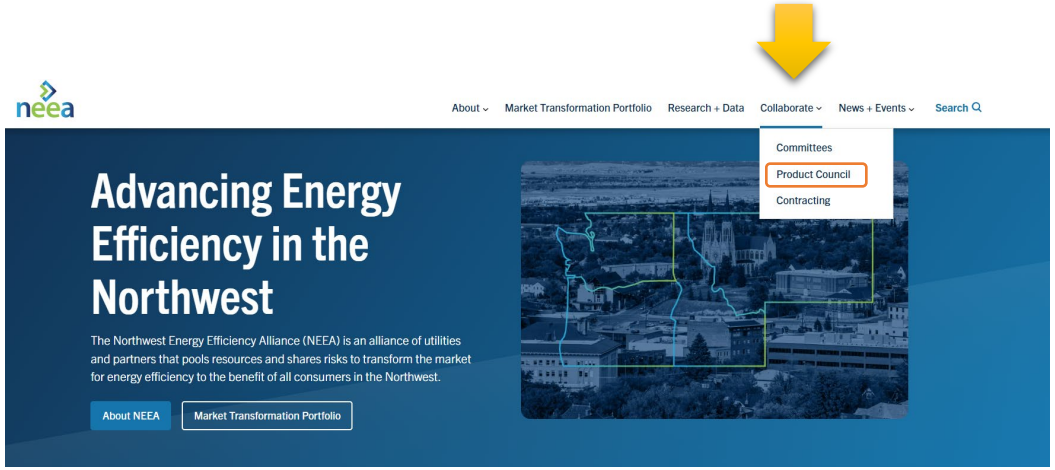
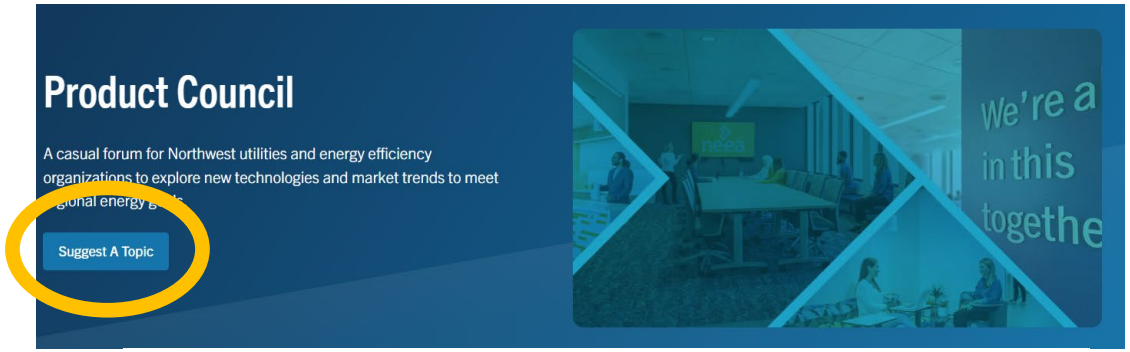
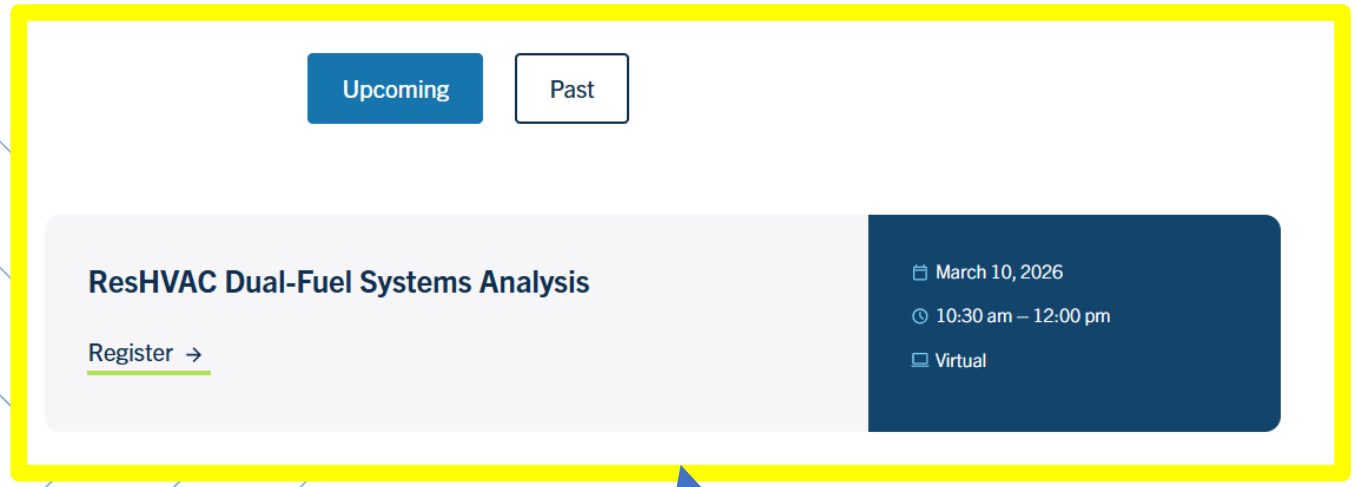
Product Council







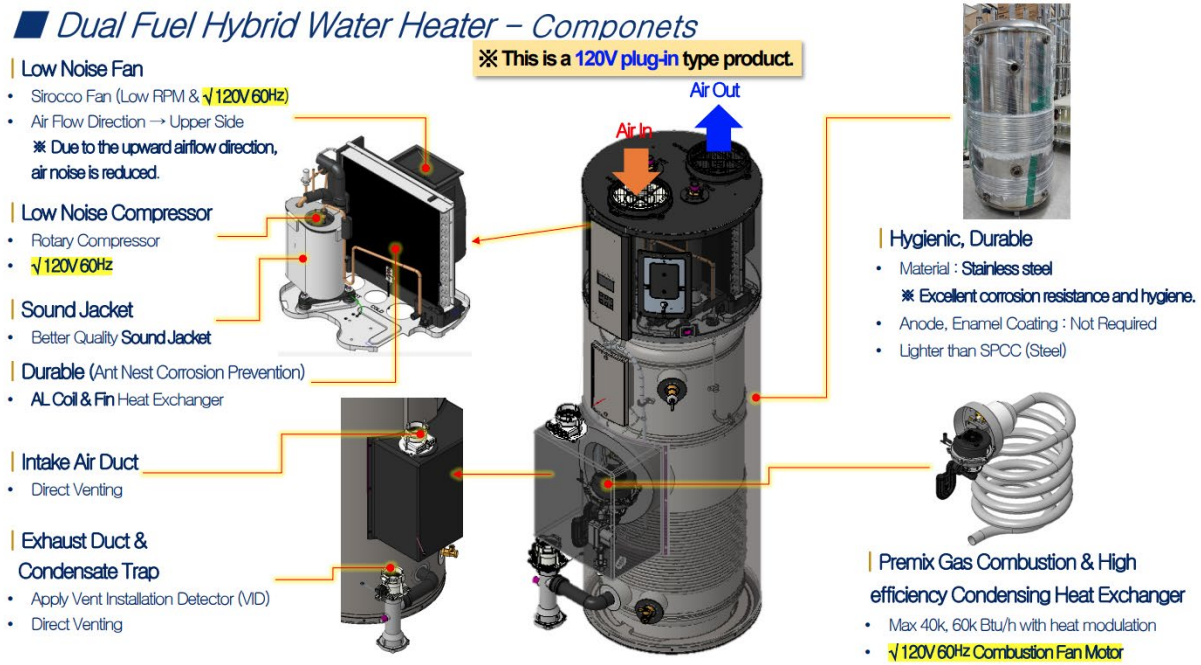
Explore Emerging Technologies and Opportunities for Innovation at Product Council

The Product Council offers an opportunity for Northwest utilities and energy efficiency organizations to explore and discuss new products, technologies and market trends that could help the region meet its energy goals. The forum is casual to foster deep discussion of the merits and challenges with the products and services reviewed.

Membership includes NEEA staff representatives from Planning, Evaluation, Product Management, Codes & Standards, Market Management, Initiative Management, Stakeholder Relations, and Corporate Communications. It also includes Planning staff from Energy Trust of Oregon, Emerging Technology staff from Bonneville Power Administration, and interested members of NEEA's Regional Emerging Technology Advisory Committee.

Meetings are held based on presenter availability. Confirmed sessions are typically held **Tuesdays from 10:30 a.m. – 12 p.m. (Pacific)**. See the calendar for upcoming meetings. Have questions? Please contact us.

Link: Navien Dual-Fuel Residential Heat Pump Water Heater



Product	*Navien* Dual Fuel	*Anesi* Gas Heat Pump	Typical High Efficiency Gas Water Heater	Typical Gas Water Heater
Type and Use	Dual-Fuel Water Heating	Gas Driven Heat Pump Space and Water	Gas Burner w/ extra heat exchanger and forced exhaust	Gas Burner Water Heating
Gas Input	40 kBTU/hr, 60 kBTU/hr	54.5 kBTU/hr	50kBTU/hr	40 kBTU/hr
Electric Input	~400 Watts	150-500 Watts	100 Watts	n/a
Efficiency	~3.50 (UEF)	1.43 (CoP)	0.90 UEF	0.64 (Federal Minimum)
Refrigerant	R-134a	R717	n/a	n/a

Housekeeping

- *Past Meeting Notes*
  - ✓ Action items and questions
- *Updates*
  - ✓ Check in on Informational Memos
- *Announcements & Reminders*
  - ✓ Next NEEA / MT 101 webinar
  - ✓ Efficiency Exchange 2026
  - ✓ 2026 NEEA Meetings
  - ✓ Regional Convening Opportunity
  - ✓ Whole Building Webinars
  - ✓ Other regional / industry events

Oct 27 Notes & Action Items

- ACTION: NEEA staff to follow up with Avista Re: participation / tracking on Residential Committee efforts for North American Gas Heat Pump Collaborative
  - NEEA no longer participating in / tracking on Residential Committee primarily due to WA policy changes.
  - NEEA only funding commercial activities right now, Neil will continue to monitor. As Navien (dual-fuel) product develops, this may drive NEEA to revisit.

- Follow up sent to Avista 10/30

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Quick check-in: Informational Memos

- NW Online Marketplace
- Efficient Rooftop Units name change
  - Now Advanced Performance RTUs
- *NEW* Q4 2025 Market Progress Report

Memos on pgs. 20-22

Could others in your organization benefit from a NEEA / MT 101?

- Offering 2x/year 90 min webinar for alliance members
- Target audience:
  - Committee members wanting a refresher
  - Team members not on NEEA committees, but interact with NEEA's work or would benefit from a basic overview
- **Next session: Tues Mar 31, 9-10:30**
- Proposed special topic feature: Emerging Tech
  - Future special topics include: Codes & Standards, Regional Studies & Infrastructure, Market Research/Evaluation, Data Acquisition, MT Barrier Removal, Special Projects
- Contact: Alisyn Maggiora (amaggiora@neea.org)

Efficiency Exchange 2026 (EFX26)

Early Bird Registration

February 9 – April 3

neea.org/EFX

EFX26 In-person Conference

May 5-6 in Boise, ID

Preconference tours and networking on May 4

Upcoming 2026 NEEA Committee Meetings

= dual-fuel

Wednesday March 11

- **Regional Emerging Technology AC**

Tues / Wed March 17-18

- **Residential Coordinating Committee**

Thursday April 23

- **Cost Effectiveness & Evaluation AC**

Tuesday May 19

- **Regional Portfolio Advisory Cmtee**

Wednesday May 27

- **C & I Coordinating Committee**

2026 NGAC Meeting Dates

Quarter	Day(s)	Date(s)	TIME (PST)	LOCATION
Interim Webinar	Wednesday	Jan 28	1-2pm	Virtual
Q1	Tuesday	Mar 3	9am-4pm	*Now Virtual*
Interim Webinar	Thursday	Apr 16	1-2pm	Virtual
Q2	Tuesday	June 2	9am-4pm	***UPDATE*** **Hybrid (NEEA)**
Q3	_	**No Q3 Mtg**	_	_
Interim Webinar	Wednesday	Sept 9	1-2pm	Virtual
Q4	Thursday	Oct 22	9am-4pm	**Hybrid (tentative based on topics)**
Interim Webinar	Wednesday	Dec 9	1-2pm	Virtual

Please join us in person on June 2!

