



Regional Emerging Technology Advisory Committee (RETAC)

Northwest Energy Efficiency Alliance

Q3 2026 Meeting

September 30, 2026

8:30 a.m. – 12:00 p.m.



*Name, Title,
Organization
and...*

*If you could
teleport anywhere
for dinner tonight,
where would you
go?*





Submit Ideas for Session Topics

September 14 – October 16

neea.org/EFX

Save the Date for EFX27

May 18-19

Wenatchee, WA

Agenda

8:30 am	Welcome and Announcements
9:00 am	ACEEE Summer Study Recap
10:00 a.m.	<i>Break</i>
10:15 a.m.	Round Robin
11:00 a.m.	Bonneville Power Administration (BPA)
11:30 a.m.	Seattle City Light
12:00 p.m.	Wrap-Up



ACEEE Summer Study Recap



Mike Smith – ACEEE Key Take Aways

- **Data Centers (Standing Room Only)**
 - **Current priorities for data center developers**
 - **Grid Capacity and Forecasting Challenges**
 - **Energy Efficiency**
 - **Load Flexing and Heat Recovery Opportunities**

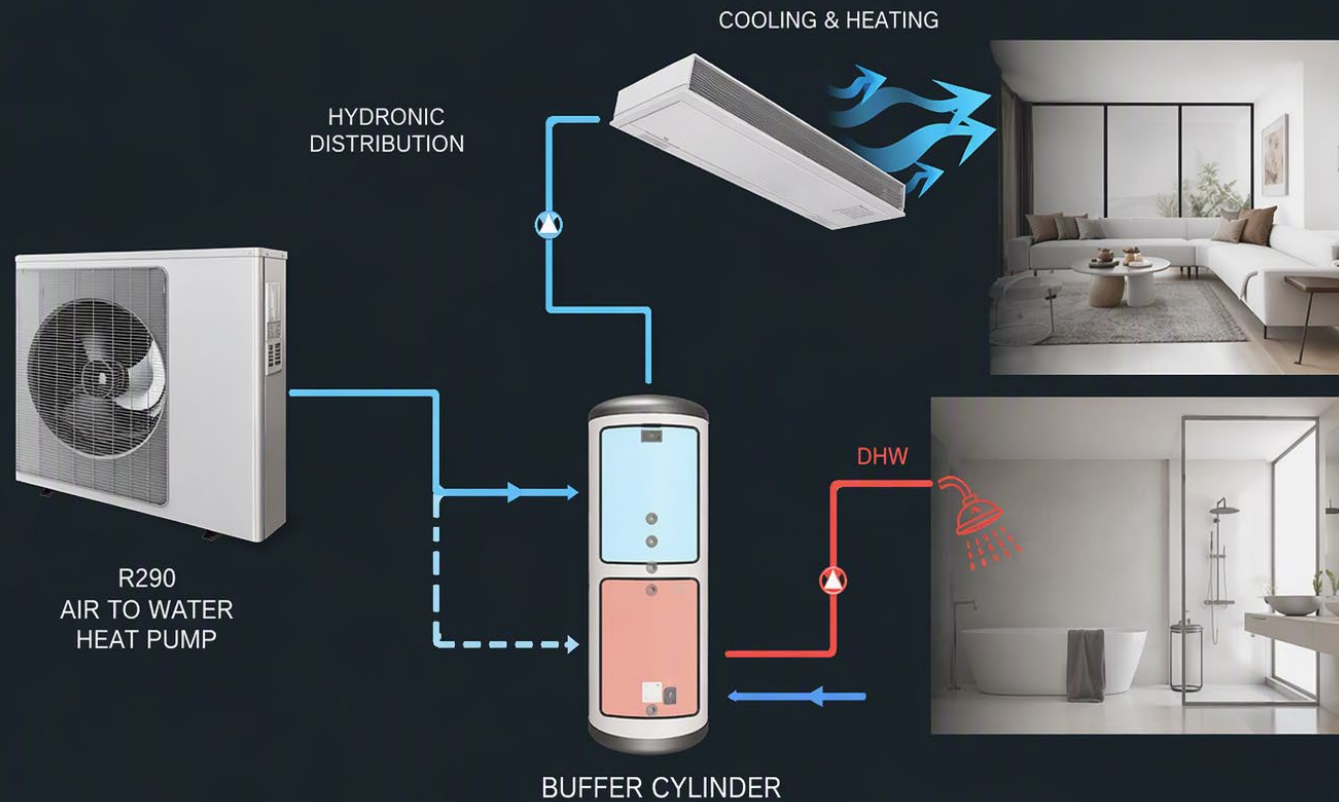


Mike Smith – ACEEE Key Take Aways

- **New analytics software for commercial building controls** (LBNL)
- **R-290 AWHP – “Compressing Costs”** (Emanant Systems / Aris Hydronics)
- **Digging Deeper into geothermal** (AnnDyl Policy/Dandelion Energy and Darcy Geothermal)
- **Thin Triple and Quad Windows** (PNNL, Alpen)
- **Integrated insulation with residing** (PNNL)
- **Getting emerging technology into programs** (informal session)



