



2009 BPA E3T Lighting Technical Advisory Group Final Report

December 2009

This report summarizes results of the one-day reunion meeting of the Energy Efficiency Emerging Technology (E3T) program's Lighting Technical Advisory Group (TAG), convened on December 1, 2009, via webinar and telephone conference and a subsequent confirmation call held December 22, 2009, at which TAG measure recommendations were finalized. The main goal of these meetings was to score five lighting measures that received high rankings in the spring sessions of the TAG, and to make recommendations.

This progress report includes:

- A list of participants in the reunion meeting and in the subsequent confirmation meeting held December 22, 2009
- An update of the E3T process and progress of the Lighting TAG
- Graphics detailing the measure scoring results from TAG members' surveys
- TAG recommendations for the five measures

Previous Work

In early 2009 the E3T Program recruited highly qualified and experienced lighting specialists to serve on the Lighting Technical Advisory Group (TAG). Two TAG meetings were convened, one in Portland on Monday, March 16, and one held in Olympia on Thursday, April 16. During those meetings participants used a facilitated brainstorm process to create a list of promising measures not yet widely adopted in the Northwest. Participants then voted on a list of measures that combined brainstorm items with other measures from the Regional Technical Forum process. An earlier Progress Report distributed to TAG members in July describes the initial work in more detail.

From those lighting measures receiving the most votes, five were selected by E3T staff for further review in the reunion meeting. All high scoring measures may potentially be considered in future TAGS. The five measures selected were:

- Wireless Lighting Controls
- Integrated Classroom Lighting System
- Bi-Level Parking Lighting with Occupancy Sensors
- Bi-Level Stairwell Lighting with Occupancy Sensors
- Bi-Level Office Lighting with Occupancy Sensors

Framework Tools

During the summer of 2009 the Framework for the E3T process was completed. The Framework is used as a guide for the E3T process, with which staff, TAG members, and others identify, rank, score, select, and assess emerging energy efficiency technologies. Prior to the reunion meeting, TAG members and E3T staff members drafted extended descriptions for each of the five initial technologies on Measure Information Identification forms ("D1s"). Another survey tool from the Framework, the Measure Benefits – TAG Scorecard ("D3") was adapted for online electronic collection and analysis.

Prior to the reunion session, a group of E3T staff members and regional energy efficiency professionals was convened in a phone conference and webinar format to review the survey questions and the D3 online tool, essentially a trial run with an opportunity to assess aspects respondents might find unclear. The most significant change emerging from that test was to split a question asking about energy and demand savings into two questions. Additional comments were received including several noting that the ranges of payback timelines in the answers were not extensive enough and were weighted too heavily to near-term options.

Reunion Meeting

Lighting Technical Advisory Group

December 1, 2009 Reunion Participants and Guests

NAME	ORGANIZATION	LOCATION
Jack Callahan	BPA Energy Efficiency	Portland, OR
Craig Ciranny	BPA Energy Efficiency	Portland, OR
Larry Giardina	City of Ashland	Ashland, OR
Charlie Grist	NW Power and Conservation Council	Portland, OR
Ira Krepchin***	E Source Technology Assessment Service	Boston, MA
Michael Lane***	Lighting Design Lab	Seattle, WA
Jonathan Livingston ***	Livingston Energy Innovations	Mill Valley, CA
Peter Morante	Lighting Research Center	Troy, NY
Rob Penney**	WSU Extension Energy Program	Olympia, WA
Jeff Smith ***	e2co	Boise, ID
Joseph Vaccher	Eugene Water & Electric Board	Eugene, OR
Jon Van Stone	e2co	Boise, ID
Cindy Wills	WSU Extension Energy Program	Olympia, WA
Jack Zeiger*	WSU Extension Energy Program	Olympia, WA
Danielle Gidding	BPA Planning	Portland, OR
Carrie Nelson	BPA Planning	Portland, OR
Jeff Harris, guest	Northwest Energy Efficiency Alliance	Portland, OR
Mark Rehley, guest	Northwest Energy Efficiency Alliance	Portland, OR
* served as facilitator	**served as recorder	*** served as presenter

Prior to the December 1 reunion meeting, TAG members were given instructions for online access to Measure Information Identification forms for basic information on the measures under consideration and to the SurveyMonkey tool designed to emulate the Measure Benefits – TAG Scorecard. Members were asked to fill out the Scorecard survey with the understanding that their answers could be changed after they heard presentations on the measures and TAG discussion during the meeting.