= Proposed Hybrid / In-person Option

Regional Convening Opportunities

- Topic need / idea: Planning Challenges
  - Big picture portfolio and program structure
  - Metrics and KPIs
  - Cost-effectiveness and avoided cost
  - Program development
- Timing:
  - TBD – do you have input / considerations?
  - Would you like to be added to an “interested parties list?
- Please share internally
- Contact: Alisyn Maggiora (amaggiora@neea.org)

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Commercial Whole Building Market Insights Webinar Series

Upcoming:

- *March 2026*
  Webinar #3: Market Transformation Concept Design Research
  Presenter: Ethno
- *April 2026*
  Webinar #4: From Policy to Practice — Lessons Learned from Building Performance Standards Implementation
  Presenter: Hayden Tanner
- *May 2026*
  Webinar #5: Commercial Building Stock Assessment
  Presenter: NEEA

Past:

- *January 2026*
  Webinar #1: Scaling Commercial Building Efficiency Across the Northwest
  Presenter: RE Tech
- *February 2026*
  Webinar #2: Clean Buildings Performance Standard — Market Challenges and Opportunities
  Presenter: Building Potential

➢ Register & view recordings

Any other regional / industry events or announcements to share?

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Portfolio Update:

Look Back, Look Ahead

Emily Moore

Director, Market Strategy & Execution

Memo pg. 3

2025 Market Progress Highlights

1. *Two new ERTU product lines that meet NEEA specification*
2. *Momentum with ERTU manufacturer reps to identify and promote qualified projects*
3. *Dual-fuel and gas heat pump commercial water heating pilots underway*
4. *Dual-fuel res HVAC Concept Advancement*
5. *National collaboration and co-funding on research and tools*

Look Ahead

2026 Operations Plan Goals and Focus Areas

- Deepen partnerships and expand availability of qualified Efficient RTUs for the light commercial market
- Continue testing gas heat pump and dual-fuel configurations for Advanced Commercial Water Heating
- Conduct research and demonstration projects on dual-fuel residential HVAC system performance
- Advance at least one new dual-fuel or fuel-neutral opportunity into the portfolio

Look Ahead

Potential 2026 Program Advancements

- Adding gas high-efficiency DOAS to existing electric High-Performance HVAC program
  - Gas portfolio Program Advancement decision in Q4

- ***Emerging Opportunity***: Adding HVAC control to existing electric Luminaire Level Lighting Controls program

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Thank You!

Emily Moore

Director, Market Strategy & Execution

emoore@neea.org

Time for a quick break!

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PORTFOLIO UPDATE

- *Progress Report Highlights*
  - Q4’25 recap

Report pg. 4-14

Natural Gas Portfolio

Commercial Laundry

High Performance HVAC to include gas products

HVAC/Lighting controls (fuel neutral)

Efficient RTU expansion to include heat pumps

Advanced Commercial Water Heating

Dual-fuel Residential HVAC

Efficient Rooftop Units

New Building Codes and Product Standards

Progress Report – New Format!

- Why the change?
  - Streamline the format and content, ensure no redundancy
  - Align program reports and cadence with electric portfolio reporting
    - ➢ ***Will provide Progress Report twice annually: Q2 and Q4***
  - Utilize meeting time to focus on key topics and highlights
- We want your feedback!
  - What do you like? Not like?
  - Anything missing for you?

Program Highlights

Efficient Rooftop Units (ERTU)

jjones@neea.org

Program Progress Report pg. 6-7

- AHR Expo highlight: Carrier product development news
- Planned replacement project opportunity with Energy Trust
- **Collaboration Opportunity:** Seeking field study sites to validate the National RTU Energy Modeling for gas-fired (gas or hybrid heating) RTUs.

Initiative Lifecycle

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Program Highlights

Advanced Commercial Water Heating (ACWH)

mmejia@neea.org

Program Progress Report pg. 2-3

- Dual-fuel commercial water heating pilot underway, with system installed and in operation in a multifamily building in Portland, OR.
- Modeling results informed field demonstration approaches.
- **Collaboration Opportunity:** Seeking leads to test gas heat pumps in a Northwest hotel application.

Initiative Lifecycle

Hold for ACWH Video Slide

Program Highlights

Dual-Fuel Residential HVAC (DFRes HVAC)

dsunada@neea.org

- Market Characterization contractor selected and kickoff underway
- Clark PUD/NWN demonstration ongoing and preliminary insights will be presented at HAF and EFX
- **Collaboration Opportunity:** Seeking sites and partners after gap analysis to identify additional pilots and demonstration opportunities

Initiative Lifecycle

Program Progress Report pg. 4-5

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Scanning Highlight: HVAC

- Increase in manufacturers adding hydronic coil auxiliary heating for dual-fuel systems
  - Rinnai
  - Napoleon

Progress Report pg. 8-9

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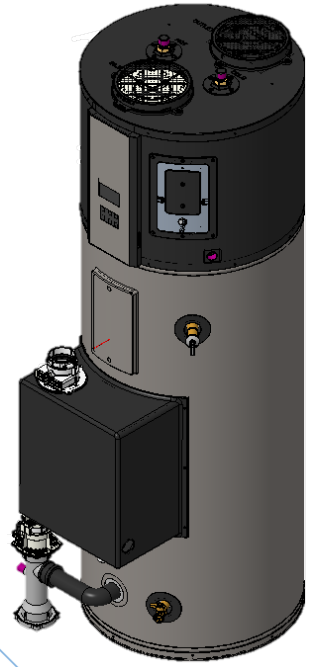
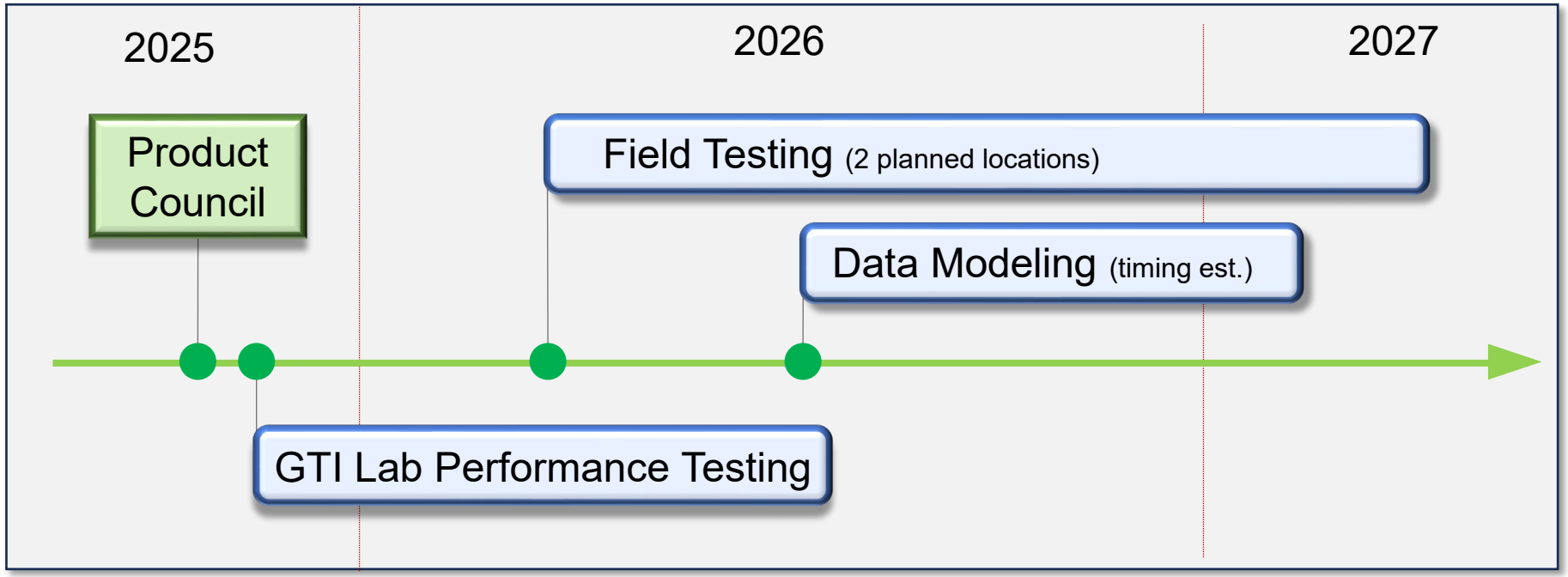
Scanning Highlight: Navien Dual-Fuel Water Heater



Navien NXW700

- Residential 50-gal dual fuel water heater (drop-in)
- 120V plug-in electric heat pump with a condensing gas burner
- Multiple out-of-the-box operating modes
- Manufacturer UEF (Uniform Energy Factor) claim of 3.50 - 3.90+



Progress Report pg. 8-9

Original Product Council Recording and slides: Navien Dual-Fuel Residential Heat Pump Water Heater

Codes, Standards, New Construction Highlights

Q4-2025

Q1-2026

Progress Report pg. 10-11

- Codes
  - **Washington** code delayed until late 2026
  - **Oregon** residential code on track for April 1, 2027
  - **Idaho** – Considering 2024 IECC
  - **Montana** – Considering 2024 IECC
  - **2027 IECC** – On track for 2027
- National Standards
  - Low activity, mostly focused on reversing standards
- New Construction
  - Cooperating with RTF on New Homes Protocol.

Check-in: New Quarterly Report Format

- How was this new approach?
- Anything you like / don't like?
- Anything missing or unclear?

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Dual-Fuel Work Group:

Charter Check-in & Discussion

Deborah Sunada

Sr. Program Manager, Dual-Fuel Residential HVAC

Memo pg. 15-17

Work Group Objectives

Do the proposed updates to the work group objectives resonate with you? Are there adjustments you recommend?

What do you hope to get out of the work group in the coming year? How can this support your dual-fuel objectives?

1. High-level awareness of product and market explorations within region
2. Well-coordinated activities and investments among regional stakeholders (well-planned use of regional ratepayer funds, avoidance of duplication, etc.)
3. Awareness of relevant extra-regional work and insights
4. [new] Awareness of policy and regulatory developments affecting dual-fuel work

[completed or removed]

- ~~Identify methods of staying coordinated beyond meetings in work group~~
- ~~Develop initial vision for alliance engagement in dual-fuel in the NW~~

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Work Group Cadence & Charter Check-in

- What other adjustments to the charter would you like to see?
- Is aligning the meetings with NGAC workable for you?

