# Q2 2025 AGENDA

## Regional Emerging Technologies Advisory Committee

**DATE:** June 18, 2025
**TIME:** 8:30 a.m. – 12:00 p.m.
**WEBINAR:** MS Teams – See link in calendar invite or register here
**AUDIO:** Web audio or telephone *971-323-0535, code 178 969 046#*

**MEETING OBJECTIVES:**

- RETAC members receive opportunities to share their emerging technology / new measure plans for 2025.
- Members can share their experiences at the Hot Water/Hot Air Forum and EFX '25 conferences.

**AGENDA**

| Time | Topic | Lead | Packet Page # |
|---|---|---|---|
| **8:30 a.m. (30 min)** | **Welcome & Announcements**<br>• Introductions and Agenda Review<br>• Regional Conferences and Product Council Updates<br>• Key announcements and highlights from ET newsletter | Mark Rehley, NEEA<br><br>All | Agenda pp. 1-2 |
| **9:00 a.m. (45 min)** | **RETAC Round Robin**<br>• Share research and other efforts to develop new measures and technologies for your organization.<br><br>**Outcome:** Awareness of emerging technology efforts by committee members | RETAC Members | |
| **9:45 a.m. (15 min)** | **BREAK** | | |

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| | | | |
|---|---|---|---|
| **10:00 a.m.**<br>**(45 min)** | **Hot Water\|Hot Air Forum & EFX '25 Conference Debrief**<br>• NEEA staff and committee members who attended the recent Hot Water\|Hot Air Forum and/or EFX '25 will share their experiences and learnings.<br><br>**Outcome:** Committee members receive an update on trends and new opportunities discovered at these recent events | All | |
| **10:45 p.m.**<br>**(15 min)** | **Wrap-Up**<br>• Final Q&A, polling questions | Mark Rehley, NEEA | |

**REGIONAL EMERGING TECHNOLOGY ADVISORY COMMITTEE CHARTER**
**Review process:**

Advisory Committee > Governance > Executive > Board

## Committee Purpose

NEEA's Regional Emerging Technology Advisory Committee's ("Committee" or "RETAC") purpose is to support the alliance[1] in achieving its Purpose[2] and Mission[3] by tracking and coordinating the progression of technologies that enable energy efficiency, grid-enabled end-use capabilities, reduce greenhouse gas emissions, and accelerate the equitable delivery of energy efficiency benefits (emerging technology or technology) in the Northwest. Also, this Committee tracks higher levels of emerging technology readiness and market adoption in the Northwest.. The regional pipeline goals adopted by the Committee help focus attention on technologies that can help improve the overall flow of the pipeline. Committees' guidance is used to inform NEEA staff's work toward achievement of NEEA's 's strategic goals and also used by Committee members to influence Committee work towards achievement of Committee members' host organization's goals to optimize Northwest collaboration on emerging technologies.

## Committee Authority

The Committee is authorized to take actions and make recommendations necessary to fulfill the Responsibilities delegated to it pursuant to this Regional Emerging Technology Advisory Committee Charter ("Charter") by NEEA's Board of Directors ("Board") as provided by NEEA's Bylaws. The Committee is a management-advisory committee, providing support to the work of NEEA's managers and other staff in its promotion of energy efficient emerging technologies. The Committee reports to NEEA's Executive Director, and NEEA's Executive Director is given related authority pursuant to this Charter.

## Committee Responsibilities

The Committee is authorized by the Board under this Charter to carry out the following Responsibilities:

1. Identifying and tracking emerging technologies.
2. Planning and conducting research.
3. Developing, implementing and assessing pilots and field demonstrations.
4. Engagement in activities including:

[1] The Northwest Energy Efficiency Alliance (NEEA) is an alliance of more than 140 utilities and energy efficiency organizations working on behalf of more than 13 million energy consumers to increase the adoption of energy-efficient products, services and practices. To do this, the alliance identifies and removes market barriers to energy efficiency to drive permanent change throughout the supply chain. This formalized, lasting approach is known as Market Transformation.

[2] NEEA's Purpose Statement: NEEA is an alliance of utilities and partners that pools resources and shares risks to transform the market for energy efficiency to the benefit of all consumers in the Northwest.

[3] NEEA's Mission: NEEA catalyzes the most efficient use of energy for a thriving Northwest.

a) Tracking adoption of new measures.
b) Identifying actions to advance promising technologies and design strategies.
c) Coordinating with the Regional Portfolio Advisory Committee ("RPAC") to increase adoption of existing technologies with low market share.
d) Scanning for new technologies, practices, and services.
e) Sharing knowledge, expertise and resources to support development and maintenance of the region's emerging technology pipeline.
f) Providing a forum for information exchange within the region on emerging technology and opportunities for collaboration.

5. Committee members and NEEA share a commitment to communicate and coordinate as part of this Committee with the intent of operating with transparency, collaboration, and clarity.
6. The Committee will act to serve NEEA's primary Mission to catalyze the most efficient use of energy for a thriving Northwest in furtherance of NEEA's primary Purpose as an alliance of utilities and partners that pools resources and shares risks to transform the market for energy efficiency to the benefit of all consumers in the Northwest.

**Committee Membership**

NEEA's Executive Director has the authority pursuant to this Charter to appoint a Committee member as designated by and from to each NEEA direct funder[4]. In addition, NEEA's Executive Director may appoint other Committee member(s), such as Northwest Power and Conservation Council staff, public utility commission staff, and state energy office staff.

