REGIONAL EMERGING TECHNOLOGIES ADVISORY COMMITTEE

Date: April 13, 2017
Time: 10:00am – 4:00pm
Location: NEEA Offices (421 SW 6th Ave, 6th Floor, Portland) – Cedar Conference Room
Webinar Link: http://neea.adobeconnect.com/retacjan2017/

Meeting Outcomes:

- Demonstration of RETAC 2.0 framework on ConduitNW in preparation of public release
- Collect ideas for updates based on what has been learned through testing.
- Identify research areas for regional collaboration
- Learn and discuss opportunities and challenges of CO2 refrigerants and Roof Top Unit (RTU) economizers

10:00 am	**Welcome and Agenda Review** Review meeting tasks and desired outcomes • Jonathan Belais, NEEA
10:15 am	**RETAC 2.0** Dave Kresta and the RETAC 2.0 workgroup will provide an updated status report on the development of the RETAC 2.0 framework. Product and Project resources have been added to ConduitNW. These features will be reviewed in preparation for a public release. • Outcomes: 1. Bring RETAC members up to speed on current RETAC 2.0 project status. 2. Train on the use of ConduitNW. 3. Decide on roll-out approach, and additional training needs for NW utilities.
11:15 pm	**Research Coordination – Classified Ads** Keshmira McVey with BPA will lead a discussion about research opportunities for regional collaboration. • Outcome: List of projects for follow-up.
12:15 pm	**Lunch – Provided**
1:00 pm	**RETAC 2.0 Demonstration using Advanced Thermostat Products** Several utilities around the region have researched advanced / connected / web enabled / learning thermostats for residential applications. This research has resulted in programs for one or two products (NEST Primarily). During this agenda item, Dave Kresta with NEEA will demonstrate the application of the RETAC 2.0 framework to these product variations and.

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	• Outcomes: 1. Demonstrate how the RETAC 2.0 framework can be used to track the pipeline status and activities for a diverse product like thermostats 2. Identify additional research needs
2:00 pm	**Technology Discussions** If you have other topics that you would like to discuss at a deeper level with the committee, please let us know. • CO2 Refrigerants: BPA will lead a discussion about CO2 refrigerants and opportunities that the region should be prepared to take advantage of. • Economizers: Roof Top Unit economizers have been a topic of discussion in our region for decades. We have seen little improvement. Is there any reason for hope from new technologies, or should we look for a different solution?
3:50 pm – 4:00	**Meeting Review and Adjournment** Feedback about the meeting and adjourn

Memorandum

April 4, 2017

TO: Regional Emerging Technology Advisory Committee (RETAC)

FROM: Mark Rehley, Senior Manager Product Management & Emerging Technology

SUBJECT: April 13, 2017 Regional Emerging Technology Advisory Committee Meeting

Our Ask of You:

1. **Advanced Thermostats**: Email Dave Kresta davek@neea.org with your thermostat program offerings and research that you've completed in this area.
2. **Classifieds:** Ask your program managers for a list of products and research that they wish was available or research projects/field tests where they seek participation from others.
3. **NEEA's ET Activities:** Review NEEA's emerging technology activities and let us know if you have any questions or suggestions.

NEEA Emerging Technology Activities

Click here for a copy of the full Q1 2017 Emerging Technology Report posted on NEEA.org (all sectors).

RETAC 2.0

Development of the RETAC 2.0 collaborative functionality is nearing completion, with several rapid rounds of testing and revisions occurring over the last several weeks. Deployment to the live Conduit site is planned for end of day April 10th Additional training and roll-out activities to ensure successful adoption will be discussed at the April 13th RETAC meeting.

Advanced Thermostats

There has been a lot of innovation in the area of residential thermostats in the past few years. The RTF has approved planning unit energy savings for connected thermostats, and several utilities around the region are offering incentives. During our RETAC meeting, we will discuss this product category and test the RETAC 2.0 framework for this product.