Hypothesis: Multi-function air-to-water heat pumps may address some of the barriers to multifamily electrification





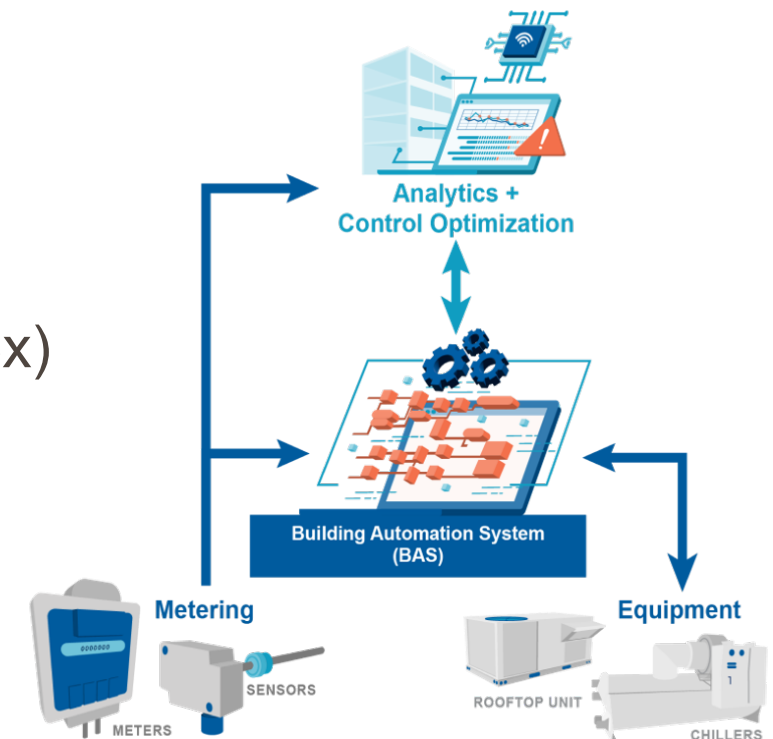
Sarah Widder – ACEEE Key Take Aways

- SO MUCH data and information out there about residential HVAC – importance of scanning and collaborating to have the most leverage
- Emphasis on pragmatic, real world programs and solutions that make EE a big tent again (not everyone, but throughout)
- Identification of market gaps, especially in Code/BPS, around small commercial buildings and simple, affordable solutions
- Interesting discussion on role of Code, Standards, and programs in “lagging” versus “leading” policy landscapes – and importance of working collaboratively in both contexts



Juan Carlos Blacker – ACEEE Key Take Aways

- Commercial Building Efficiency and BPS Standards
 - BPS standards and implications was a significant focus
 - Panelists included state and jurisdictional organizations, utilities, and implementors
- AI and LLM use in efficiency planning
 - Building the correct LLM prompts
 - AI analytics of AMI data to provide energy use reports
- Tools that drive building efficiency and DR
 - Technology stack with analytics (optimization, FDD, ACx)
 - BMS as a way to enable demand response
- Digital Twins and Building Modeling
 - Modeling buildings to target at need populations
 - Using AMI data to model EUI and retrofit potential





Eric Olson – ACEEE Key Takeaways

- AI and LLMs for planning and evaluation
 - Use of AI and LLMs for grid planning
- Understanding the benefits of EE and Load Flexibility
 - Benefits stacking for C&I customers
 - Using successful EE models to scale load flexibility
- Load flexibility
 - VSHPs and Dual Fuel systems
 - Scaling demand flexibility
 - Smart panels, smart homes, mitigating service upgrades and integrating battery storage
- Hardware, software, communications and interoperability
 - Importance of open, non-proprietary protocols
 - Difficulty in selecting aggregators and/or DERMS providers
- Presented on NEEA research with water heater Compliance & Conformance



Realizing the Benefits of Grid Connected Water Heaters

Eric Olson, Northwest Energy Efficiency Alliance (Lead)

Brenda Hunt, Northwest Energy Efficiency Alliance

Dr. Robert Bass, Portland State University

Daniel Colwell, SkyCentrics Inc.

Tristan de Frondeville, SkyCentrics Inc.