Remaining 2026 NGAC meetings:

Quarter	Day(s)	Date(s)	TIME	NOTES
Interim Webinar	Thursday	Apr 16	1-2pm	
Q2	Tuesday	June 2	Hold: 9-4	• Planned work group meeting (time TBD)
Interim Webinar	Wednesday	Sept 9	1-2pm	
Q4	Thursday	Oct 22	Hold: 9-4	
Interim Webinar	Wednesday	Dec 9	1-2pm	

- Does 2-4 mtgs/year work for you?
- Any other thoughts / ideas?

Request of You by March 20:

- Share feedback about charter & cadence
- Confirm any changes to your org's work group membership

Organization	Current Work Group Member(s)
Avista	Carlos
Cascade	Jodie (Kathy W copied (Int.Mtn.Gas))
Energy Trust	Jackie, Andrew
NW Natural	Laney, Kevin, Ian
PSE	Jesse

Thank You!

Deborah Sunada

Sr. Program Manager, Dual-Fuel Residential HVAC

dsunada@neea.org

Lunch

Please return by 12:30pm Pacific

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Round Robin Updates

Focus: Organizational & program highlights

- Big changes (programs/personnel)
- Current challenges, lessons learned
- How utility activities relate to NEEA's
- Sharable tools/materials
- Equity, hard-to-reach markets
- Findings, filings, IRPs

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Emerging Opportunity: LLLC & HVAC

Chris Wolgamott

Principal Product Manager

Memo pg. 18

Luminaire Level Lighting Controls (LLLC) Context

- NEEA LLLC program
  - In Market Development since 2019
- LLLC product
  - Strong availability
  - Capability to control other building loads
- Integration with HVAC
  - Regional and national interest
  - Momentum is growing quickly

 |

What is LLLC?

NLC

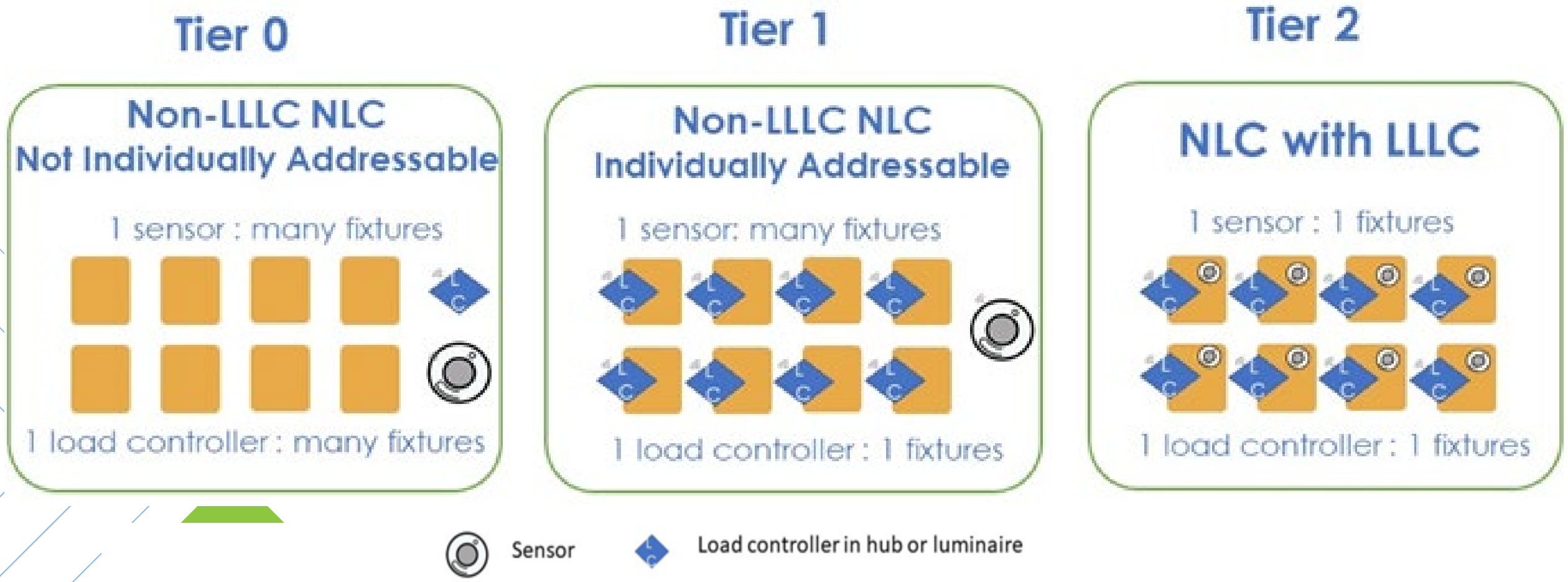
A networked lighting control system consists of an intelligent network of individually addressable luminaires and control devices, allowing for application of multiple control strategies, programmability, building- or enterprise-level control, zoning and rezoning using software, and measuring and monitoring.

LLLC

Luminaire Level Lighting Control, in which **each luminaire has a networked occupancy sensor and ambient light sensor** installed and directly integrated or embedded into the luminaire form factor during the manufacturing process or installed in the field.

Design Lights Consortium - Definitions

3 Tiers for Network Lighting Control Types



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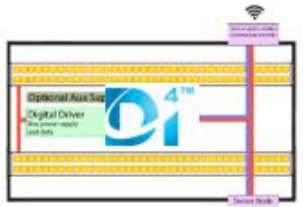
NEEA Field Evaluation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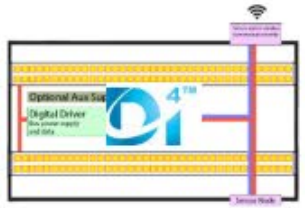
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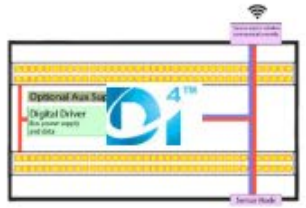
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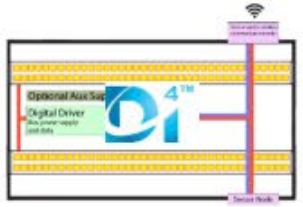
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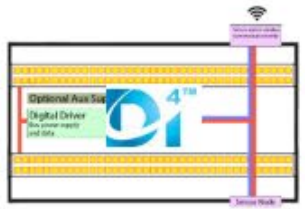
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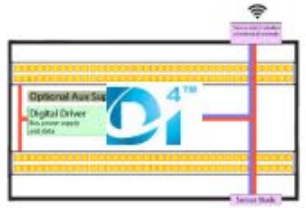
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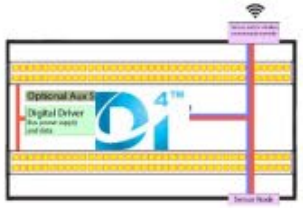
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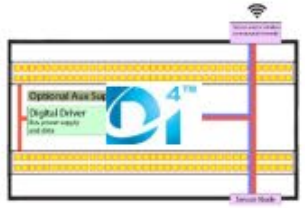
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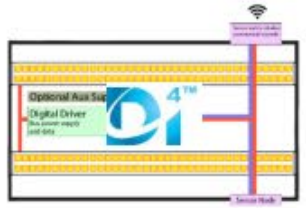
Fixture I

# Fixtures	HVAC
7≥ occupancy	Normal
4-6 occupancy	Float 1°
≤3 occupancy	Float 2°

Simple

Limited HVAC changes

Some energy savings

Suited to small buildings (60% of bldgs)

Image courtesy of PNNL

NEEA Pilot Project

NEEA Lighting / HVAC Integration Project

The NEEA lighting/HVAC integration project deployed in mid-2025 in a 10,000 sqft commercial office building in Sacramento, California. The purpose of the field study was to evaluate the energy efficiency merits of integrating occupancy data from a luminaire level lighting control (LLLC) system with the building's HVAC system to reduce HVAC energy usage when office spaces were not fully occupied.

Estimated to save approximately 4 – 21 %* of its annual energy usage

***Key elements*:**

- **LLLC lighting control system**.
- **Wi-Fi thermostat**.
- **Edge device**.

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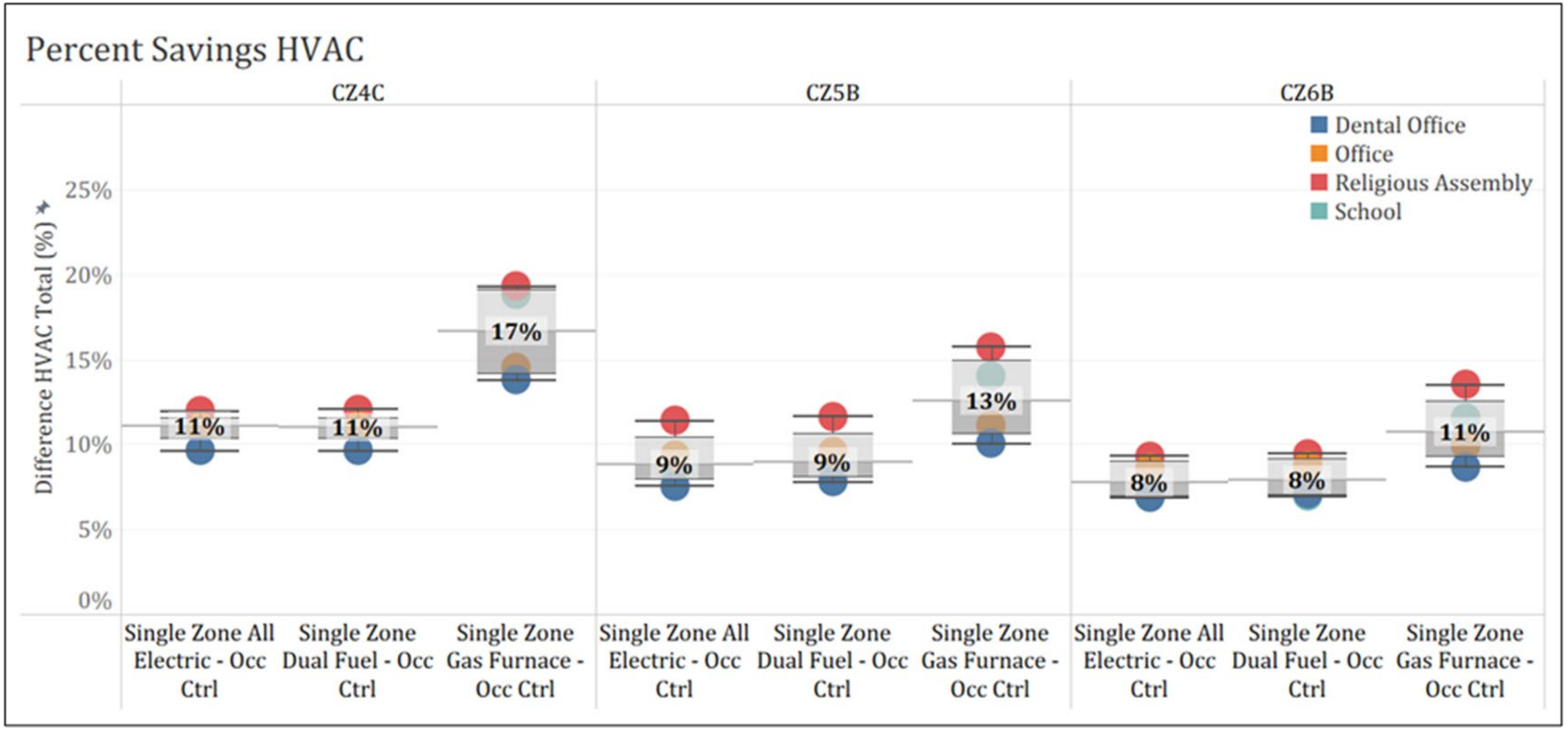
Modeled Total HVAC Saving Percentages