Connected Thermostats at the Council and RTF

The RTF adopted a Planning UES in November 2016 for Connected Thermostats. The Planning UES estimates 6 percent heating savings for forced air furnace systems (based on runtime reductions), 14 percent heating savings for air source heat pumps (combination of runtime reductions and heat pump lockout controls), and 6 percent cooling savings (based on runtime reduction).

As this is a Planning UES, the RTF is seeking more data to improve the reliability of its savings estimates. The RTF crafted this measure with a goal of developing performance

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metrics that will correlate to energy savings, which in turn is expected to support easier qualification of new applications and devices. The metrics of interest are (1) run time reduction and (2) resistance back-up heat usage reduction. The RTF is seeking data to demonstrate whether energy savings can be sufficiently correlated to these performance metrics. Since the region already has good data on the baseline, and data for the post case can be collected directly from the thermostat, if a relationship exists, energy savings could be determined for new products and applications by collecting only these performance data. This research relies on the willingness of manufacturers to provide data from thermostats.

The Seventh Plan estimates 12 aMW of potential from connected thermostat. This estimate is based on savings for the resistance heat lock out potential for air source heat pumps.

The following picture provides more detail on the RTF UES. It shows the estimated percent savings for the different applications, including the lower and upper bound estimates at a 90 percent confidence level.

	Savings - Heating - eFAF			Savings - Heating - ASHP			Savings - Cooling		
	Lower bound (90% conf.)	Estimate	Upper bound (90% conf.)	Lower bound (90% conf.)	Estimate	Upper bound (90% conf.)	Lower bound (90% conf.)	Estimate	Upper bound (90% conf.)
Thermostat	2%	6%	10%	8%	14%	20%	2%	6%	10%
	source: ETO Gas Nest study			*source: ETO ASHP Nest study*			*source: assume same percentage savings as heating (from run time reduction)*		

CO2

In 2016, BPA created a CO2 Action Plan with input from RETAC. The draft plan is posted on ConduitNW. https://conduitnw.org/Pages/File.aspx?RID=3318

At the April meeting, BPA will lead a discussion about CO2 heat pump water heaters. We will discuss the technology readiness, region program offerings, manufacturer needs and concerns, and BPA program interest and readiness. This will be another opportunity to test the RETAC 2.0 framework for this product.

READINESS LEVELS - RETAC 2.0

Market/Commercial Readiness	Level 1	Level 2	Level 3	Level 4	Level 5
supply chain maturity/product availability	Not commercially available or limited, pre-commercial availability	Commercially available outside of NW; Requires special order in NW	Commercially available in NW from 1 manufacturer through standard channels.	Commercially available in NW from at least two manufacturers; Stocked throughout region	Commercially available from 2+ manufacturers, well developed supply chain; Widely and easily available
presence of market failures/ lack of market maturity		Existing market not ready, but similar to other successfully transformed markets warranting further efforts; Limited market awareness	Limited market research suggest market failures/barriers and opportunities to intervene; Growing market interest	Market characterization provides details on on barriers and opportunities, some barriers already being addressed; Growing desire for product	Market is starting to function well and appears on path to sustainable, financial viability

Product Performance (based on BPA's Measure Readiness Levels)	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Energy savings viability	Concept not validated Claims of energy savings may not be credible due to lack of documentation or validation by unbiased experts.	Concept validated An unbiased expert has validated efficiency concepts through technical review and calculations based on engineering principles.	Limited Assessment An unbiased expert has measured technology characteristics and factors of energy use through one or more tests in typical applications with a clear baseline.	Extensive Assessment Additional testing in relevant applications and environments has increased knowledge of performance across a broad range of products, applications, and system conditions.	Comprehensive Analysis Results of lab and field tests have been used to develop methods for reliable prediction of performance across the range of intended applications.	Approved (by whom? RTF?) Protocols are established and approved (by reaching RTF "approved" level?)
Fitness for use *RTF measure status(if applicable)*		Planning	Planning	Provisional	Provisional	Proven

Program Readiness	Level 1	Level 2	Level 3	Level 4	Level 5
Cost effectiveness	N/A	Not cost effective, but preliminary analysis shows a pathway to CE	Not cost effective but shows pathway to CE with higher volumes, more competition, improved technology	Marginally at cost effective levels	Cost effective
Program delivery/interventions	No program design	Limited program design	Preliminary program design, small scale pilots	Program design complete, larger scale pilots underway	Ready for full-scale programs.
Risk Assessment (Technical, 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.