Geoff Wickes, Wickes Energy Services

ACEEE Summer Study, August 7, 2026

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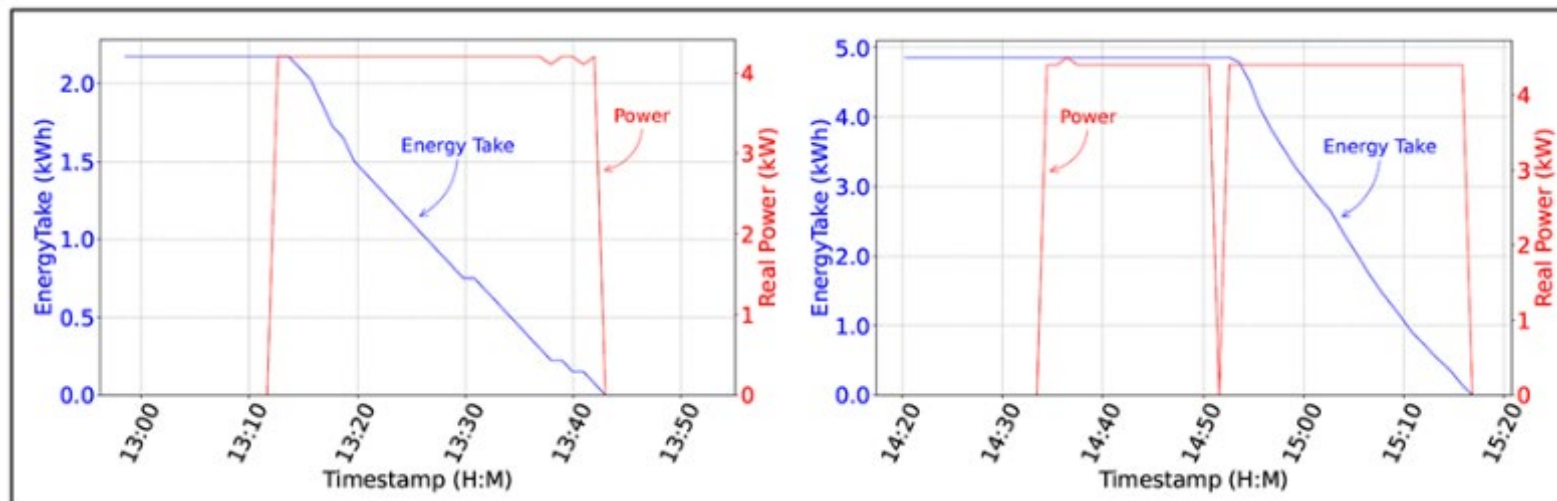


Compliance and Conformance Results

Table 4: Present Energy Take data resolution, error percentage, and standard deviation

Unit	Capacity (gal)	Voltage (V)	Resolution (Wh)	PET % error	PET Std. Dev.
a	50	240	75	52%	40%
b	50	240	75	44%	7%
c	50	240	1	89%	11%
d	50	240	51	337%	167%
e	80	240	1	98%	8%
f	50	120	30	41%	17%
g	50	240	22	201%	35%

- Present Energy Take is difficult to estimate due to a non-linear temperature gradient
- Watt-hour resolution from 1 to 75 Wh
- PET errors varied from 41% to as high as 337%
- Large range of Standard Deviation



Left plot: Proper calculation of *Energy Take*.

Right plot: Incorrect calculation of *Energy Take*.



Some Numbers

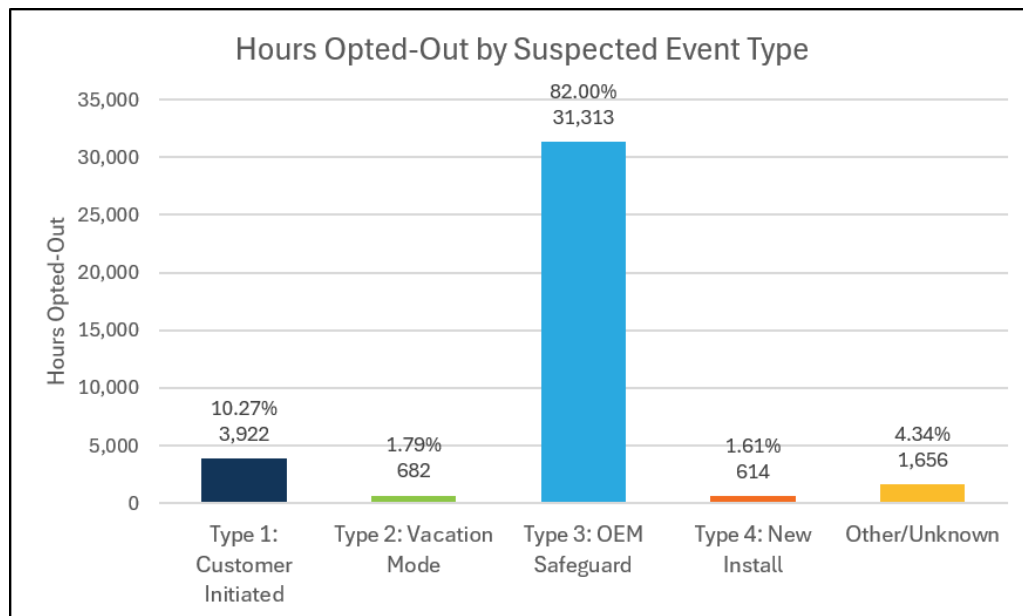
- Fleet consumption ↓49% during curtailed periods
 - 44.90% decrease in ERWH; 50.97% decrease in HPWH
- Curtailed units heated water less than 3% of the time during events
- Achieved event participation over 95%
- ERWHs shifted an average of 928 W per unit (57% reduction)
- HPWHs shifted an average of 1.1 kW per unit (85% reduction)