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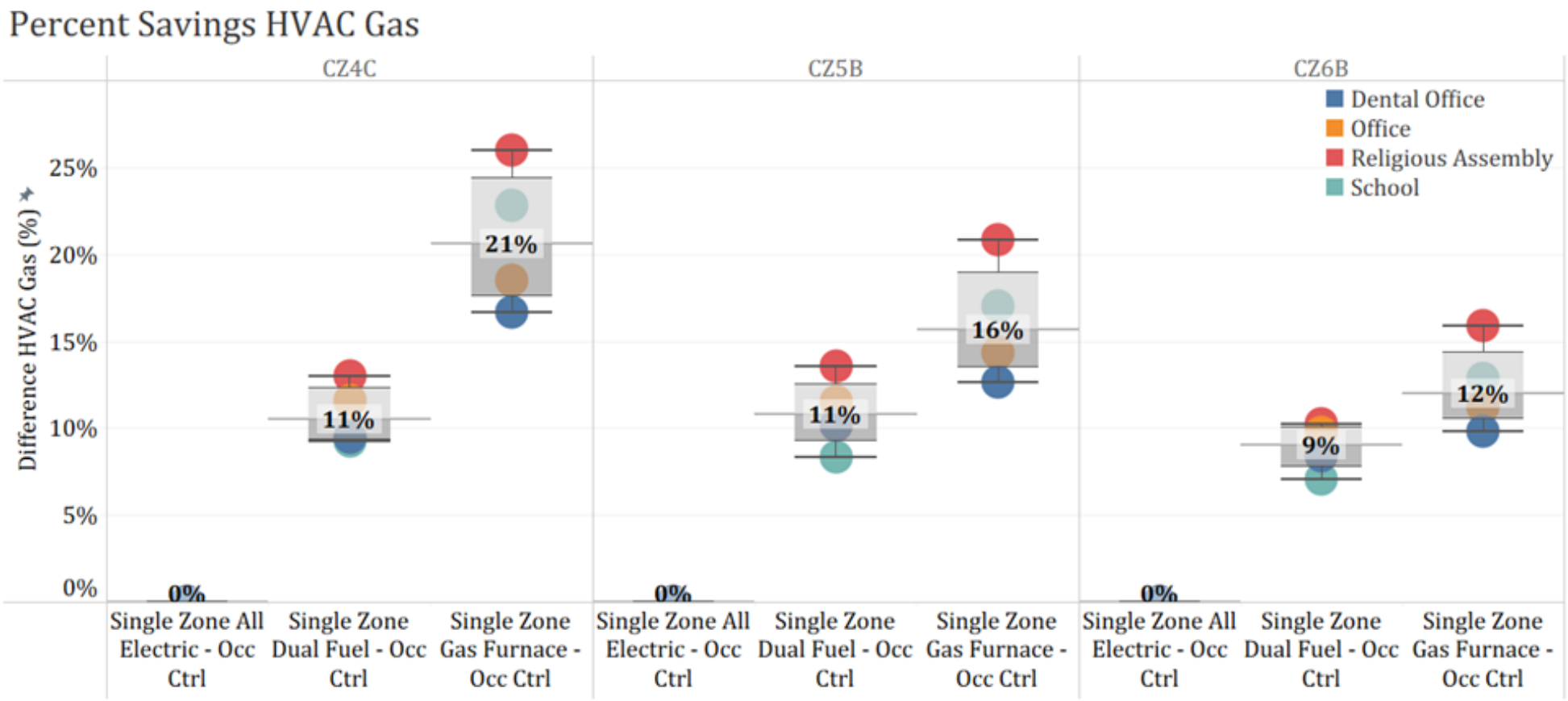
Modeled Natural Gas Savings Percentages



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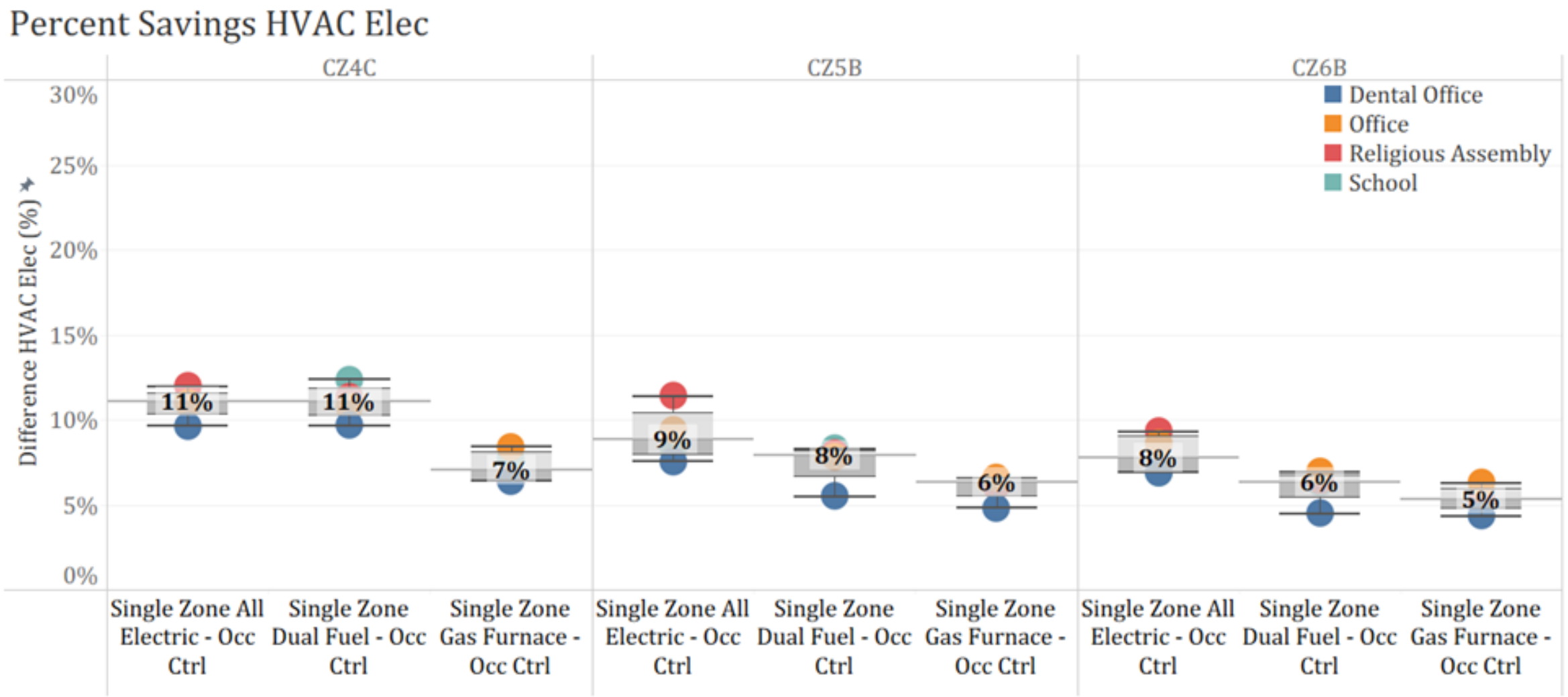
Modeled Electric Savings Percentages



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20-yr Technical Potential Natural Gas

10%	51,504,950	therms
12%	61,805,940	therms
15%	77,257,425	therms

Luminaire Level Lighting Controls (LLLC) + HVAC: What Next?

- Please share any questions or feedback you have
- Team is continuing to explore opportunity, including:
  - Refining savings potential and considering how to incorporate into LLLC program
  - Assessing how to advance this opportunity in the gas portfolio
- More will come to NGAC in the next 1-2 quarters

Thank You!

Chris Wolgamott

Principal Product Manager

cwolgamott@neea.org

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Agenda

All Times Pacific

9:30-9:50	**Welcome, Introductions, Agenda Packet Review**
9:50-10:05	**Housekeeping, Looking Ahead**
10:05-10:25	**Portfolio Update**
10 min	**BREAK**
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12:55-1:15	**Emerging Opportunity: Luminaire Level Lighting Controls + HVAC**
1:15-1:45	**Commercial Water Heat Modeling Update**
1:45-1:55	**Public comment, wrap up and adjourn**

Energy Modeling Analysis
Commercial Water Heating Systems

Noe Contreras

Sr. Product Manager

Memo pg. 19

Agenda

- Background on service hot water plants
- Modeling approach
- Technology configurations
- Modeling results by building type

ASHRAE differentiates residential vs. commercial service

- DHW = Domestic Hot Water → primarily residential
- SHW = Service Hot Water → primarily commercial / institutional

- The idea was to avoid confusion between:
  1. In-unit residential loads
  2. Centralized, building-level commercial systems

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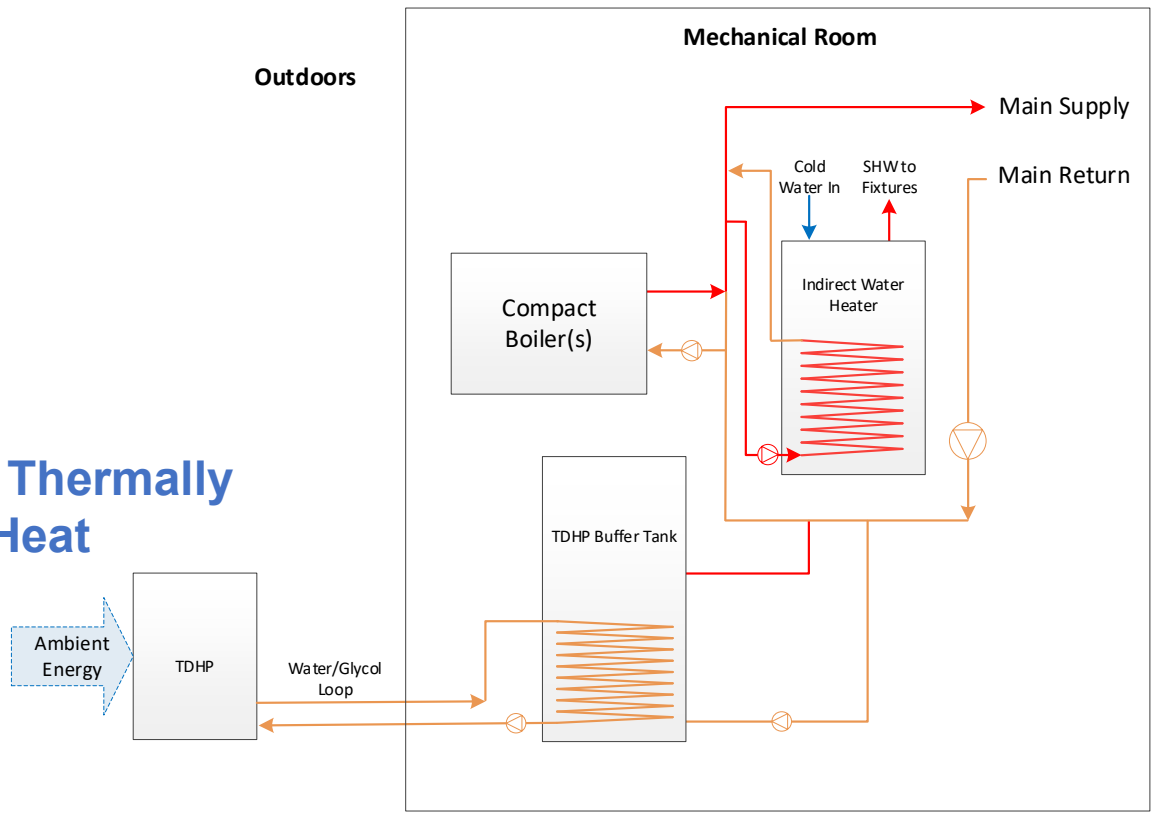
SWH - Typical Simplified Piping Diagram for a Multi-Family building