NEEA Emerging Technology Report – Q2 – 2017

Emerging Technology Project List						
Technologies	**Description**	**Sector**	**Product Manager**	**Readiness**	**TP aMW**	**Updates**
Advanced HVAC Solution and Roof Top Units (RTU)	NEEA staff is scanning for efficient alternatives to existing roof top units. Past research has explored evaporative cooling and advanced controls. Currently we are testing a systems approach to separating ventilation control from building heating and cooling. The approach includes an efficient Heat Recovery Ventilation (HRV) system for Dedicated Outside Air and a hydronic or variable refrigerant flow (VRF) for building heating and cooling.	Commercial	John Jennings / Charlie Stephens	**Readiness (0-4)** Product – 2 Market – 1 Program – 2 MT Program 2018	85	In the first quarter, the Trapper Creek project was completed and commissioned, with post-conversion blower door and final commissioning adjustments made for this project and the Flathead Electric Libby District Office project. The installation was completed and turned on at the King County International Airport (KCIA, or Boeing Field). This one will be commissioned at the beginning of the second quarter. The Verde Cocina restaurant project in NW Portland was awarded its Energy Trust of Oregon incentives and will be installed in April. The Portland State University project is being modeled with project scope, specifications and estimated energy savings completed before the end of the month. The Ventacity lab in Corvallis is being set up (NEEA is collaborating) for testing a new ventilation zoning system, with early testing expected to be completed by mid-May. Case study updates are being completed for each project with winter data through the end of January.
Dynamic Glass	Dynamic glass is glazing that adapts to changing natural light to lower glare and solar gain. Most are also double pane providing high insulation benefits.	Commercial	Rob Curry	**Readiness (0-4)** Product – 2 Market – 2 Program – 1 MT Program 2019 or later	40	Seattle Integradted Design Lab is conducting a one-year evaluation study of a 90,000 SF six story UNICO office building in Seattle with electrochromic primary window replacement manufactured by VIEW. This (successful) study is now complete. A draft case study is being reviewed and will be published in Q2.
Extended Products for Motor Driven Systems	Integrated motor systems with optimized performance to a system curve. Includes motor, controller, and fan / pump / compressor combinations.	Commercial / Industrial	Geoff Wickes	**Readiness (0-4)** Product – 4 Market – 2 Program – 3 MT Program 2017	150	Circulator water pumping systems received unanimous approval on March 21 for provisional energy savings from the Regional Technical Form (RTF). NEEA staff is continuing to participate actively with the American Council for the Energy Efficient Economy (ACEEE) and industry market actors to expand this approach to compressors and fans. NEEA staff are also preparing to request a new program be formed to support market transformation efforts with motor systems. The request will likely be submitted to the Regional Portfolio Advisory Committee (RPAC) in Q3.