Opt Outs

Opt-Out Type	Events	Typical Duration	Runtime During Opt-Out	Key Insight
Type 1 – Customer Override	162 events (~61%)	~24 hours (23–25 hr)	19% runtime (vs. 30.4% normal)	Customer overrides were common but short-lived and had limited long-term impact on fleet availability.
Type 2 – Vacation Mode	6 events (~2%)	>48 hours	<1% runtime	Rare events consistent with minimal hot-water use; reporting varies by OEM because CTA-2045 does not require this state to be reported.
Type 3 – OEM Safeguards	14 events (~5%)	≥16 days (one >200 days)	7–45% runtime	OEM safeguards disabled grid participation for extended periods and accounted for >82% of total opt-out time.
Type 4 – New Installation	24 events (~9%)	Temporary post-install period	28.5% runtime	OEM-specific safeguard preventing grid control immediately after installation.

- Customers opted out of 162 events (defined as around 24 hours)
- There were 6 shifts to vacation mode.
- Type 4 represents 24 events where the unit will not participate in events immediately after installation.
- Type 3 events disabled grid participation for extended periods.





Field Conformance

Critical

- Power values that show discrepancy from actual power usage
- Large variance in reported total capacity

Additional Conformance Issues

- Insufficient separation of behaviors between Shed and Critical Peak
- PET not reaching 0 when water heater completes heating cycle



Certification, Compliance Testing

- A standard does not guarantee proper behavior
- AHRI 1430-2022 defines basic water heater responses but not reporting accuracy
- Experience can now guide OEMs on expected responses
- With standards developed, OEMs can ensure customer satisfaction

Image courtesy of Portland State University.