Example of Redundancy

TDHP – Thermally Driven Heat Pumps



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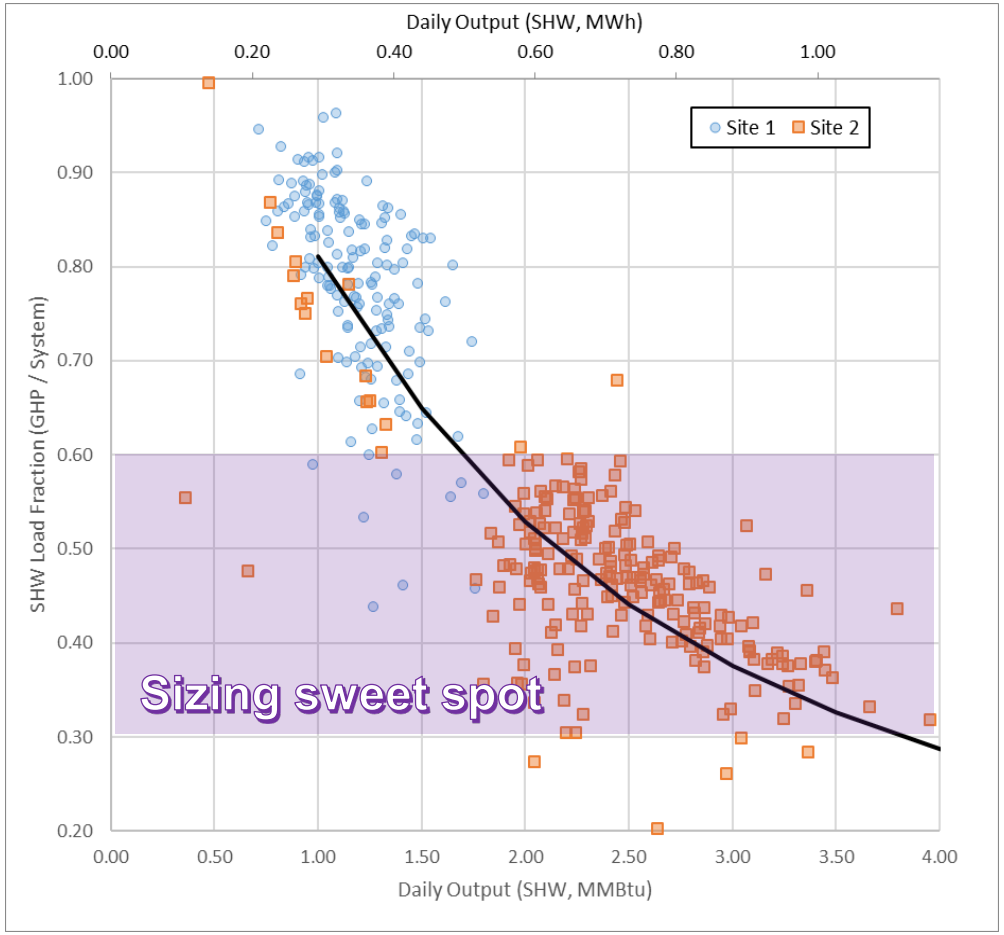
Hybrid SWH Heating – Best Practices for Gas Absorption Heat Pump (GAHP)

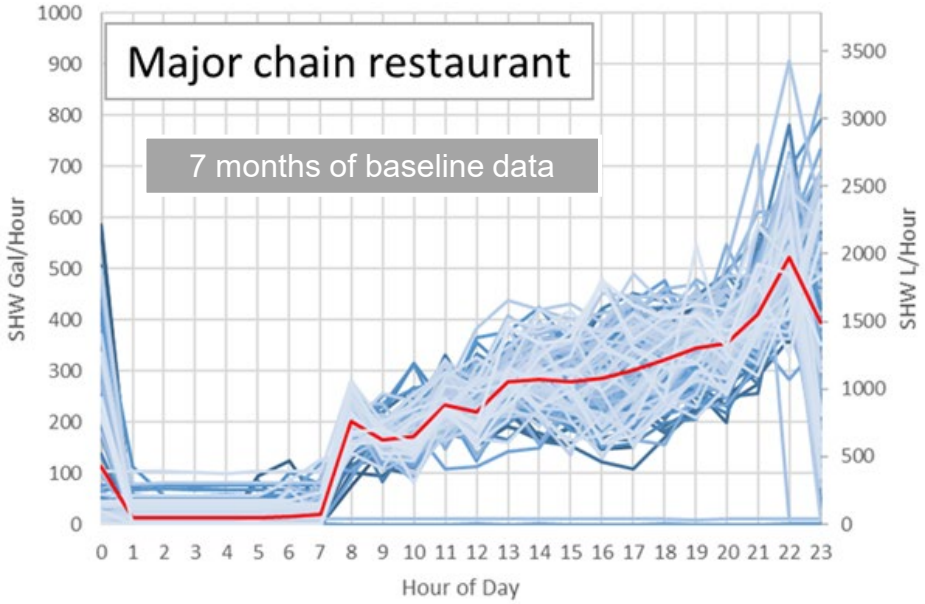
- **Reliable Savings:** Annual efficiency >120%, 40%-60% therm / emission savings typical for **well-designed** installations
  - Utilities have issued *Best Practices* for installations*
- **Plan for Parallel Operation:** With GAHP COP_{Gas} > 1.0 at $T_{ambient}$ < -30°C, design for maximum GAHP operation
- **Size GAHP Carefully:** Initial rule-of-thumb to size GAHP for 30%-60% of peak demand *at peak conditions*
  - Undersize limits GHG impact, oversize limits cost-effectiveness
- **Lower T_{return} Where Possible:** Common concern for T_{return} < 60°C for condensing boilers, GAHP performance is also affected and generally have upper limits (e.g. T_{return} < 50°C)
- **Buffer Tanks Are Critical:** Cycling penalties for GAHPs are greater than boilers, due to greater thermal inertia

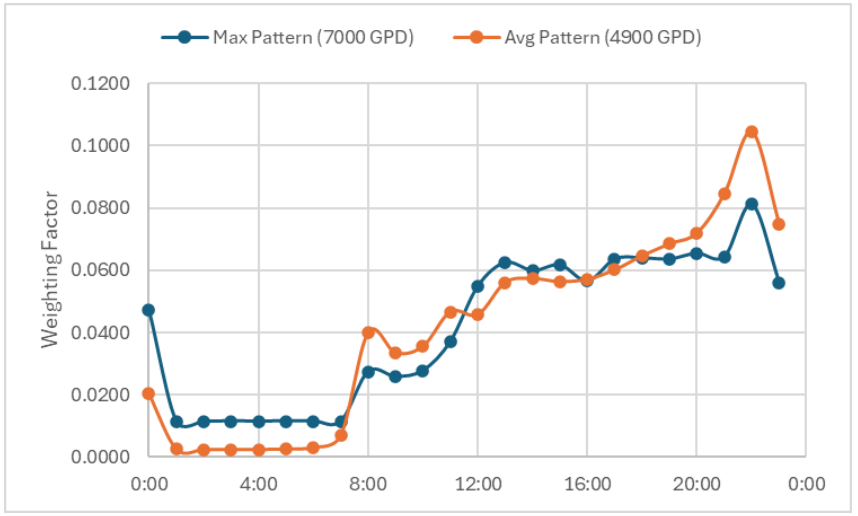


In restaurant SWH study, well-sized GAHP operated 13% more efficiently on average, with half the estimated payback*

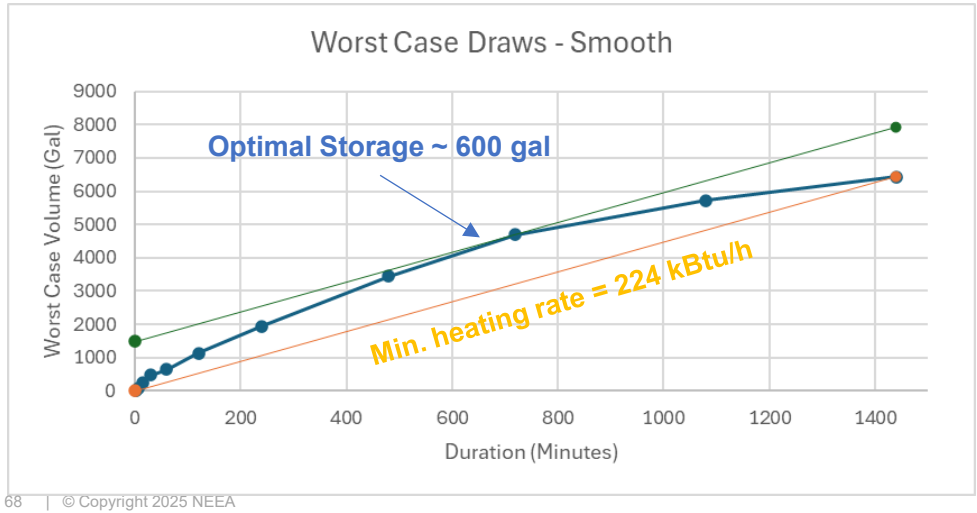
*Example is FortisBC; link to GAHP Best Practices Guide // Glanville, P. et. al (2021), Demonstrating an Integrated Thermal Heat Pump System for Hot Water and Air-Conditioning at Full-Service Restaurants, ASHRAE Transactions; Vol. 127 363-370.
Glanville, P., Mensinger, M., Blaylock, M., Li, T. and Hardesty, R. (2022) Hybrid Heating and Hot Water in Multifamily Buildings: Demonstration and Analysis of Integrated Boilers and Thermally-Driven Heat Pumps, Proceedings of the ASHRAE Winter Conference, Las Vegas, NV.