**Open Committee Meetings and Closed Sessions**

All Committee meetings are open to participation by members of the public. With the exception of sensitive information, confidential information, or other information not appropriate for public dissemination as determined by the Committee or NEEA's Executive Director, Committee meeting materials (including but not limited to Committee meeting packets, slide presentations, and summary notes) are posted for public access. A closed, non-public session for part or all of any Committee meeting may be called at any time by any Committee member or NEEA's Executive Director to discuss sensitive, confidential, or other information not deemed appropriate by the same for public dissemination, including but not limited to competitive or proprietary information that should not be publicly shared.

**Committee Meeting Schedule**

The Committee meets on a quarterly basis and conducts additional meetings and/or webinars as needed in its determination, or as requested by NEEA's Executive Director or Board.

[4] Pursuant to NEEA's Bylaws, a "direct funder" refers to electric and gas, public or investor-owned utilities, Bonneville Power Administration, energy efficiency administrators, and the like that have committed to fully fund their share of NEEA's 5-year Business Plan's Cycle Core Funding activities, consistent with Board approved NEEA Funding Mechanism Policies, which determine the financial contribution required by each Direct Funder; not including funders paying such funds exclusively through other Direct Funders. See NEEA Bylaws, Art. II, Section (b)-(d).

**Review Schedule**
NEEA's Board reviews this Charter during the first year of NEEA's then current funding cycle, or at other times as needed as determined by the Board.

**Reference Chart**

| ***NEEA Governance/ Management/ Advisory Roles and Responsibilities*** | |
|---|---|
| NEEA Board | • All corporate governance and fiduciary duties, including ensuring the system of rules, practices and processes by which NEEA is directed to balance the interests of the alliance's stakeholders, to support the achievement of the organization's purpose<br>• Strategic and Business Plan development and approval<br>• Operations Plan and budget approval |
| NEEA Executive Director | • Manage the business of NEEA according to Strategic, Business and Operations Plans, set forth by Board<br>• Oversee business operations and staff |
| Regional Portfolio Advisory Committee ("RPAC") | • Advise NEEA's Executive Director on portfolio performance and program advancement; "challenge flag" process; RPAC+ downstream marketing elections<br>• Monitor developments from other advisory committees with regard to regional coordination, market progress, and emerging technology |
| Coordinating Committees ("CCs") | • Collaborate with NEEA Staff and report to RPAC on coordination and optimization of NEEA programs and related activities, to identify and manage through potential implementation challenges between NEEA and local utility activities, and seize opportunities for amplified market influence |
| Cost-Effectiveness and Evaluation Advisory Committee ("CEAC") | • Advise NEEA's Executive Director on methods, data sources and inputs for use in NEEA's cost-benefit analysis and energy savings reporting<br>• Advise NEEA's Executive Director on market research and evaluation methodologies |
| Regional Emerging Technology Advisory Committee ("RETAC") | • Advise NEEA's Executive Director on NEEA's work toward achieving its strategic pipeline goals<br>• Track and coordinate the progression of energy efficiency technologies to improve technology readiness and market adoption in the Northwest |
| Natural Gas Advisory Committee ("NGAC") | • Advise NEEA's Executive Director on gas portfolio performance and program advancement; "challenge flag" process; RPAC+ downstream marketing elections<br>• Monitor developments from other advisory committees with regard to market progress and emerging technology |
| Work Groups | • Formed by RPAC on an as-needed basis and staffed with as-needed expertise, for a limited term and specific purpose that is distinct from that of RPAC, the CCs, and other Advisory Committees or Work Groups |

| **HISTORY** | | | |
|---|---|---|---|
| **Source** | **Date** | **Action/Notes** | **Next Review Date** |
| RETAC | Q1-Q2 2020 | Proposed Draft | Q1 2021 |
| Governance Committee | July 8, 2020 | Recommended for Board consideration | Q2 2025 |

| **HISTORY** | | | |
|---|---|---|---|
| **Source** | **Date** | **Action/Notes** | **Next Review Date** |
| Executive Committee | August 27, 2020 | Recommended for Board consideration | Q2 2025 |
| Board Decision | September 15, 2020 | Board Approval | Q2 2025 |
| *Governance Committee* | *October 17, 2024* | *Recommended for Board consideration* | *Q2 2030* |
| *Executive Committee* | *November 14, 2024* | *Recommended for Board consideration* | *Q2 2030* |
| *Board Decision* | *December 5, 2024* | *Board Approval* | *Q2 2030* |

# 2025 Q2 Emerging Technology Quarterly Newsletter

## WHAT'S NEW:

The Q2 2025 Emerging Technology Newsletter highlights several exciting developments and updates of NEEA's emerging technology efforts. Final reports are available for commercial heat pump dyers and residential heat pump rating representativeness studies. Several other projects are complete, and reports will be available soon including the residential laundry field study, low load efficient heat pump investigation, tri-mode heat pump study, skinny wall retrofit panels, combination space and water heating study, and commercial and industrial fan products. Finally, NEEA has started a couple of new projects, including residential duct sealing and modeling for natural gas and high efficiency dedicated outdoor air systems.

NEEA staff scan for new emerging technologies for all sectors and end uses. Please let us know if you have a product or research idea. We'd love to hear from you.

NEEA has several interesting Product Councils scheduled, and is always open for topic ideas.

**Recent and Upcoming Product Councils:**

- March 25, 2025 – Low Load Efficient Heat Pumps
- June 24, 2025 – Empowering Meaningful Measurement & Verification with EcoDash: A standardized tool for HPWH M&V
- July 1, 2025 – Distributed Pumping Solutions
- July 8, 2025 – Advanced Heat Pump Coalition Spring Meeting

Information on upcoming Product Councils is always available at https://neea.org/product-council/.

Please reach out to any of NEEA's product managers with questions or suggestions on NEEA's emerging technology work.