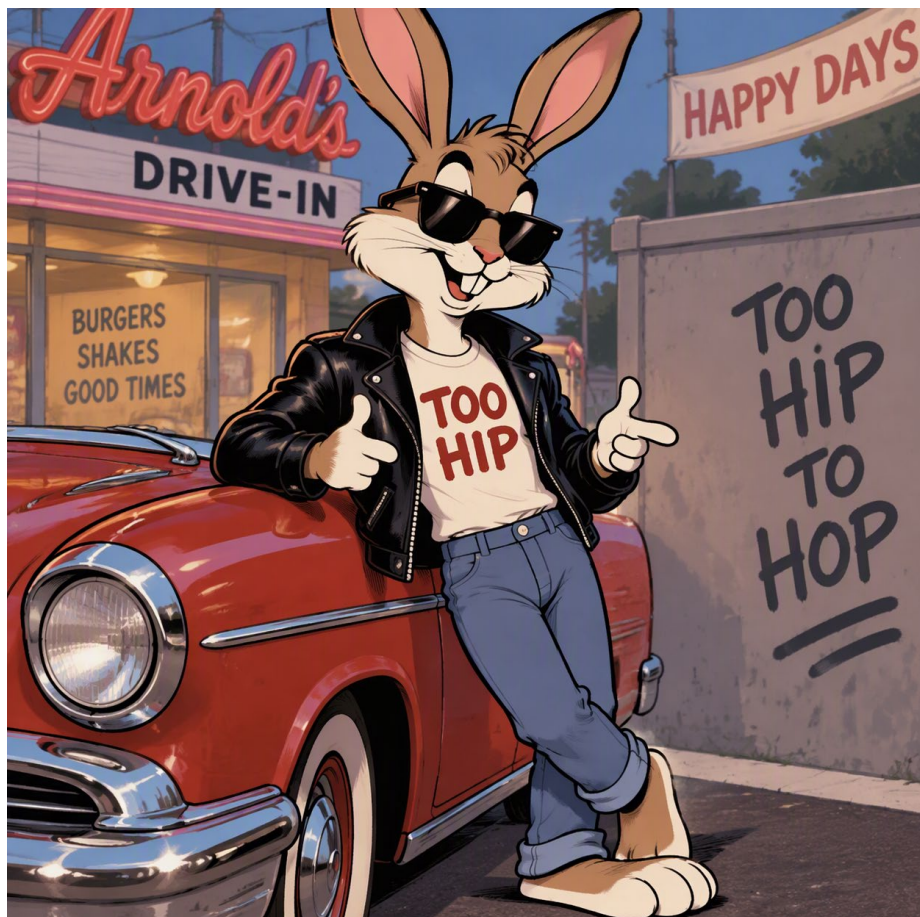


Heat Pump Papers & Sessions – C. Dymond

- **BPA HPHC Field Study**
“[Field Performance of High-Performance High-Capacity Heat Pumps](#)”; John Bush, Ben Larson, Christopher Dymond, JJ Sawicki
- **Embedded Commissioning**
“[Connected Commissioning: Enhancing HVAC Performance Through Improved Installation Quality](#)”; Christian Valoria, Jon Winkler, Christopher Dymond, Alexander Rees, Parker Wall, Christian Kaltreider
- **Field Calibrated HP Energy Modeling**
“[Mapping the Way to Higher Performing Heat Pumps](#)”; Neal Kruis, Elyse Malherek, Christopher Dymond, Aaron Ingle
- **WSU Room heat pump field study**
“[Cold Climate Room Heat Pump Field Study](#)”; Matt Booth, Christopher Dymond
- **Room heat pump informal session**
overview of current products, market trends and the [Room Heat Pump Collaborative](#)
- **AI and HVAC informal session**
Discussion about creating a National Open-Source AI model context protocol so AI knows how to guide EE HVAC



Stuff of Interest



- Heat Pumps are too “hip”
- Room Heat Pump Collaborative
- Thermostats are Important
- Electrification vs Efficiency
 - Weatherization first?
 - Dual fuel
- AI potential impact on customer engagement and HP selection
- Tri-mode Heat pump systems



Break

Round Robin



Bonneville Power Administration (BPA)

BPA Emerging Technology Portfolio

RETAC discussion

Not finalized

BPA is seeking feedback before locking the FY portfolio.



Discussion Questions



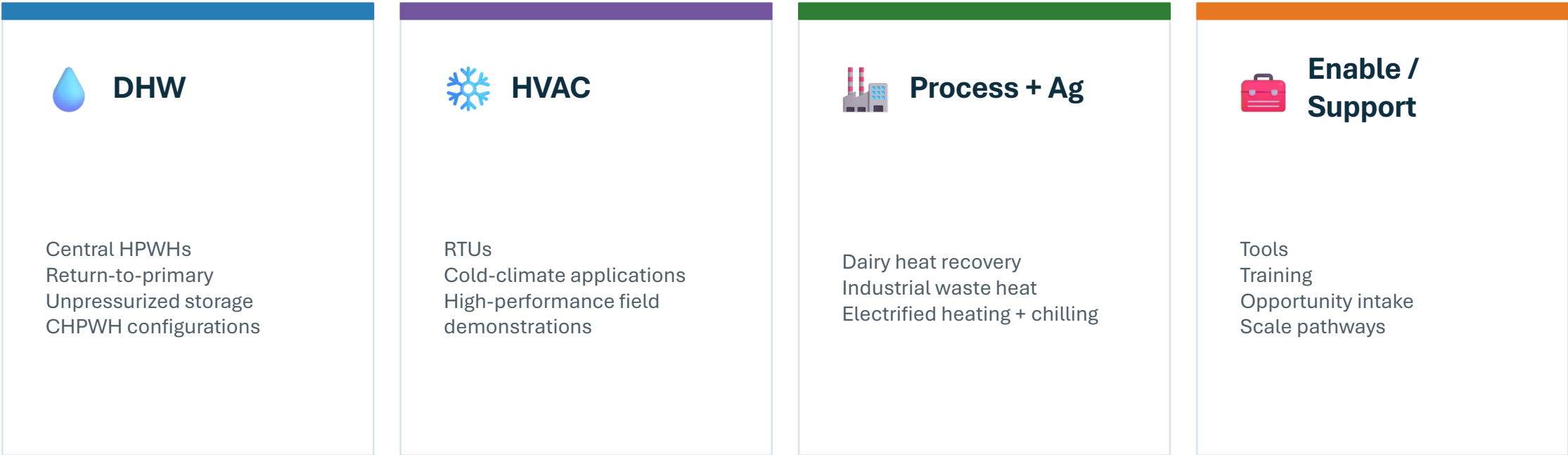
What emerging technologies are of most interest to you and your work?



How are commercial and central multifamily heat pump water heating projects reported? (Are they reported?)

How the portfolio is organized

Use technology families to make the pipeline easier to discuss.



Stage-gate snapshot from the SharePoint view

The visible list is organized by stage to show what kind of work each item needs next.



Interpretation

- Feasibility work screens concepts, integration fit, sites, and partner readiness.
- Demonstrations move promising technologies into field performance testing.
- M&V work builds evidence for BPAQ, RTF, program design, or market baseline assumptions.
- Tools and pilot activities help translate research into repeatable delivery.