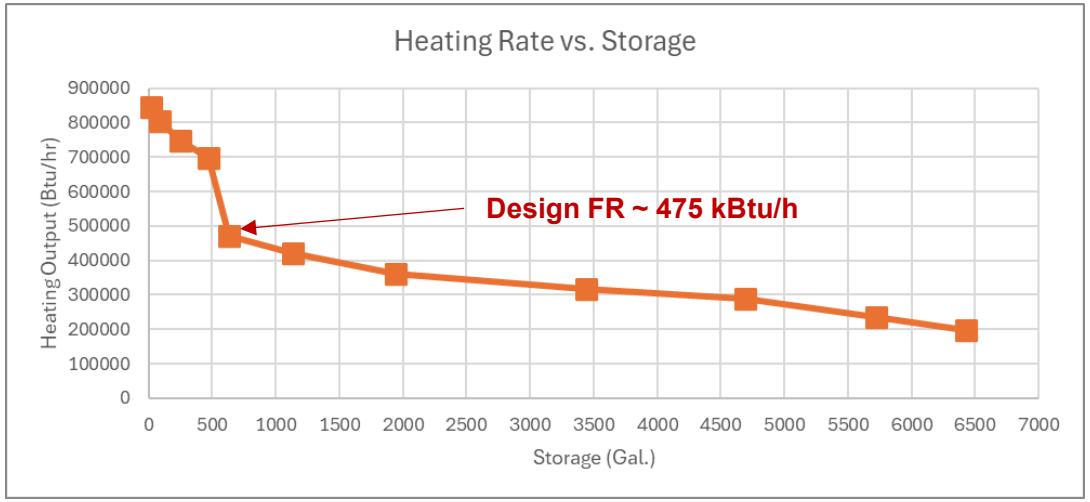
Full-Service Restaurant Example – Value of High-Res SHW Data





- Convert dataset into **weighted hourly draw pattern**, using average draw and *actual* maximum draw (left)
- Using **moving window analysis*** arrange synthetic sequences of the *worst* case 1-min, 5 min, 15 min, … 24 hr draws. Charting for the 1st, 2nd, etc. worst case patterns yields potential combinations of design firing rate / storage and is **inherently conservative.**
- System sizing in model based on this approach, assures part-load operation though right-sizes for the demand





Repeat for Multifamily and Hotel/Motel

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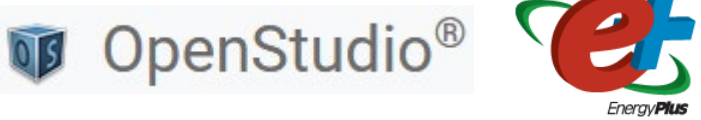
Modeling Approach - Commercial Water Heating Systems

- Models developed from DOE Commercial Building Prototypes
- Models run on EnergyPlus



- Investigate potential savings of emerging systems in hybrid SWH system design approach
  - Relative to traditional gas-fired SWH systems
  - Relative to electric HPWH integrated systems

Emerging Commercial Water Heating Technologies	Traditional Commercial Water Heating Technologies
Gas Absorption Heat Pump (Modulating) with	Boiler, Tankless Water Heater, Storage Tank Water Heater
Gas Absorption Heat Pump (Non-modulating) with	Boiler, Tankless Water Heater, Storage Tank Water Heater
Electric Heat Pump Water Heater (HPWH) with	Boiler, Tankless Water Heater, Storage Tank Water Heater
Electric Heat Pump Water Heater (HPWH)	N/A

Commercial Building Types
Full-Service Restaurant
Multifamily
Hotel/Motel

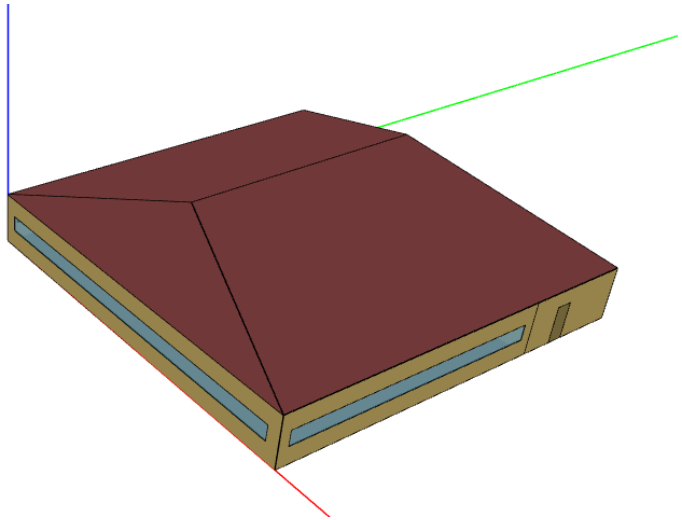
Approach - Load Patterns – Dataset sources and Methodology

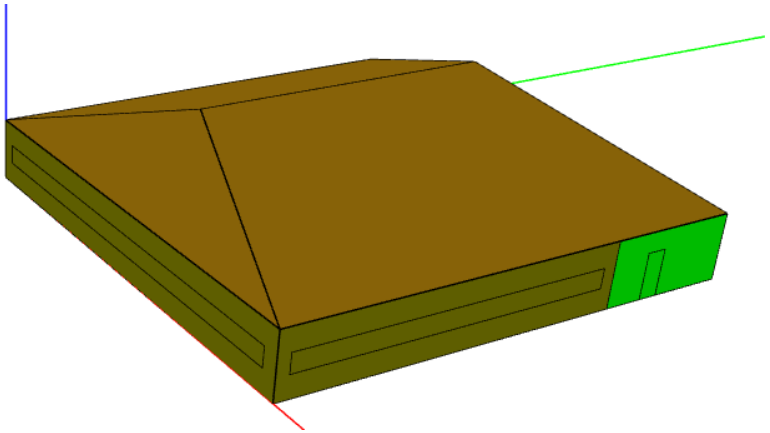
GTI Energy used real-world based draw patterns for all simulated building prototypes

Building Type	Dataset source
Full-Service Restaurant	GTI Energy dataset from CEC demo
Multifamily	GTI's dataset from MN demo
Hotel/Motel	Ecosizer Tool and published Hiller data i.e. ASHRAE 1544-RP

Using Moving Window analysis to inform load patterns and sizing of WH equipment
(Hiller, C. "New Hot Water Consumption Analysis and Water-Heating System Sizing Methodology", ASHRAE Transactions v104 (1B): 1864-1877 (1998).

Model Details – Full-Service Restaurant

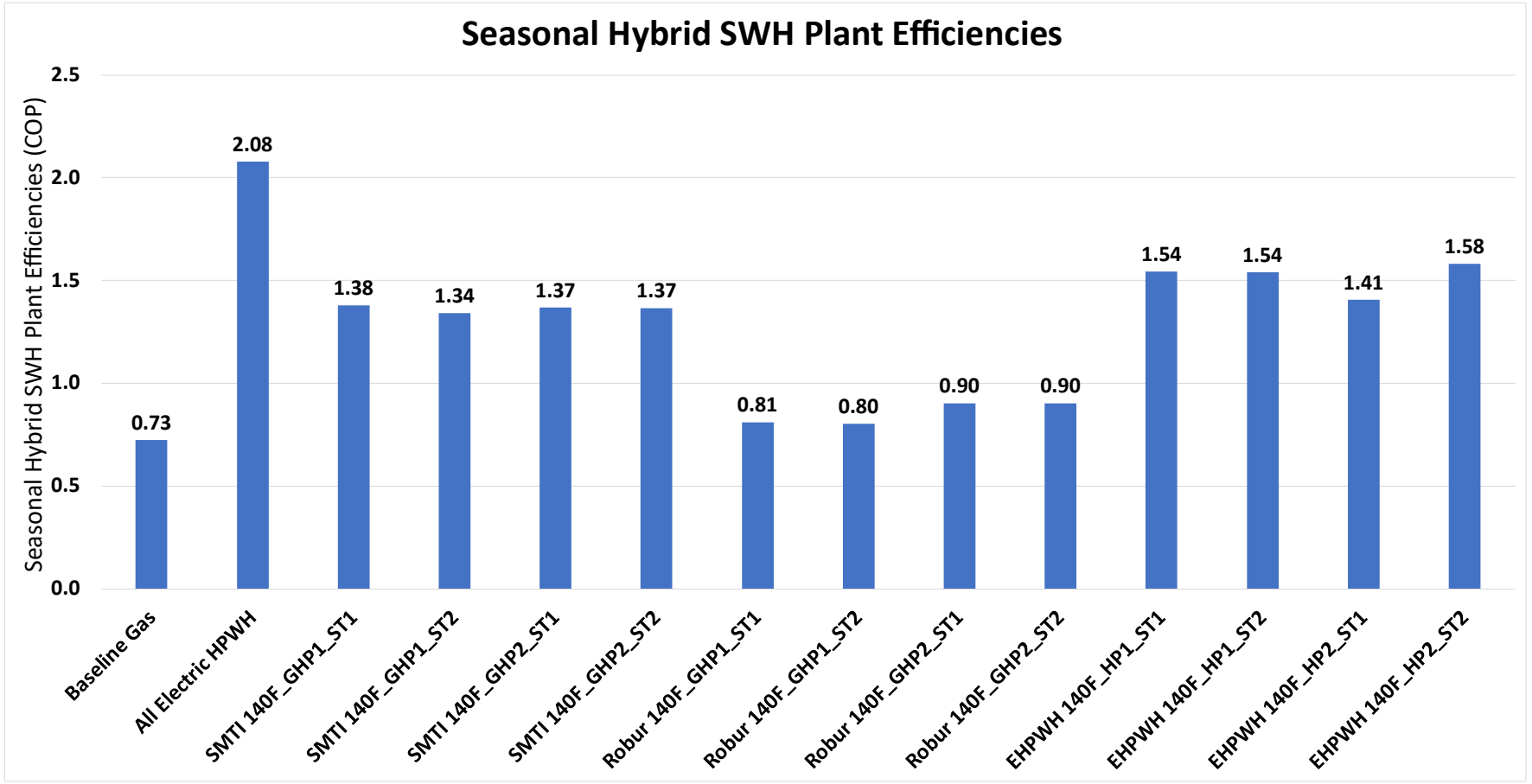




Building Details	Full-Service Restaurant
Size	5,502 sq.ft
SWH Peak Demand	7,000 gal/day
Baseline Water Heating System	588 kBtu/h input Boiler 80% AFUE with a 600-gal indirect storage tank Other baseline sensitivities for Storage WH and Tankless WH
Hybrid Water Heating Configurations	Retain baseline system to supplement SWH needs
Plant Loop Config	Custom SWH plant loop built on EnergyPlus for each scenario

3 thermal zones – Dining Room, Kitchen, and Attic

FSR Results - Seattle HP+Tank WH: Annual Efficiency



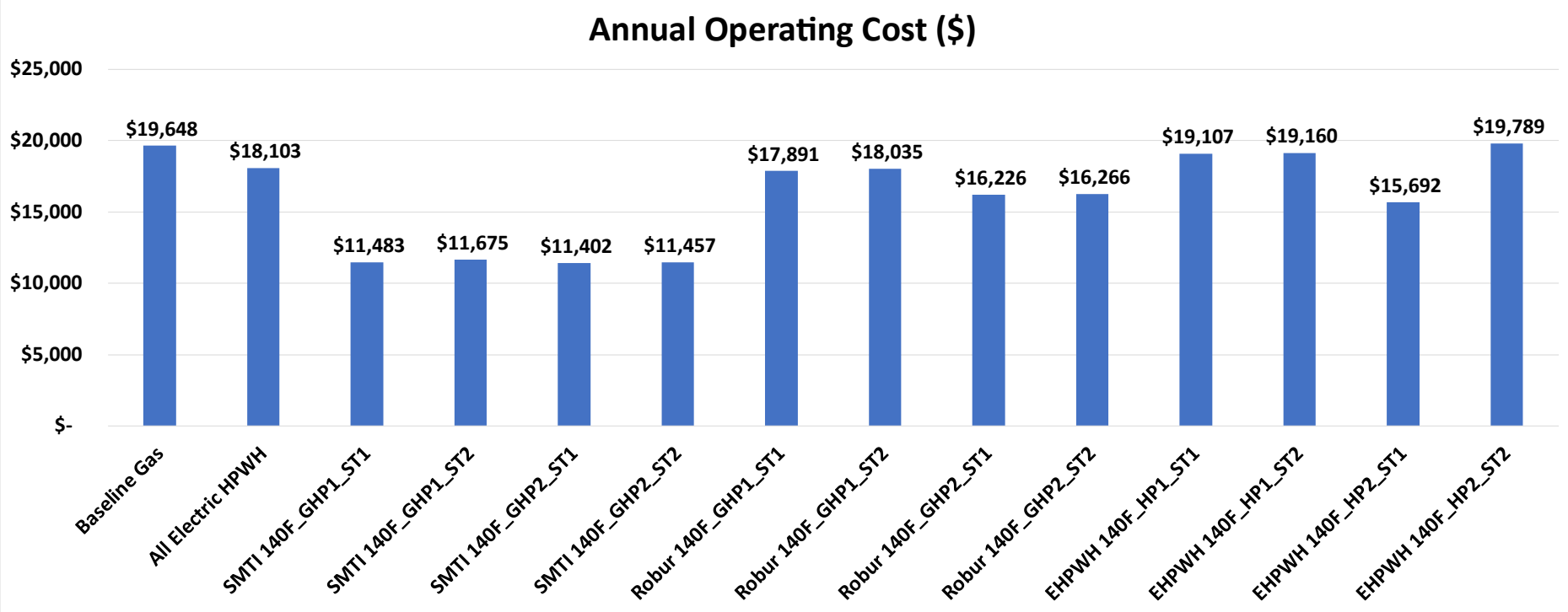
SWH Plant with Heat Pumps and an 80% efficient Boiler