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Technologies	**Description**	**Sector**	**Product Manager**	**Readiness**	**TP aMW**	**Updates**
Pump Operator Certification	Certification for pump operators who demonstrate mastery of efficiency.	Industrial	Geoff Wickes	**Readiness (0-4)** Product – 0 Market – 2 Program – 0	20	Hydraulic Institute (HI) has completed Pump System Assessment training course and certificate was released September 2016. Since that time 10 certificates have been issued for pump system assessment. NEEA staff is exploring ways to test if a link between a Pumps System Assessment Profession (PSAP) and energy savings exists.
Compressed Air Saving Unit	This is an add-on product to compressed air systems. It reduces air consumption by interrupting air flow through engineered air nozzles.	Industrial	Geoff Wickes	**Readiness (0-4)** Product – 2 Market – 2 Program – 2 MT Program 2017	8	Based on the result of an early assessment of the Air Saver Unit by Parker Hannifin, NEEA staff is preparing to request that a new program be started to support market transformation efforts for this product. NEEA staff expect to request this from the Regional Portfolio Advisory Committee in Q3.
Combo Hot Water & Space Heating – Ductless Heat Pump (DHP) Includes Carbon Dioxide (CO2) heat pumps	Leverage inverter-driven heat pump technology for space conditioning and domestic hot water.	Residential	Dave Kresta / Charlie Stephens	**Readiness (0-4)** Product – 1 Market – 1 Program –2	194	Mitsubishi combo product has been delayed due to Rheem exiting the partnership. No timeline for commercialization as of March 2017, and NEEA staff has heard that the product is on hold while a new team takes over the product category. BPA/ Washington State University (WSU) field- and lab-testing of a new Sanden "EcoRuno" combo system from Japan is underway.
Advanced Water Heater systems	Water heaters that don't fit the integral product covered by the federal standard. Includes split systems.	Residential	Dave Kresta/ Geoff Wickes	**Readiness (0-4)** Product –1 Market –1 Program – 3 MT Program 2017	354	Product is available in the Northwest and North America in general. RTF issued a "Planning" status on the Tier 4 Sanden product but it is currently challenged by the cost effectiveness. NEEA staff plan to publish the Advanced Water Heater Specification qualified products list after the working group has a chance to review the reports. NEEA staff is preparing a proposal, that split system water heaters to be included into NEEA's portfolio as a part of the heat pump water heater program, for the Regional Portfolio Advisory Committee (RPAC) that will be reviewed in 2017. The Sanden split system CO2 water heater is now listed on the Advanced Water Heater qualified products list.
Window Attachments	Automated Cellular Shades and permanently installed operable Low-e high performance storm windows	Residential	Rob Curry	**Readiness (0-4)** Product – 3 Market – 4	100	NEEA staff is preparing a proposal, that residential window attachments to be included into NEEA's portfolio as a part of the commercial window attachment program, for the

Emerging Technology Project List						
Technologies	**Description**	**Sector**	**Product Manager**	**Readiness**	**TP aMW**	**Updates**
				Program – 3 MT Program 2017		Regional Portfolio Advisory Committee (RPAC) that will be reviewed in 201 Both products are focused on national energy ratings developed and maintained by the Attachment Energy Rating Council.
Next Generation/UHD TVs	4K Ultra High Definition (UHD) TVs with various forms of High Dynamic Range (HDR), wide color gamut, smart features are quickly gaining consumer market share. The current US Department of Energy (DOE) test method contains gaps and loop holes and does not adequately test the next generation technologies. Several new display technologies unique from LED back lit LCDs are emerging.	Residential	Nick Leritz	**Readiness (0-4)** Product – 2 Market – 4 Program – 4 (in Retail Product Portfolio)	57	DOE has issued a pre-publication Federal Register advance notice of proposed rulemaking (ANOPR) pertaining to the test procedure for television sets (January 19, 2017). DOE is seeking to determine if the existing TVs test procedure needs to be amended to ensure that a TV is configured for testing during a representative use cycle or period of use. ENERGY STAR Version 8 development process is being finalized in May 2017 to go into effect in 2018.
Connected Thermostats	Residential thermostats that control various heating and cooling equipment, utilize weather and occupancy data to better manage the systems, and engage homeowner to more closely manage energy use and comfort.	Residential	Dave Kresta	**Readiness (0-4)** Product – 3 Market – 4 Program – 4	226	No updates. RETAC will be convening a group to discuss collaboration around tstats, and the Consumer Products Regional Market Strategy has identified it as a priority product.
Ductless Heat Pump Product Innovations and Channel Developments	Quick connect ductless heat pumps (DHP) are common in other parts of the world. They enable end users or contractors to install a DHP without having a refrigerant license. Exploration of new market channels direct to General Contractors and Electricians.	Residential	Geoff Wickes	**Readiness (0-4)** Product – 2 Market – 3 Program – 3	100	Four test units have been installed in the Portland Metro. Initial results look very promising. Leak tightness testing will continue for one year with regular check ins to verify performance. 75 day leak test completed with no leaks detected.
Pivot Commissioning	Pumping energy is used to compensate for poorly maintained pivot systems. NEEA staff are exploring ways for growers to monitor pivot performance to achieve maximum efficiency of current equipment.	Agricultural	Geoff Wickes	TBD	10	The Project is still on hold pending the release of the BPA Market Characteristic Study and the updated Scientific Irrigation Scheduling (SIS) analysis. NEEA staff will start working with the new BPA Lead David Lee as soon as he gets up to speed after Jennifer Eskil's retirement.