Supervisory CHPWH Control Strategy	Opportunity	01 Feasibility Analysis	Controls	ET Field Test, Custom Project	
Thermstar Waste Air Heat Recovery	Opportunity	01 Feasibility Analysis	Agriculture	ET Field Test	ThermStar Waste Heat Recovery —Industrial processes with continuous or high-duty-cycle exhaust that is hot, humid, or particulate-laden and where there is a simultaneous need for process hot water, boiler makeup heat, or heated supply air. Priority applic
Vapor Phase	Opportunity	01 Feasibility Analysis	Agriculture	ET Field Test	An electrified heating + chilling platform using heat pumps, stratified thermal storage, and simple hydronic interfaces.
Vitalis CO2 Heat Recovery for Dairies	Opportunity	01 Feasibility Analysis	Agriculture	ET Field Test	Vitalis designs R744 heat pumps that capture this heat and transfer it to a glycol loop or other process, replacing fossil-fuel boilers
Stage Gate : 03 Demonstration (7)					
Colmac CxV-7	Opportunity	03 Demonstration	Water - DHW / Central HPWH	Custom Project, BPAQ	
Dairy High-Lift Heat Recovery Demonstration	Opportunity	03 Demonstration	Agriculture	ET Field Test	
Eco2pipe Monitoring - LHI	Opportunity	03 Demonstration	Water - DHW / Central HPWH	BPAQ	Hydronic heating and cooling system for a 90-unit Seattle senior housing project using centralized air-to-water heat pumps and a two-pipe loop to distribute heating and chilled water to individual fan-coil units.
Mestek CO2 Simco Field Validation	Opportunity	03 Demonstration	Water - DHW / Central HPWH		Demonstrates a commercial Mestek/Transom CO ₂ heat pump water heater in a Northwest central DHW application, with monitoring focused on cold-climate performance, single-pass heating, storage stratification, and reduced reliance on resistance backup. The un
PNW High-Performance HP RTU Demonstration	Opportunity	03 Demonstration	HVAC	ET Field Test	
Unpressurized Storage Demonstration	Opportunity	03 Demonstration	Water - DHW / Central HPWH	ET Field Test	Demonstrates central heat pump water heating using an unpressurized thermal storage tank and heat exchanger, reducing reliance on pressurized potable storage while improving system flexibility, load shifting, and installation options.
Vapor Phase	Opportunity	03 Demonstration	Agriculture	ET Field Test	An electrified heating + chilling platform using heat pumps, stratified thermal storage, and simple hydronic interfaces.
Stage Gate : 04 M&V (4)					
CHPWH Field Performance Survey / Market Baseline	Opportunity	04 M&V	Tools	RTF Measure	For CHPWHs, the market baseline should reflect typical field performance without persistent fault detection and diagnostics (FDD) or ongoing performance assurance. For planning purposes, that baseline could be represented as a system COP of 1.1, with NEEA
Colmac CxV Monitoring / RTP OA - 1 Site Concept	Opportunity	04 M&V	Water - DHW / Central HPWH	Custom Project, BPAQ	Monitors a CHPWH using a return-to-primary configuration to evaluate energy use, hot water performance, recirculation losses, and overall system efficiency.
Lochinvar Ventus Monitoring / Swing Tank to RTP	Opportunity	04 M&V	Water - DHW / Central HPWH		

Process and agriculture heat recovery cluster

Dairy and industrial heat recovery projects test higher-temperature electrification use cases.

Common theme

Recover heat that would otherwise be wasted and use electric heat-pump systems to serve process hot water, boiler makeup, glycol loops, or paired heating and chilling needs.



Dairy high-lift

Field demonstration of high-lift heat recovery for dairy/process loads. Fit depends on site load profile and operational complexity.



Vitalis CO2

R744 heat pumps capture heat and transfer it to glycol or another process loop. Potential fossil boiler displacement in dairy applications.



ThermStar

Waste air heat recovery for hot, humid, or particulate-laden exhaust streams. Useful where process hot water or supply air needs are simultaneous.



Vapor Phase

Electrified heating + chilling with heat pumps, stratified storage, and hydronic interfaces. Could serve paired thermal loads where heat and cooling are both valuable.

Field value depends heavily on hours of operation, heat quality, maintenance risk, and customer willingness to host demonstrations.

M&V and measure-conversion work

Several items are less about proving a single technology and more about utility program measure

Candidate M&V / conversion items visible in the list

- CHPWH Field Performance Survey / Market Baseline - improve baseline assumptions and field performance expectations.
- Colmac CxV Monitoring / RTP OA - one-site concept to evaluate energy use, hot-water performance, recirculation losses, and system efficiency.
- Lync Monitoring - CO2 RTP - monitor Lync Aegis CO2 HPWH with return-to-primary recirculation.
- Eco2pipe Monitoring - LIHI - hydronic heating/cooling for a 90-unit senior housing project using centralized air-to-water heat pumps and a two-pipe loop.

1. Priority

Which opportunities are most important to resolve first, and which can wait?

2. Sites and partners

Which utilities, customers, manufacturers, or market actors could make the work real?

3. Evidence

What data would be credible enough for BPAQ, RTF, custom projects, or program planning?

4. Scale pathway

Where should the output land: measure, tool, training, BPAQ, custom project, RTF, or reference guidance?

5. Dependencies

Which items depend on external participation, site access, data-sharing, or partner funding?

6. Gaps

What is missing from the list, and what should be removed or reframed?