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*Questions about this report may be addressed to:*
Mark Rehley
Director, Codes, Standards, New Construction and Emerging Technologies
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PUBLISH DATE: June 9, 2025

# Product Summary & Readiness Levels

| | PRODUCT OR PROJECT | PROGRAM* | FUEL TYPE | SECTOR | ELECTRIC SAVINGS POTENTIAL[1] | GAS SAVINGS POTENTIAL[2] | PRODUCT PERFORMANCE[3] | MARKET/ COMMERCIAL[3] | PROGRAM READINESS[3] |
|---|---|---|---|---|---|---|---|---|---|
| **Consumer Products** | Ultra-High Definition TVs | RPP | | | 57 | N/A | 4 | 5 | 4 |
| | Residential Laundry Field Study | RPP | | | N/A | N/A | 5 | 5 | 5 |
| | Monitors and Commercial Displays | TBD | | | TBD | N/A | 3 | 5 | 3 |
| | Laundry Centers & All-in-One Washer-Dryers | RPP | | | TBD | TBD | 4 | 5 | 5 |
| | Commercial Heat Pump Dryers | TBD | | | TBD | TBD | 1 | 3 | 1 |
| **HVAC** | Heat Pump Rating Representativeness | AHP | | | TBD | N/A | 3 | 5 | 4 |
| | Low Load Efficient Heat Pump Investigation | AHP | | | TBD | N/A | 4 | 3 | 3 |
| | Air-Conditioning, Heating, and Refrigeration Institute (AHRI) 1380 HVAC Connectivity Standard | EULF | | | TBD | N/A | 2 | 2 | 2 |
| | Dual-Fuel Heat Pumps Modeling | DFHP | | | TBD | TBD | 3 | 3 | 1 |
| | Dual-Fuel Heat Pump Field Study | DFHP | | | TBD | TBD | 3 | 3 | 1 |
| | Cold Climate Room Heat Pump Field Testing | AHP | | | TBD | N/A | 3 | 3 | 2 |
| | Tri-Mode Heat Pump Study | TBD | | | TBD | N/A | 2 | 2 | 1 |
| | Gas High Efficiency Dedicated Outdoor Air System (GHE DOAS) Modeling | TBD | | | N/A | TBD | 1 | 3 | 1 |
| **Building Envelope** | Secondary Windows | Window Attachments | | | 35 | 23† | 4 | 5 | 4 |
| | Skinny Wall Retrofit Panels | TBD | | | TBD | TBD | 2 | 1 | 1 |
| | Advanced Prefabricated Zero Carbon Homes | TBD | | | TBD | TBD | 2 | 2 | 1 |
| **Lighting** | LLLC with HVAC Control | LLLC | | | 358 | TBD | 3 | 3 | 3 |
| | Parking Lot Lighting with LLLC | TBD | | | TBD | N/A | 3 | 3 | 1 |
| **Water Heating** | Combination Hot Water and Space Heat | N/A | | | 130 | N/A | 1-4 | 1-3 | 2 |
| | Integrated Residential GHPWH | GHPWH | | | N/A | 200 | 3 | 1 | 2 |
| | Central Commercial Heat Pump Water Heater | HPWH | | | 50 | N/A | 3 | 3 | 3 |
| | Advanced Commercial Gas Water Heating Modeling | ACWH | | | N/A | 64 | 3 | 3 | 2 |
| | Advanced Commercial Gas Water Heating Field Test | ACWH | | | N/A | 64 | 3 | 3 | 2 |
| | Split System Heat Pump Water Heater | HPWH | | | 50 | N/A | 3 | 3 | 3 |
| | Split System HPWH Innovation | HPWH | | | TBD | N/A | 4 | 2 | 2 |
| **Motors** | Commercial & Industrial Fans | Fans | | | 176 | N/A | 5 | 4 | 2 |
| | Power Drive System Technology Assessment | N/A | | | 292 | N/A | 5 | 4 | 1 |
| | Extended Motor Products (Pumps) | XMP | | | TBD | TBD | 3 | 5 | 3 |
| **Other** | Flexible Load Management | N/A | | | TBD | TBD | 5 | 5 | 2 |

***Program Acronyms Defined:** Retail Product Portfolio (RPP); Ductless Heat Pumps (DHP); Advanced Heat Pumps, formerly Variable Speed Heat Pumps (AHP); Very High Efficiency Dedicated Outdoor Air Systems (DOAS); Luminaire Level Lighting Controls (LLLC); Heat Pump Water Heaters (HPWHs); Efficient Gas Water Heaters (EGHW); Extended Motor Products (XMP); High-Performance Windows (HPW); Gas Heat Pump Water Heaters (GHPWH); Dual-Fuel HVAC (DFHP); End-Use Load Flex (EULF); Gas High Efficiency Dedicated Outdoor Air System (GHE DOAS)

1: Technical achievable **electric savings potential** in the region aMW
2: Technical achievable **gas savings potential** in the region in MM Therms
3: **Readiness Level Definitions** provided on page 25; **Rating Scale** 1=low 5=high
†: Preliminary estimate or technical potential from the RTF

**Fuel Type Symbols:** Electric Gas **Sector Symbols:** Residential Commercial Industrial

## *Ultra-High Definition (UHD) TVs*

**Project Status:** The ENERGY STAR® Retail Products Platform has approved the addition of TVs to the product tiers that are eligible for midstream and retailer incentives. The basic tier covers TV <50" and the advanced tier covers TVs >/=50". Qualifying TVs must appear on the ENERGY STAR Qualified Products List (QPL). Costco has agreed to join the roster of ESRPP retailers joining Best Buy and Nationwide as retailers receiving incentives on TVs.