- Mod-GHP = Modulating GHP
- NonMod-GHP = Non-Modulating GHP

Key Characteristics

- Annual Seasonal Efficiency of SWH Plant
  - Includes both Heat Pump and Tank operation
- Modulating GHPs and Electric HPWHs show significant seasonal efficiency gains
- Non-modulating GHPs drop in efficiency attributed to cycling and higher return water temperatures

FSR Results - Seattle HP+Tank WH: Annual Operating Cost

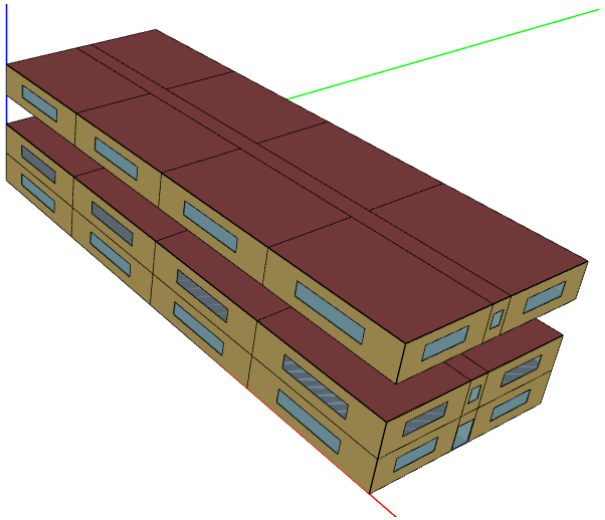


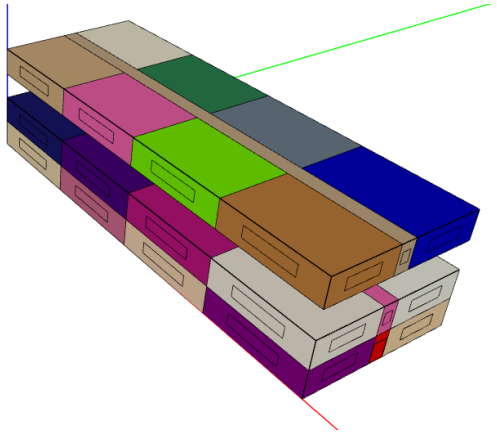
Electric Price - $0.13/kWh
Gas Price – $1.43/therm

Key Characteristics

- Annual Operating Costs of SWH
  - Includes both Heat Pump and Tank operation
- Modulating GHPs show significant annual cost savings
- Regional electric to gas price ratio is a significant driver
  - Cheaper to provide 1 Btu of heating with gas vs electric

Model Details – Multi-family

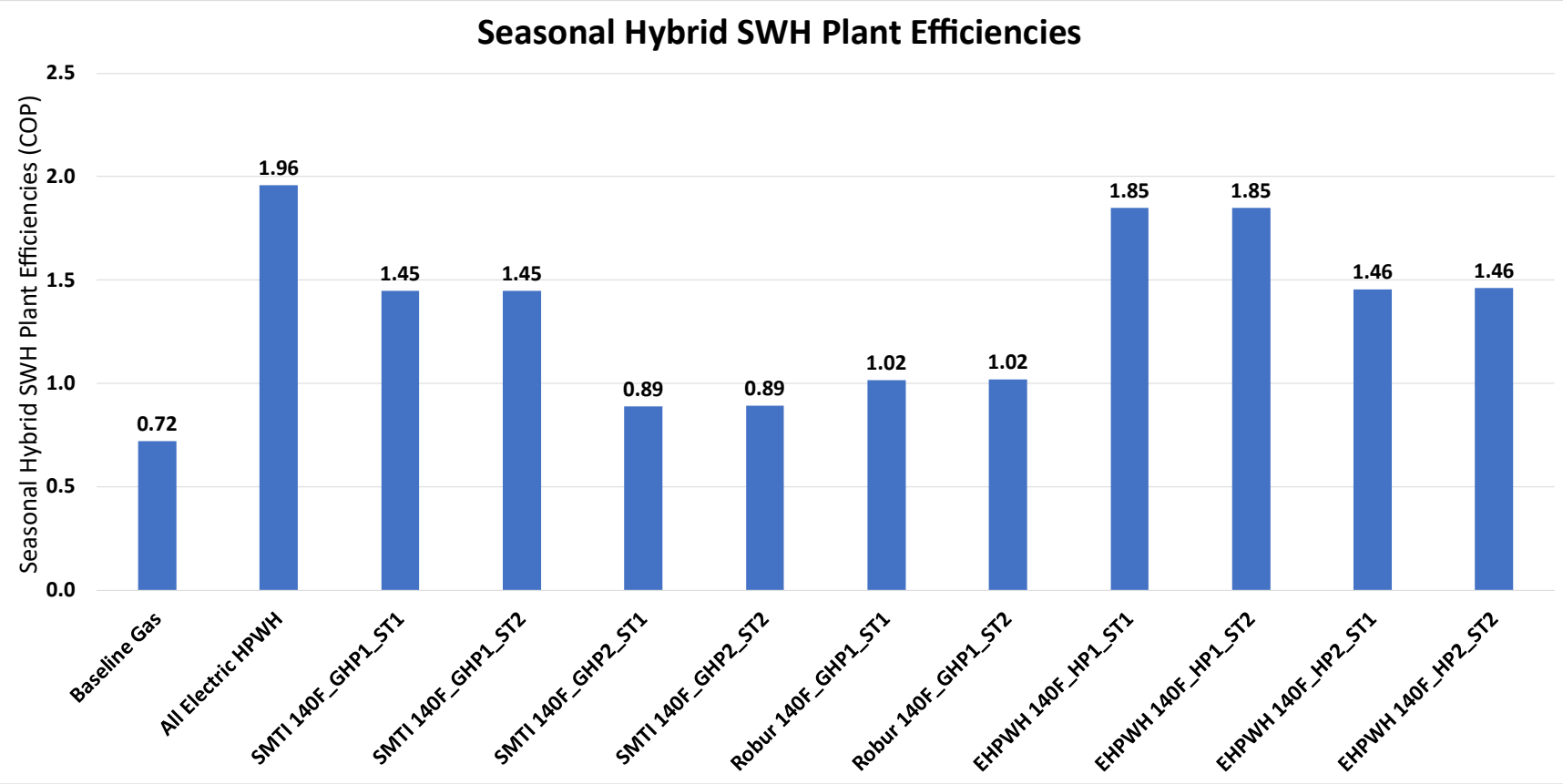




Building Details	Multi-family
Size	33,740 sq.ft.
SWH Peak Demand	2,000 gal/day
Baseline Water Heating System	197,308 kBtu/h input Boiler 80% AFUE with a 250-gal indirect storage tank Other baseline sensitivities for Storage WH and Tankless WH
Hybrid Water Heating Configurations	Retain Baseline system to supplement SWH needs
Plant Loop Config	Custom SWH plant loop built on EnergyPlus for each scenario

Multiple thermal zones

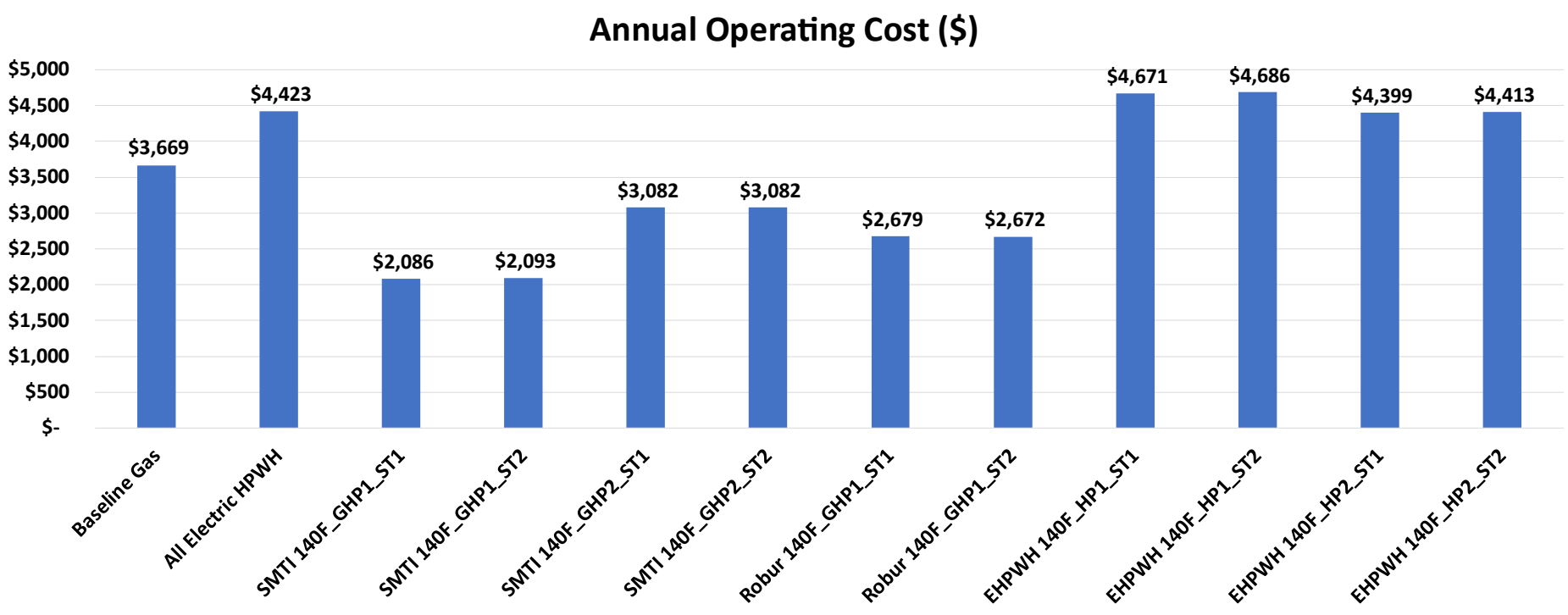
Multi-family Results – Boise HP+Tank WH: Annual Efficiency



Key Characteristics

- Annual Seasonal Efficiency of SWH Plant
  - Includes both Heat Pump and Tank operation
- Modulating GHPs and Electric HPWHs show significant seasonal efficiency gains
- Non-modulating GHPs drop in efficiency attributed to cycling and higher return water temperatures