Seattle City Light

Robert Bogataj Sr. Building Technology Specialist Seattle City Light

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Seattle City Light

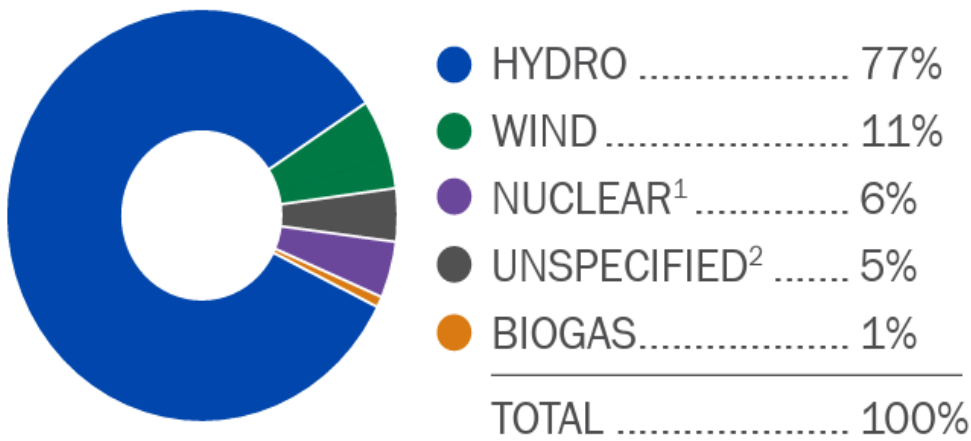
WE POWER SEATTLE

Seattle City Light Area and Resource Mix

City Light's Strategic Objectives

- 1 Improve the Customer Experience
- 2 Create Our Energy Future
- 3 Develop Workforce & Organizational Agility
- 4 Ensure Financial Health & Affordability
- 5 We Power

City Light's Power Mix 2024



Customers & Load

During the 2021 Heat Dome event, we saw a record summer peak of 1533 MW.

Winter Peak ~2100 MW

Demand Response Target: 29MW by 2029

Data shown reflects the latest information available through
Dec. 31, 2025.

	Average Number of Customers	Megawatt-Hours*
Residential	472,309	3,229,894
Commercial and Industrial	52,731	5,777,400
Total	525,040	9,007,294

TOU

- Residential – opt in, signups in progress
- Small Business & Commercial – just launched, opt in.
- Good for EV charging 6-8 cents/kwh Midnight to 6am.

New Identity

- Formerly: *Lighting Design Lab*
 - Due to LED's, Lighting has been declared a mature technology.
- Now: *The Lab at City Light*
 - Electrification, Heat Pumps, Efficiency
 - <https://labatcitylight.com/>



Webinars

Subject	Day	Time
Electrifying the Ocean Pavilion: Connected Systems Help Showcase Our Connected Waters	Tue, Sept 15	10:00am-11:00am
Get to Know Air Source Heat Pump Chillers – Technology, Lessons Learned, and Design Considerations	Tue, Sept 29	10:00am – 11:30am
A Guide to the Guide: “Decarbonizing Building Thermal Systems: A How to Guide for Heat Pump Systems and Beyond”	Wed, Oct 7	10:00am-11:00am
Incentive Updates: Use City Light Funding and Expertise for your Energy Projects.	Thu, Oct 22	10:00am-11:30am

A little background

- United Industries
- SBW Consulting
- Honeywell
- N2H2
- Fluke
- Powerit Solutions
- Optimum Energy
- Powerplant Specialists