**Product Description:** 4K UHD TVs with various forms of advanced display technologies.

**Project Objective(s):**

- Influence adoption of key aspects of the NEEA test method and approach internationally.
- Support ongoing implementation of the NEEA test method and approach in the U.S. by ensuring data integrity of tests submitted.
- Support ongoing discussions of on-mode power levels within the TV Voluntary Agreement supported by TV test data.

**Product Manager:** Wendy Preiser
wpreiser@neea.org
503.688.5494

| Product | 4 | Comm/Market | 5 | Program | 4 |
|---|---|---|---|---|---|

## *Residential Laundry Field Study*

**Project Status:** The report is complete. Results are being compared to other regional datasets to fine-tune energy use and cycle frequency projections. The final report is now expected by end of Q3 2025.

**Product Description:** Residential appliances for washing and drying clothes.

**Project Objective(s):** Conduct research to leverage NEEA's Residential Building Stock Assessment (RBSA) households by selecting a statistically representative sample of households and studying their laundry use patterns and equipment energy use. This study collects data on water usage, load sizes, textile mix, washer and dryer cycles selected, how efficiently washers remove water from the load, and how efficiently dryers dry clothes. These insights will allow updates to energy savings opportunities, inform current ENERGY STAR specification development, inform future U.S. Department of Energy (U.S. DOE) rulemakings, and facilitate collaboration with other partners to replicate the study in their territories.

**Product Manager:** Wendy Preiser
wpreiser@neea.org
503.688.5494

| Product | 5 | Comm/Market | 5 | Program | 5 |
|---|---|---|---|---|---|

## *Monitor and Commercial Display Testing*

**Project Status:** The test procedure modifications for monitors and commercial displays are complete. Testing is complete on monitors and is beginning on commercial displays to assess level settings. The final report is expected in Q3 2025.

**Product Description:** High-definition and UHD monitors and commercial displays with various advanced display technologies.

**Project Objective(s):** The current monitor and display policy approach has several gaps. Most displays and monitors are similar in design and construction to TVs. For TVs, the U.S. DOE has adopted ANSI/CTA-2037D, developed by NEEA, which represents true energy use better than the current industry standard. This project has three objectives:

- Replace the current industry standard with the NEEA-developed test procedure adapted to monitors and displays;
- Achieve adoption by ENERGY STAR of the NEEA-developed test procedure and methodology for monitors and displays, with buy-in by industry stakeholders including major manufacturers and energy efficiency advocates; and
- Succeed in having the new test procedure inform an update to the U.S. DOE federal energy test standard.

**Product Manager:** Wendy Preiser
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503.688.5494

| Product | 3 | Comm/Market | 5 | Program | 3 |
|---|---|---|---|---|---|

## *Laundry Centers and Washer-Dryer Combo Testing*

**Project Status:** Consumer adoption of all-in-one units continued to be strong. The research was rescoped to understand potential post-purchase dissatisfiers that might impact long-term advances in heat pump dryer technology. The final research plan and scope is in progress.

**Product Description:** Laundry centers are residential clothes washers and electric or gas clothes dryers that clean and dry clothes in separate, stacked drums. A combination all-in-one washer-dryer is a residential clothes washer and electric or gas clothes dryer that cleans and dries the clothes in a single tumble-type drum.

**Project Objective(s):** Laundry centers and combination all-in-one washer-dryers with heat pump dryers are now available in the market. This research aims to:

- Test equipment to understand actual performance and energy consumption compared to U.S. DOE and ENERGY STAR estimates:
  - Are cycle times falling within reasonable expectations?
  - Does lint accumulation impact performance and energy use over time?
  - Does lint accumulation shorten usable life expectancy?
- Craft laundry center and single-drum washer-dryer ENERGY STAR program recommendations; and
- Identify relevant regional program opportunities for laundry centers and single-drum washer-dryers.

**Product Manager:** Wendy Preiser
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503.688.5494

| Product | 4 | Comm/Market | 5 | Program | 5 |
|---|---|---|---|---|---|

## *Commercial Heat Pump Dryers*

**Project Status:** Report is complete and is available on neea.org: Commercial Heat Pump Dryers Report

**Product Description:** Commercial clothes dryers using electric heat pump technology in place of, or in addition to, electric resistance elements to dry textiles. Commercial heat pump dryers may be utilized in vended applications or as on-premises laundry.

**Project Objective(s):** Commercial heat pump dryers are now available in the market. Research objectives included:

- Quantifying the energy use of heat pump dryers compared to similar capacity (50 lb. ± 10 lbs.) electric resistance and gas commercial dryers;
- Developing a regional model of energy use and savings estimates looking at three locations in NEEA's territory and comparing them to a U.S. national average calculation;
- Understanding the cycle time differences between conventional and commercial heat pump dryers by testing a variety of textiles, including Association of Home Appliance Manufacturers (AHAM) 100% cotton textiles, hotel linens and hotel towels;
- Quantifying potential impacts in capital costs, operational and labor costs in using heat pump dryers vs. conventional commercial dryers; and
- Utilizing learning to inform future ENERGY STAR and U.S. DOE test procedure developments or rulemakings.

**Product Manager:** Wendy Preiser
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503.688.5494

| Product | 1 | Comm/Market | 3 | Program | 1 |
|---|---|---|---|---|---|

## *Heat Pump Rating Representativeness*

**Project Status:** Project is complete – The final report is now available on the Northeast Energy Efficiency Partnerships (NEEP) website. In addition, Natural Resources Canada (NRCan) just completed a companion research project report on the representativeness of load-based testing to which NEEA also contributed.