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Technologies	**Description**	**Sector**	**Product Manager**	**Readiness**	**TP aMW**	**Updates**
Inverter Driven Packaged Terminal Heat Pumps (PTHP), Package Terminal Air Conditioners (PTAC)	PTACs and PTHPs that used the same inverter driven compression cycles that DHPs use. Potentially quieter and capable of operating at lower outdoor air temperatures (OAT)s than current options.	Residential, small commercial	Christopher Dymond	**Readiness (0-4)** Product – 1 Market – 3 Program – 2	TBD	Preliminary investigation of current equipment manufacturers, and distributors. Only a few 9,000-15,000 Btuh options currently available – cost roughly $1.1k @. Potential do-it-yourself system with that uses 120V source could be great option for motels, manufactured homes and apartment buildings.

TP – Technical potential – maximum possible savings over 20 years MS – Market Share

Emerging Technology Strategic Activities					
Strategies	**Description**	**Sector**	**Product Manager**	**Next Milestone**	**Notes**
Automated Measurement and Verification (M&V) (Used to be Low Cost Whole Building Energy Metering); also incorporates industrial, commercial and residential energy management information systems (EMIS)	Exploring how low cost sensors and / or improved analytics can be used to reduce the cost of measurement and verification of savings	All	Nick Leritz John Jennings	Completion of three-year study of Bullitt foundation building's use of an advanced energy management system. 2018	The energy efficiency power purchase agreement between Seattle City Lighting and the Bullitt building in Seattle reached its first year milestone. EnergyRM's DeltaMeter demonstrated promising performance against an independent model and actual energy use. An explanation of the project can be found here. http://www.meetscoalition.org/pilot-projects/. An independent evaluation requested by Seattle City Light of NEEA's Validation process used at Bullitt was completed in December. Data collection and validation work continues into 2017.

Unsolicited Proposals – Received in the last quarter.				
Date Received	**Title**	**Sector/Description**	**Decision**	**Explanation of Decision**
1/2/2017	Minimize Loss in electrical power distribution network without any investment	This proposal was for power distribution systems to reduce losses and to integrate renewables.	Not a fit for NEEA	This technology is for limiting losses in distribution networks which is out of scope for NEEA. Forwarded to BPA for consideration
2/15/2017	Space Solar Power	Developing power in space and transferring to Earth	Not a fit for NEEA	Electric generation is out of scope for NEEA.

Technologies / Projects - Moved from Scanning or incorporated into another project					
Title	**Description**	**Sector**	**Product Manager**	**Technical Potential for Savings**	**Status**
Clothes Washers	Field data revealed washers test procedure does not adequately estimate the remaining moisture (and consequently drying energy needed). We can improve the test procedure and pursue greater savings.	Residential	Christopher Dymond	36	Removed from active scanning. No clear research plan at this point.