Multi-family Results - Boise HP+Tank WH: Annual Operating Cost

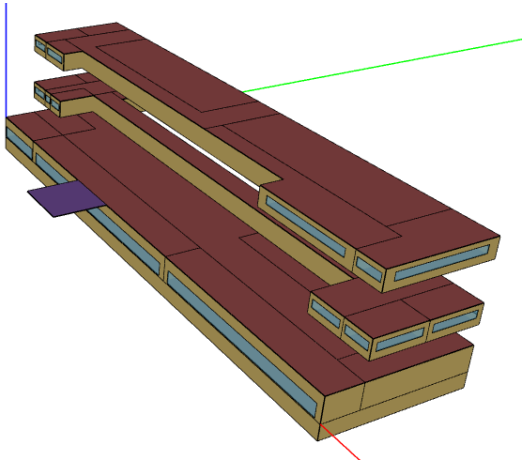


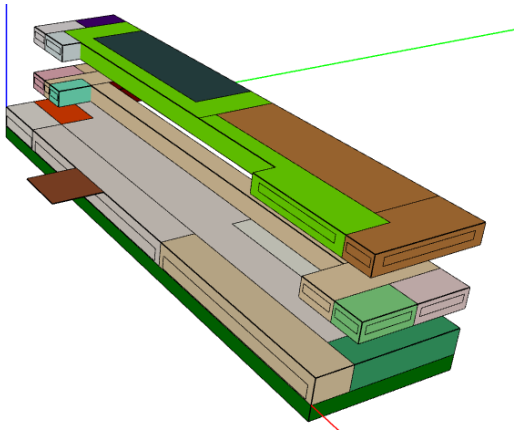
Electric Price - $0.11/kWh
Gas Price – $0.95/therm

Key Characteristics

- Annual Operating Costs of SWH
  - Includes both Heat Pump and Tank operation
- Modulating GHPs show significant annual cost savings
- Regional electric to gas price ratio is a significant driver
  - Cheaper to provide 1 Btu of heating with gas vs electric

Model Details – Hotel

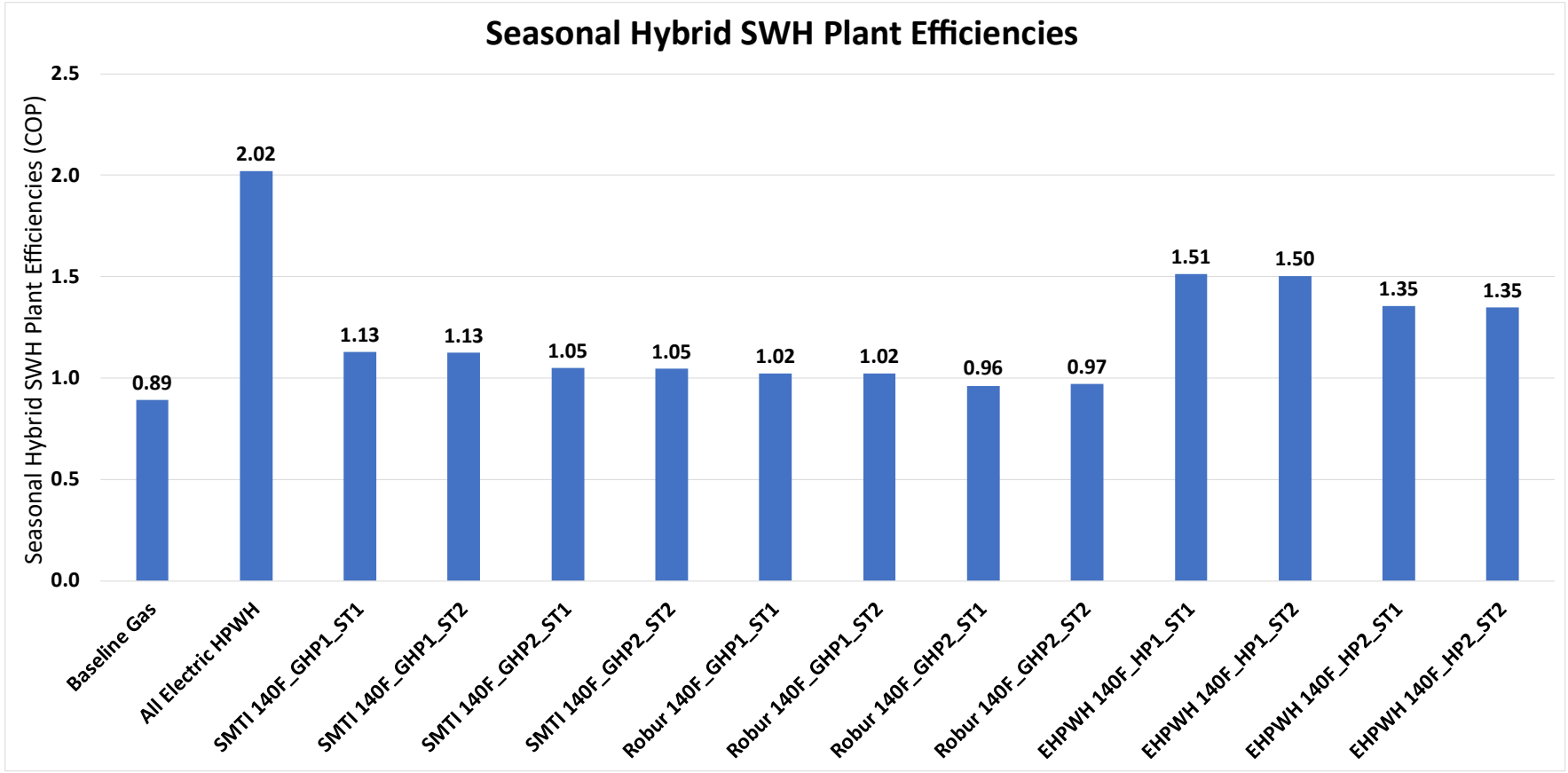




Building Details	Hotel
Size	122,120 sq.ft
SWH Peak Demand	26,500 gal/day
Baseline Water Heating System	4,708,000 kBtu/h input Boiler 80% AFUE with a 5,450-gallon indirect storage tank Other baseline sensitivities for Storage WH and Tankless WH
Hybrid Water Heating Configurations	Retain baseline system to supplement SWH needs
Plant Loop Config	Custom SWH plant loop built on EnergyPlus for each scenario

Multiple thermal zones

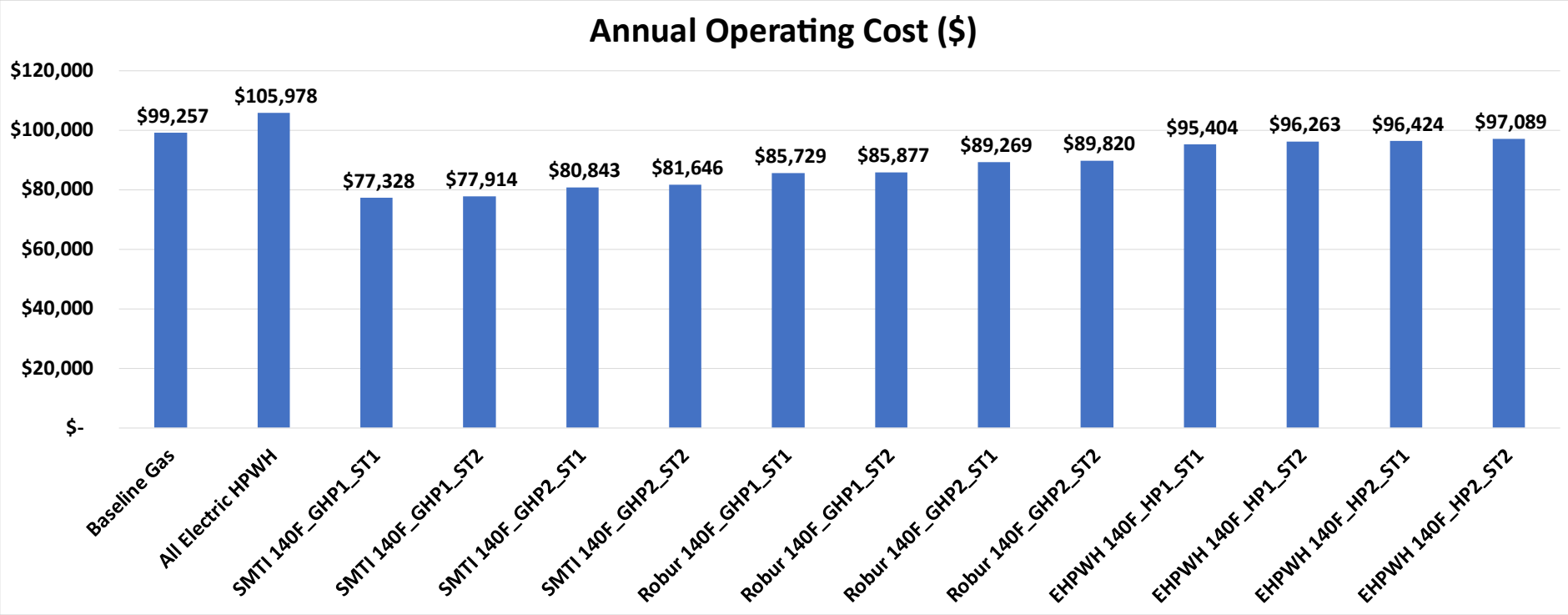
Hotel Results - Portland HP+Tank WH: Annual Efficiency



Key Characteristics

- Annual Seasonal Efficiency of SWH Plant
  - Includes both Heat Pump and Tank operation
- Modulating GHPs and Electric HPWHs show significant seasonal efficiency gains
- Non-modulating GHPs drop in efficiency attributed to cycling and higher return water temperatures

Hotel Results - Portland HP+Tank WH: Annual Operating Cost



Key Characteristics

- Annual Operating Costs of SWH
  - Includes both Heat Pump and Tank operation
- Modulating GHPs show significant annual cost savings

Electric Price - $0.11/kWh
Gas Price – $1.09/therm

Sensitivity Analysis – Peak Hot Water Demand (Gallons per Day)

Sensitivity Analysis (Minimum Demand)			
Building Type	**Peak Gallons per Day (GPD)**	**Peak Gallons per Hour (GPH)**	**Peak Baseline Sizing Output (BTU/hr)**
Full-Service Restaurant (FSR)	3,925	319	295,021
Multi-family	2,000	296	197,308
Hotel-Motel	1,500	432	295,731

- Sensitivity Analysis was performed to confirm if the results are applicable to lower SWH demand data
  - Tabulated demand represents minimum peak SWH demand for respective building types where comparable results are seen

Takeaways / Next Steps

- Modulating gas heat pumps consistently outperform non-modulating designs
- Operating cost outcomes are highly sensitive to regional energy price ratios
- Hybrid configurations preserve reliability while enabling efficiency gains
- Results are consistent across multiple commercial building archetypes

Thank You!

Noe Contreras

Sr. Product Manager

Ncontreras@neea.org

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All Times Pacific

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Meeting Feedback

- One thing you learned?
- What was helpful?
- Opportunities for improvement?
- Would you like us to follow up with you on anything?

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Action Items / Recap / Final Qs?

- By Fri 3/20
  - Feedback on DF work group meetings, membership & charter
- By Mon 3/30
  - Let Alisyn know if you (or your colleagues) want to be added to the NEEA/MT 101 webinar on 3/31

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Public Comments?

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Thank You!

That's a wrap NGAC! Until we meet again…

- Interim Webinar: Thursday, April 16 (1-2 pm) – *to be confirmed*
- Q2 Meeting: Tuesday June 2 ***in-person**** - please plan to attend!