- Rating Representativeness Report Phase 1
- Rating Representativeness Report Phase 2
- NRCan Reproducibility Report

**Product Description:** Variable speed heat pumps and air conditioners.

**Project Description:** NEEA, in collaboration with Northeast Energy Efficiency Partnerships (NEEP); Air-Conditioning, Heating, and Refrigeration Institute (AHRI); BC Hydro; NRCan; New York State Energy Research and Development Authority (NYSERDA); Southern California Edison; Xcel Energy; and U.S. DOE, conducted a unique project to evaluate the accuracy of the test procedure for heat pumps. The study observed heat pump performance in a controlled field installation and compared those observations with corresponding laboratory test results. The results of this study were used to inform federal test procedure development and inform future Canadian standard CSA C700 load-based tests for heat pumps.

**Project Objective(s):**

- Identifying how well U.S. DOE Appendix M1 represents field performance.
- Identifying how well CSA SPE07 represents field performance.
- Identifying which lab data is essential for accurate ratings.
- Determining critical performance indicators that could effectively be used to differentiate efficient equipment in a Qualified Products List (QPL) in advance of wide availability of modified test procedures.

**Product Manager:** Christopher Dymond
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503.688.5454

| Product | 3 | Comm/Market | 5 | Program | 4 |
|---|---|---|---|---|---|

## *Low Load Efficient Heat Pump Investigation*

**Project Status:** All phases are complete.

- Preliminary findings were presented at the April 2, 2024, Product Council.
- A summary presentation was given at the Product Council on March 25, 2025.
- A final report is being prepared.

**Product Description:** Variable speed heat pumps that are highly efficient when running under low loads.

**Project Objective(s):** The core objectives are to determine the incremental cost and reasons why some variable speed heat pumps exhibit significantly better part load (low load conditions) operating performance.

- Phase 1 of the project reviewed existing publicly available data.
- Phase 2 conducted a virtual teardown of equipment to compare a dozen different heat pumps based on technical service manuals.
- Phase 3 consisted of lab testing several variable speed heat pumps to validate and understand how heat pumps operate under part load conditions.
- Phase 4 performed a physical teardown of subcomponents to provide insight on component differences, the manufacturing costs, and components that enable low load efficiency.

**Product Manager:** Christopher Dymond
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503.688.5454

| Product | 4 | Comm/Market | 3 | Program | 3 |
|---|---|---|---|---|---|

## *Air-Conditioning, Heating, and Refrigeration Institute (AHRI) 1380 HVAC Connectivity Standard*

**Project Status:** NEEA is participating in the AHRI unitary equipment standards technical committee.

**Product Description:** Hardware and software necessary to make HVAC grid flexible and controllable.

**Project Objective(s):** Support efforts to harmonize connectivity standards among several standards, including heat pumps, ENERGY STAR, OpenADR and others.

**Product Managers:** Eric Olson
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| Product | 2 | Comm/Market | 2 | Program | 2 |
|---|---|---|---|---|---|

## *Dual-Fuel Heat Pump Modeling*

**Project Status:** Modeling shows that dual-fuel systems with switchover-based approaches achieve HVAC operational consumer savings. To better understand the consumer value proposition, more installation cost data is needed to clarify equipment and installation labor cost. System control and grid connectivity are expected to be essential components of the value proposition in achieving these results.

**Product Description:** A forced air gas furnace or hydronic furnace combined with an air source heat pump (ASHP) with integrated controls.

**Project Objective(s):** Understand energy and cost savings from dual-fuel systems centrally ducted across various representative applications in the Northwest.

**Product Manager:** Noe Contreras
ncontreras@neea.org • 503.688.5412

| Product | 3 | Comm/Market | 3 | Program | 1 |
|---|---|---|---|---|---|

## Dual-Fuel Heat Pump Field Study

**Project Status:** Commissioned a residential dual-fuel technology demonstration. The sites have dual-fuel systems installed along with metering equipment to measure and validate performance.

**Product Description:** A forced air hydronic furnace combined with an ASHP with integrated controls.

**Project Objective(s):** Understand the efficiency and ability of residential dual-fuel systems to provide value through energy savings and grid flexibility by pairing highly efficient gas water and space heating with an electric heat pump and using a smart controller to increase fuel flexibility and dynamically control the system.

**Product Manager:** Noe Contreras
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| Product | 3 | Comm/Market | 3 | Program | 1 |
|---|---|---|---|---|---|

## Cold Climate Room Heat Pump Field Testing

**Project Status:** Room heat pump units were installed in February 2025. As of January 29, 2025, 27 of 30 sites have been recruited. Participating utilities include Seattle City Light, Puget Sound Energy, Energy Trust of Oregon, Okanogan PUD, Ravalli Coop, and Glacier PUD.

**Product Description:** A small heat pump designed to condition a single room that is plugged into a standard 15A 120V AC outlet. The heat pump may be installed in a window, like a window air conditioner, or portable so it can easily be moved from room to room. Cold climate-capable room heat pumps can actively defrost and provide 100% capacity down to 17°F.

**Project Objective(s):**

- Obtain lab test data collected from manufacturers to characterize heat performance vs. ambient temperature.
- Conduct field testing to gather real-world operational data (runtime, consumer acceptance, etc.).

**Product Manager:** Christopher Dymond
cdymond@neea.org • 503.688.5454

| Product | 3 | Comm/Market | 3 | Program | 2 |
|---|---|---|---|---|---|

## *Tri-Mode Heat Pump Study*

**Project Status:** Initial market research survey and interviews with manufacturers are complete. The final report and a NEEA Product Council presentation are pending.