DOE2 Modeling

Pacific Gas & Electric project audits

Boeing Factories / Las Vegas Airport

Website access software

Datalogger software

Industrial Demand Control

Chiller Plant Optimization

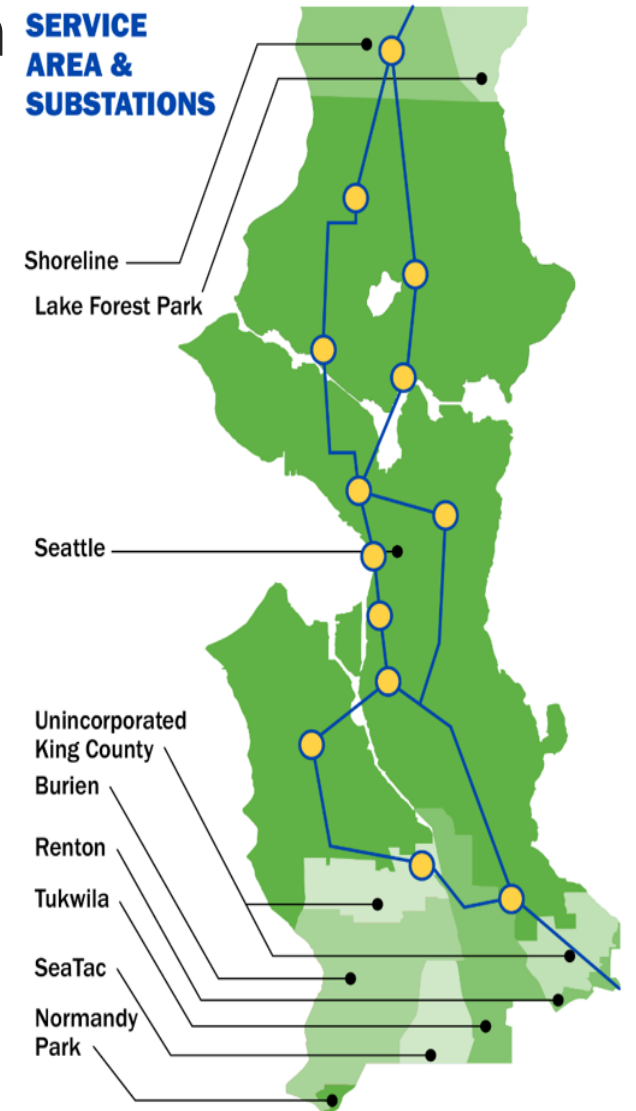
Ferryboat Control systems

New Construction Incentives: Energy Design Assistance

- **Energy Design Assistance** implemented by Willdan

- Complimentary Modeling and Strategy Bundling Options
 - Analyze savings opportunities with costs and paybacks
- Incentive Rate
 - \$0.45/kWh for Nonresidential / Market Rate Properties
 - \$0.675/kWh for Affordable Housing Multifamily Properties
- Engage before completion of design construction documents and contact 3 months before TempOcc

	Efficient	High Performance	Superior Performance
CO2e Intensity (lbs/ft2/yr)	37.1	11.1	7.2
Energy Cost Savings (%)	\$7,057 (17%)	\$9,219 (21%)	\$22,591 (51%)
Projected Incentives	\$5,560	\$10,208	\$26,679
Payback with Incentives	4.8	9.4	7.9
Energy Use Intensity(kBtu/ft2/yr)	182.5	111.2	73.5



Commercial Retrofit Incentives

- Funding for efficient equipment & operations
 - Early replacement
 - Efficiency above code requirements
- Distributor Discounts/ Simple Rebates
- Calculated & Custom incentives
- Pay for Performance
- Building Commissioning (MBCx & RCx)
- Energy Efficiency as a Service
- SEM



**Detailed Presentation on City Light
Programs Oct. 22nd!**

HVAC, Building System, Equipment Incentives

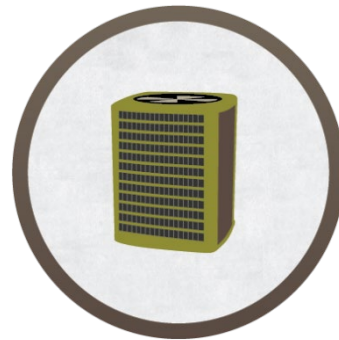
Controls upgrades

- Occ Sensors
- Pneumatic to digital
- Adv Rooftop Ctrl
- Scheduling
- Etc.



Heat Pumps*

- PTHPs
- VRF
- VSD / VFD
- Comm HPs
- Etc.



Cooling

- Cooling Towers
- Chillers
- CRAC
- Etc.



Ventilation

- DOAS
- Economizers
- Fan drive upgrades
- Demand Ctrl Ventilation
- Etc.



Non-Lighting Building System & Equipment Incentives

Commercial Kitchen Equipment

- Convection/combination ovens
- Ice machines
- Induction Griddles
- Etc.

Grocery Equipment

- Refrigeration cases
- Controls
- Fans
- Etc.

Industrial Measures

- Compressed Air
- Refrigeration
- Pumps
- Heat recovery
- Etc.

Bio Tech

- Ultra low temp freezers
- Lab-grade refrigerators and freezers
- Etc.

And many more...

Lighting Rebates

- Yes they still exist
- **Lighting Retrofit Program:** Incentives based on kWh savings for energy-efficient fixture and/or controls upgrades.
 - HB1185 will prohibit us from funding Fluorescent Replacements in 2029

Residential Heat Pumps

- Looking to offer the new BPA room heat pump incentive.
- Planning on increased residential heat pump incentives this year.
- Interesting Fact:
 - The majority of heat pump installations in Seattle are mini-splits.
- Research Needed:
 - Efficient usage of multi-head mini-splits. Especially at lower loads.

Solar & DER Handbook 2026

- Clarity and consistency to the DER interconnection process
- Helping improve installer and customer experiences
- Allowing the utility to effectively manage the growing integration of renewable energy sources and battery storage
- Solar Goal by 2035: +500MW
- *The Lab* DER Training webinar video:
<https://www.youtube.com/watch?v=jc3T6tCX--Y>
- [Distributed Energy Resources Interconnection Handbook](#)

THANK YOU



Seattle City Light

Open Discussion/ Q&A



Thank You!

