

Highlights from the E3T 2015 Commercial HVAC Technical Advisory Group (TAG #11) Phase I

Overview

The purpose of the 2015 Commercial HVAC Technical Advisory Group (HVAC TAG) is to help scan, screen, and score the most promising energy efficient technologies (ETs), which are then further assessed by BPA. The TAG output helps to guide BPA in identifying the most promising technologies that may eventually become incentivized measures for BPA customers: publicly owned utilities throughout the Pacific Northwest region.

The HVAC TAG focuses on technologies that reduce electric resistance heat in the commercial sector, with an emphasis on existing technologies that currently have limited market share. We focused on retrofit technologies, not on technologies that are applicable only in new construction or those that have already been well assessed by BPA. While HVAC technologies may not be evolving as quickly as lighting and electronic technologies, they have changed enough since the last HVAC TAG, held five years ago, to warrant another TAG on the topic.

Meetings were held via online webinars, and included two presentations of top-rated technologies. These presentations offered educational opportunities to TAG members, as well as to the public and BPA stakeholders. Communication with TAG members was accomplished using the TAG Portal on the E3TNW.org website, where announcements and documents were shared, as well as through a dedicated discussion Listserv.

This was the first TAG to be held after TAG process guidelines were finalized by BPA in early 2015. Care was taken to follow those guidelines as closely as possible.

TAG Steering Committee

BPA provided a steering committee comprised of staff members from BPA Programs, the E3T team, and PEJD Engineering Services:

- Debra Bristow
- Erik Boyer
- Mira Vowles
- John Wilson
- Chris Wolgamott
- Rick Hodges
- Keshmira McVey

This steering committee was set up to help guide the TAG process so that end results would advance the plans and needs of BPA Programs staff. These staff members will then, hopefully, be able to move some of the selected technologies into utility conservation programs and effectively promote adoption in the region.

The steering committee serves a number of functions:

- Help guide the development of the TAG plan
- Nominate some prospective TAG members
- Select the technologies to be presented to TAG members at the scanning meeting
- Participate in TAG meetings
- Select the technologies rated by the TAG to be researched further and scored

The steering committee encouraged greater participation by key stakeholders at BPA, which is vital to the ability of the TAG to provide useful information to BPA. The three most relevant groups within BPA and three of the BPA offices were well represented on the committee and provided valuable support.

TAG Members

A vigorous recruiting effort resulted in 28 members of the TAG – they included an outstanding collection of senior-level decision makers from top regional and national research organizations, utilities, and private companies working on new and emerging HVAC technologies. Participation was voluntary, and yet contributions from these nationally recognized experts were outstanding. In addition, six members of the BPA Steering Committee and four BPA staff regularly attended meetings. TAG members included:

- 2 from utility organizations,
- 7 from utilities,
- 14 from research organizations, and
- 5 from manufacturers, vendors, and consulting firms.

Organizations represented by members included:

- ACEEE
- Benton Rural Electric Association
- California Institute for Energy and the Environment
- CLEAResult
- E Source
- Ecotope
- Electric Power Research Institute
- Energy Trust of Oregon
- Johnson Air Products
- Lawrence Berkeley National Lab
- Lockheed Martin
- MacDonald-Miller Facility Solutions
- National Renewable Energy Laboratory
- Northwest Energy Efficiency Alliance
- Northwest Power and Conservation Council
- Oregon Trail Electric Cooperative
- Pacific Northwest National Laboratory
- Puget Sound Energy
- Sacramento Municipal Utility District
- Seattle City Light
- Sky Heating
- Snohomish County PUD
- Southern California Edison
- Trane
- Western Cooling Efficiency Center
- WSU Energy Program

TAG Process Chronology

Planning

WSU staff worked closely with the BPA HVAC TAG Steering Committee, particularly Debra Bristow, who is the BPA TAG Lead, to plan the TAG.

It was clear from the start that the committee was especially interested in soliciting feedback on how to more effectively engage utilities and their end-use customers so that they would adopt more of the commercial HVAC technologies already incentivized. This was a departure from recent TAGs. After some discussions, it was resolved that there would be two phases to the TAG: Phase I would focus on the technologies, and Phase II would focus on the programmatic aspect of utility promotion. TAG members were recruited to focus only on Phase I, yet it is anticipated that many of them would be willing to continue with Phase II.

TAG members who have expertise in commercial HVAC topics were recruited from previous TAG participants, specialists known by WSU staff, and others as suggested by steering committee members.

The steering committee reviewed the list of existing commercial HVAC technologies in the E3TNW database and selected 16 to present to the TAG as a starter set.