**Product Description:** Tri-Mode heat pumps use a single outdoor unit to drive indoor space heating, space cooling and domestic water heating. They are integrated systems that can use either refrigerant or water as the distribution fluid coupled to a variable speed vapor compression heat pump.

**Project Objective(s):**

- A detailed market survey of tri-mode heat pumps available in North America, Asia and Europe.
- Preliminary estimate of energy savings potential.
- Preliminary evaluation of market barriers for these systems.

**Product Manager:** Christopher Dymond
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503.688.5454

| Product | 2 | Comm/Market | 2 | Program | 1 |
|---|---|---|---|---|---|

## *Duct Sealing Investigation*

**Project Status:** This project kicked off in May 2025.

**Product Description:** A 2004 study revealed that residential HVAC distribution losses from leakage and conduction of an average Northwest home exceed 30% of all heating energy. This project will investigate the current state of the market and efficient solutions to improve indoor air quality and air distribution of space conditioning air. The work involves literature research and interviews with a wide range of subject matter experts. NEEA seeks to determine if there have been changes in the duct sealing, indoor air quality and ventilation solutions over the past decade that warrant further investigation as a potential Market Transformation program.

**Project Objective(s):**

- Provide an updated summary of current methods through secondary research and simple analysis.
- Conduct a comparative analysis of existing methods.

**Product Manager:** Christopher Dymond
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503.688.5454

| Product | 2 | Comm/Market | 2 | Program | 1 |
|---|---|---|---|---|---|

## *Gas High Efficiency Dedicated Outdoor Air System (DOAS) Modeling*

**Project Status:** Modeling is underway to understand the energy savings potential for high-efficiency DOAS configurations where the primary heating system is a natural gas solution.

**Project Objective(s):**

- Evaluate the energy use and savings of gas high efficiency DOAS in non-residential and multifamily buildings.
- Identify how climate and building type impact energy savings potential.
- Evaluate the energy use and savings potential of new and existing buildings with gas high efficiency DOAS.

**Product Manager:** Adam Gage
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503.688.5486

| Product | 1 | Comm/Market | 3 | Program | 1 |
|---|---|---|---|---|---|

## *Secondary Windows Field Study*

**Project Status:** The California Energy Commission extended the project due to unforeseen complexities. GTI is developing an updated schedule. Lawrence Berkeley National Labs continues investigating condensation mitigation testing and data analysis. Selected test sites are comprised of multiple office spaces in multiple buildings. Three manufacturer's products will be tested.

**Product Description:** Retrofit products comprised of one or more panes of material such as glass, polymer or acrylic, with or without Low-E coatings, which are mounted in a frame attached either to the interior or exterior of existing windows without replacing the primary glass or frame.

**Project Objective(s):** Primarily funded by the California Energy Commission (CEC), this multi-year, co-funded project, led by GTI Energy, seeks to:

- Advance high-performance window technologies by addressing the retrofit technical and cost challenges such as replacement cost, existing window size and weight incompatibilities, and durability;
- Demonstrate increased energy performance with a U-Factor ≤ 0.13, Solar Heat Gain Coefficient (SHGC) ≤ 0.20, Visual Transmittance (VT) > 0.42, and decreased HVAC energy consumption by at least 15% compared to current HVAC energy use with existing single pane windows;
- Reduce installation costs compared to code compliant windows; and
- Accelerate high-performance window uptake in the retrofit market through direct partnerships with manufacturers, suppliers and others.

**Product Manager:** Eric Olson
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503.688.5435

| Product | 4 | Comm/Market | 5 | Program | 4 |
|---|---|---|---|---|---|

## *Skinny Wall Retrofit Panels*

**Project Status:** This project is underway, with the Feasibility Stage report expected in Q3 2025.

**Product Description:** Highly efficient, customizable vacuum insulated panels (VIP) with an insulation value of up to R30 targeted for residential applications.

**Project Description:** A co-funded project with GTI Energy and NYSERDA to develop an easy-to-install, highly efficient, and customizable wall retrofit solution for residential buildings. Key innovations include using VIPs, 3D scanning and modeling of the building enclosure, and customized design and fabrication of retrofit panels.

**Project Objective(s):**

- Determine retrofit parameters affecting thermal performance, air, vapor and moisture drainage, and weather-resistive barriers;
- Evaluate panel concept with the defined design characteristics;
- Fabricate full-scale prefabricated prototype panels retrofitting a 10'x20' mock-up wall, including door, window and corner features;
- Recruit sites and develop a screening process for demonstration site(s);
- Construct and install VIPs; and
- Conduct energy performance modeling, including comparisons to baseline building performance.

**Product Manager:** Eric Olson
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| Product | 2 | Comm/Market | 1 | Program | 1 |
|---|---|---|---|---|---|

## *Advanced Prefabricated Zero Carbon Homes*

**Project Status:** This project is currently on hold due to the prior demonstration sites being no longer available. GTI Energy identified two alternative sites and is looking for additional sites by partnering with other organizations. Once the California Energy Commission (CEC) approves the sites, work will resume.

**Product Description:** Prefabricated net-zero homes that meet California Title 24 Building Efficiency Standards with efficient HVAC, heat pump water heating, photovoltaic (PV) energy generation and energy storage.

**Project Description:** A co-funded project with GTI Energy and the CEC project EPC-23-018 to develop advanced, highly efficient manufactured homes that can achieve zero carbon operation with on-site PV power generation and battery energy storage. Homes will meet the California 2022 Title 24 Building Energy Efficiency Standards and will use heat pump water heaters (HPWHs) and air source heat pumps.

**Project Objective(s):**

- Design, build and commission energy-efficient, all-electric manufactured homes with integrated PV and battery energy storage.
- Perform field validation of zero carbon operation.
- Perform techno-economic analysis using as-built advanced home costs within this project as well as scaled future costs assuming broad adoption of energy efficiency and demand response technologies.

**Product Manager:** Eric Olson
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| Product | 2 | Comm/Market | 2 | Program | 1 |
|---|---|---|---|---|---|

## *Luminaire Level Lighting Controls with HVAC Control*

**Project Status:** Data collection is underway and will continue until Q3 2025. The project is getting a lot of interest from multiple extra-regional agencies, including the U.S. DOE, Pacific Northwest National Laboratory (PNNL), DesignLights Consortium (DLC) and others. Project staff are continuing to look for additional sites for more field testing.

**Product Description:** Luminaire Level Lighting Controls (LLLC) integrated with basic HVAC systems (rooftop units with only thermostats) simplifying the equipment necessary to control thermostats.

**Project Objective(s):** Determine whether additional energy savings are possible from more granulated sensors in every general lighting fixture. Analyze the data using simple thermostats (as a cost-effective way to do LLLC+HVAC) and LLLC to help reduce HVAC usage. With more than 50% of the building stock being less than 15,000 square feet and lacking a complex Building Management System, the NEEA team is seeking a cost-effective and straightforward way to use the occupancy data from the LLLC system to inform the HVAC on setpoints and setbacks based on who is in the space.

**Product Manager:** Chris Wolgamott
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| Product | 3 | Comm/Market | 3 | Program | 3 |
|---|---|---|---|---|---|

## *Parking Lot Lighting with LLLC*

**Product Status:** The contractor is conducting a market survey, including existing demand response systems and currently available parking lot luminaire technology, and is conducting industry interviews. The market analysis report is complete; Phase 3 is underway and should be completed by the end of Q2 2025.

**Product Description:** Exterior lighting with LLLC.

**Project Objective(s):** Develop and field test a simple, cost-effective parking lot lighting LLLC technology that will reduce electric demand from parking lot lighting during times of peak electric demand.

**Product Manager:** Chris Wolgamott
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| Product | 3 | Comm/Market | 3 | Program | 1 |
|---|---|---|---|---|---|

## Combination Hot Water and Space Heat (Gas)

**Project Status:** Final publication is pending.

**Product Description:** An integrated appliance providing space and water heating. Production options include different refrigerants and water, air and refrigerant working fluids.

**Project Objective(s):** Demonstrate the performance and adaptability of these systems to provide space conditioning and domestic water heating systems in existing homes and small commercial applications.

**Product Manager:** Noe Contreras
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| Product | 1-4 | Comm/Market | 1-3 | Program | 2 |
|---|---|---|---|---|---|

## Integrated Residential Gas Heat Pump Water Heaters

**Project Status:** Initial performance evaluation shows COP > 1 at specific buffer tank water temperatures. Further design improvements have been implemented to enable a COP >1 at a larger range of buffer tank water temperatures.

**Product Description:** A HPWH using either an adsorption or absorption thermal cycle powered by natural gas.

**Project Objective(s):** Evaluate the performance of a prototype, full-size, adsorption gas HPWH.

**Product Manager:** Noe Contreras
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| Product | 3 | Comm/Market | 1 | Program | 2 |
|---|---|---|---|---|---|

## *Advanced Commercial Gas Water Heating Modeling*

**Project Status:** Modeling gas absorption heat pumps and electric heat pumps installed with traditional commercial gas-fired water heating products such as boilers, unitary water heaters and tankless water heaters. Findings expected in Q2 2025.

**Product Description:** Central water heating systems utilizing a thermally driven heat pump, buffer tank, indirect storage tank and other smaller components to deliver domestic hot water.

**Project Objective(s):** Understand energy and cost savings from thermally driven heat pumps as replacements for boilers, natural gas-fired storage tanks and tankless systems across various representative applications in the Northwest region.

**Project Manager:** Noe Contreras
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| Product | 3 | Comm/Market | 3 | Program | 2 |
|---|---|---|---|---|---|

## *Advanced Commercial Gas Water Heating Field Study*

**Project Status:** The team has visited multiple sites to identify field sites for different commercial water heating solutions.

**Product Description:** Central water heating systems utilizing a thermally driven heat pump or electric heat pump and other components to deliver domestic hot water.

**Project Objective(s):** Understand energy and cost savings from hybrid or dual-fuel commercial water heating systems across various representative applications in the Northwest region.

**Project Manager:** Noe Contreras
ncontreras@neea.org • 503.688.5412

| Product | 3 | Comm/Market | 3 | Program | 2 |
|---|---|---|---|---|---|

## *Split-System Heat Pump Water Heater Innovation*

**Project Status:** The Hot Water Innovation Prize contest is underway. Participating manufacturers will supply their split-system HPWH prototype units for lab testing beginning in January 2026.

**Product Description:** Electric water heaters in single-family and manufactured homes tend to be larger tank sizes with high draw patterns. The updated federal water heating standard will generally require HPWH in these housing types. However, in-dwelling electric water heaters in low-rise multifamily buildings have smaller tank sizes and draw patterns and are typically installed in space constrained locations. These product and application types are not required by the new federal water heating standard to be HPWHs.

**Project Objective(s):** Innovate and manufacture energy-efficient split-system HPWH technologies for water heaters in space constrained locations in low-rise multifamily buildings that are not required to be HPWHs by the updated federal water heating standard to ensure all consumers have access to low cost, easy to install, efficient water heating options.