Scanning

The 2015 E3T Commercial HVAC TAG first convened March 10, 2015. Attendees included 19 TAG members and seven BPA steering committee and staff members. TAG members suggested 17 additional technologies, seven of which were already in the E3TNW database but had not been selected for the TAG. Of these 17 technologies, 13 were selected to add to the TAG list of ETs, including six already in the database and seven that were added to the database.

Rating

TAG members rated the 30 technologies on a scale from 1 to 5, with 5 being the highest. Out of the top ten highest-rated technologies, the committee selected six to receive additional attention.

Presentations

TAG members were recruited to make presentations on the six selected technologies at two webinars. Video archives of both of these excellent presentations are available on the TAG Portal on E3TNW.org.

April 8 (18 TAG members in attendance):

- ECPM Motors for Single-Phase HVAC Fan Applications
- Circulating Hot and Chilled Water Pumps with Variable Speed ECPM Motors
- Q-Sync Motors
- High-Volume, Low-Speed Fan Technology

April 14 (14 TAG members in attendance):

- Variable Refrigerant Flow (VRF) Heat Pumps

- Variable-Speed Split System Heat Pump

There was some confusion about the Q-Sync motor. While it received a lot of marketing buzz, it became clear when some research was performed that no products were currently available that would be useful in commercial HVAC systems. Therefore, it was mentioned briefly in the webinar and was not scored.

Scoring

Following these webinars, TAG members scored these five technologies in five separate areas, as follows.

SCORES <i>(average ratings)</i>	ET# 101 ECPM Motors for Single-Phase HVAC Fan Applications	ET# 200 VRF Heat Pumps	ET# 291 Circulating Hot and Chilled Water Pumps with Variable Speed ECPM Motors	ET# 332 Variable- speed Split System Heat Pump	ET# 620 High-volume, Low-speed Fan Technology
Energy savings	3.7	3.3	3.9	2.9	3.5
Non-energy benefits	2.8	2.9	3.3	2.4	2.8
Tech readiness	3.4	3.9	3.4	3.8	3.6
Adoption ease	2.6	2.9	3.2	3.9	2.7
Value	2.9	3.1	3.2	2.4	3.3
Average	3.1	3.2	3.4	3.1	3.2

Ranking per criteria	ET# 101 ECPM Motors for Single-Phase HVAC Fan Applications	ET# 200 VRF Heat Pumps	ET# 291 Circulating Hot and Chilled Water Pumps with Variable Speed ECPM Motors	ET# 332 Variable- speed Split System Heat Pump	ET# 620 High-volume, Low-speed Fan Technology
Energy Savings	2	4	1	5	3
Non-energy benefits	3	2	1	5	4
Tech readiness	4	1	5	2	3
Adoption ease	5	3	2	1	4
Value	4	3	2	5	1
ET Ranking	5	2	1	4	3

All five of the technologies received high enough scores to be recommended to BPA; the traditional threshold for that is 2.9.

Final Meeting

The TAG's final meeting was on April 29, 2015. Attendees included 17 TAG members and nine staff members from BPA. A synopsis of discussions is as follows:

- Variable-speed split systems have received a lot of investment in the region and good applications are ubiquitous. However, they rated lower possibly because the presenter, Jon Heller, emphasized that duct losses would still be an issue. Harvey Sachs noted that this could be avoided with better duct sealing (ACCA-5). There was some interest in a demonstration of abandoning existing ductwork and installing ductless heat pumps.
- There was some disagreement as to how common variable speed controls were on HVAC circulating pumps.
- It was acknowledged that ECPM motors on fans require programming that can be problematic, so it is better if these motors are part of an OEM package. ECPM fans are starting to be required for many applications.
- TAG members chose VRF and variable speed split systems as the overall winners.

Rob Penney asked TAG members for input on utility programs that effectively promote new HVAC technologies. Who offers them and what makes them effective? TAG feedback includes:

Challenges with utility programs:

- Lack of outreach
- Lack of knowledge about which technologies are good
- Programs change too frequently and frustrate "boots on the ground" staff
- HVAC just more complicated and expensive to deal with

What to do in utility programs:

- Simplification – use assumptions and estimates with calculations and provisionally deemed measures to get contractors to promote the ETs so they become more mainstream, then adjust down the road as needed
- Provide design guidelines (mandatory?)
- Provide higher incentives
- Incentivize distributors to stock more equipment locally
- Provide expert coaches for designers

Examples of utility programs:

- ETO starting VRF field studies for new construction
- EWEB has a program for VRF
- SnoPUD has four or five new VRF projects and used mid-stream incentives to get distributors to stock locally
- Harvey Sachs used expert coaches (mid-stream)

Air NW:

- Most thought it will be useful

Next Steps

- Plan and implement HVAC TAG Phase II