**Product Managers:** Dana Bradshaw
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503.688.5449

| Product | 4 | Comm/Market | 2 | Program | 2 |
|---|---|---|---|---|---|

## *Commercial and Industrial Fans Product Research*

**Project Status:** To better understand how fan efficiency is affected when operating point differs from design point, NEEA has investigated the feasibility of developing a methodology for measuring the in-situ Fan Energy Index (FEI) of fans once they are installed and operating in-field. This project is complete and results are expected to be published in late Q2 2025.

**Product Description:** Stand-alone fans that are not packaged as part of an efficiency-rated product.

**Project Objective(s):** The FEI describes the fan efficiency at a design point compared to a "minimally compliant" reference fan at that same operating point and is accepted as the best metric to characterize "efficient fans" at a particular operating point. This project sought to identify which fan systems and corresponding applications can best achieve efficiency through proper selection using the FEI, proper sizing, speed control, design and other efficiency options.

**Product Manager:** Kristen Aramthanapon
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503.688.5423

| Product | 5 | Comm/Market | 4 | Program | 2 |
|---|---|---|---|---|---|

## *Extended Motor Products (Pumps)*

**Project Status:** Conducted research to compare the efficiency between clean-water pumps and similar pumps that are designed to pump non-clean water.

**Product Description:** Process pumps that meet American Society of Mechanical Engineers (ASME) B73 specifications and are generally used to pump light, non-viscous fluids.

**Project Objective(s):** Identify energy savings opportunities for pumps that are not classified as "clean water" pumps.

**Product Manager:** Kristen Aramthanapon
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503.688.5423

| Product | 3 | Comm/Market | 5 | Program | 3 |
|---|---|---|---|---|---|

## *Flexible Load Management – Specially Funded Project*

**Project Status:** The field portion of the line voltage thermostat study has concluded, and the data analysis is underway. The connected water heater field study continues. Additionally, NEEA continues to influence AHRI by requiring CTA-2045B Level 2 for residential and commercial HPWHs. AHRI 1430 applies to 40–80-gallon electric water heaters, and AHRI 1530 applies to electric commercial water heaters over 80 gallons. Industry continues to look at updating other connectivity standards to improve grid flexibility.

**Product Description:** Connecting informed autonomous behind-the-meter applications.

**Project Overview:** NEEA has received special funding to explore connected devices capable of operating under flexible load management. These devices can be used for traditional demand response opportunities and may also enable leveraging future energy imbalance markets and potential carbon markets. To start, NEEA is focusing on open architecture connected pathways that work with the marketplace and operate in the background with limited awareness by the end customer. Initial technologies are water heating and line voltage thermostats. Future products may include inverter-driven HVAC, electric vehicle (EV) charging, consumer appliances, battery storage, commercial buildings, street lighting and others.

**Project Objective(s):** Create pathways for behind-the-meter loads that can help support the integration of renewable energy on the grid.

**Product Manager:** Eric Olson
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503.688.5453

| Product | 5 | Comm/Market | 5 | Program | 2 |
|---|---|---|---|---|---|

## MARKET & COMMERCIAL READINESS

| | Level 1: Pre-commercial | Level 2: Limited | Level 3: Niche | Level 4: Growing | Level 5: Wide |
|---|---|---|---|---|---|
| Supply Chain Maturity & Market Demand | Not commercially available or limited, pre-commercial availability | Commercially available outside of region<br>Requires special order<br>Limited market awareness | Commercially available in Northwest from one manufacturer through standard channels<br>Niche market demand | Commercially available in Northwest from at least two manufacturers<br>Growing market demand | Commercially available from 2+ manufacturers, well developed supply chain across region<br>Wide market demand |

## PRODUCT PERFORMANCE READINESS

| | Level 1: Unvalidated | Level 2: Engineering Validation | Level 3: Lab Validation | Level 4: Limited Field Validation | Level 5: Confirmed |
|---|---|---|---|---|---|
| Savings Reliability & Fitness for Use | Manufacturer claims energy savings but not validated by unbiased experts | Concept validated by unbiased expert via technical review and engineering calculations | Independent lab testing of product features and energy use in typical applications with clear baseline established | Lab and small-scale field testing across broader range of applications and systems conditions | Reliable prediction of performance across the range of intended applications; fully evaluable savings via established protocols by regional or national bodies |

## PROGRAM READINESS

| | Level 1: None | Level 2: Exploratory | Level 3: Preliminary Pilots | Level 4: Full-scale Pilots | Level 5: Ready |
|---|---|---|---|---|---|
| Cost Effectiveness Knowledge (technical and market potential, product cost at scale, non-energy benefits) | None or very limited | Performance readiness at 2; initial market size calculated (units per year) | Performance readiness at 3; product cost at-scale estimated | Performance readiness at 4; product costs at or trending towards at-scale levels; preliminary estimates of non-energy benefits | Performance readiness at 5; CE calculations based on solid estimates or proven values |
| Market & Program Knowledge | None or very limited | Preliminary research exposes barriers and/or similarities to other successfully transformed markets warranting further efforts | Market research illuminates barriers and opportunities to intervene; preliminary logic model developed; small-scale pilots | Formal market characterization underway; larger-scale pilots to test program elements and barrier removal | Formal logic model developed; market characterization and large-scale pilots prove out program design and barrier removal |
| Risk Assessment (Market, Program, Regulatory) | No risk assessment | Limited risk assessment | Preliminary risk assessment complete - major categories of risk understood | Well-developed risk assessment - no major unresolved risks | Periodic risk assessment process in place |

# CONTACT US: Ask questions • Request feedback • Suggest technologies

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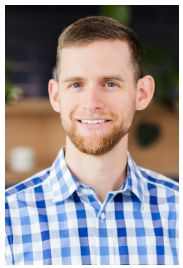

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