The Reunion meeting was held via a telephone conference call augmented by a webinar allowing all participants to view and share presentations and other visual materials. After introductions, Jeff Harris from the Northwest Energy Efficiency Alliance spoke about regional organizations and efforts related to emerging technology and the opportunities for collaboration among them. Jonathan Livingston updated TAG members and guests about the development of Framework tools since the last session of the TAG and solicited comments on those in use at the session.

The core of the Reunion session was a focus on details of each of the five measures. TAG members and E3T staff gave presentations on each measure. During and after presentations TAG members offered questions and discussion on detailed aspects of the measures in the context of E3T goals. Members were then encouraged to complete or adjust their online Scorecard surveys in light of the discussions. TAG members were also asked to help E3T staff calibrate survey questions by offering feedback. Summary quantitative results of that survey are presented in Figures 1 and 2.

Figure 1. Graphical Representation of Measure Scoring

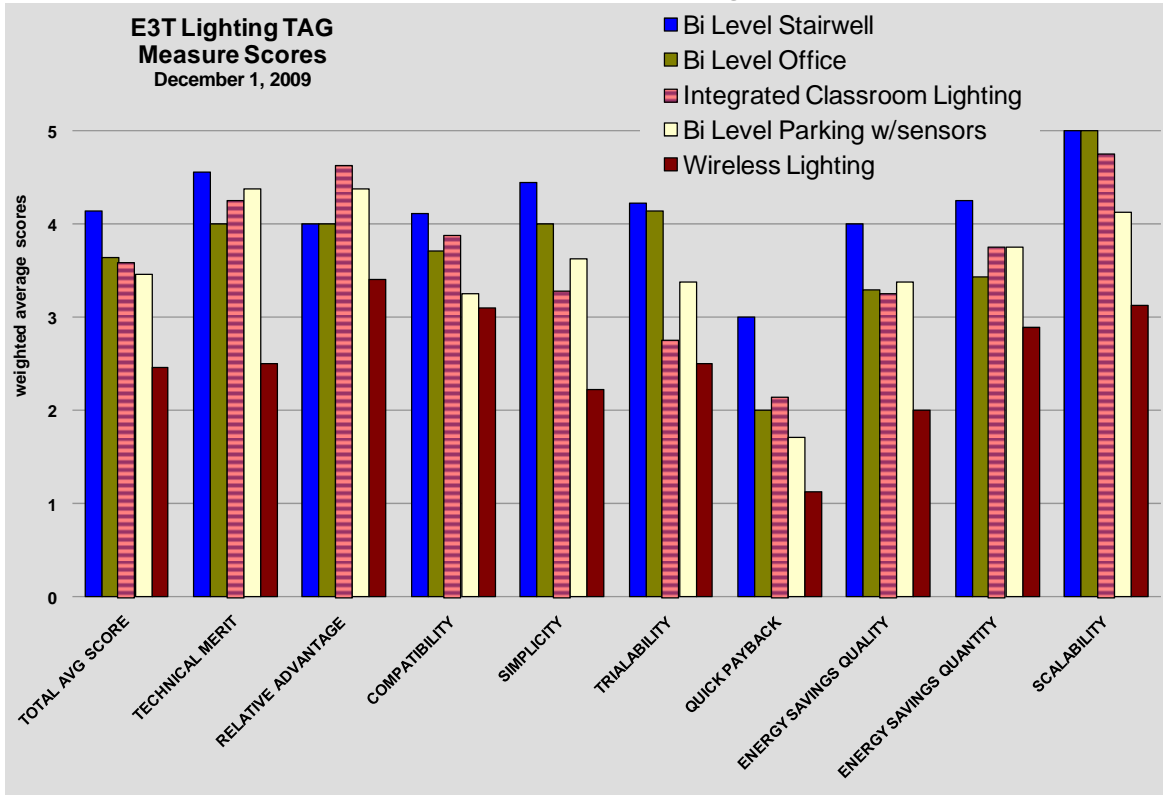


Figure 2. Scoring Detail and Rankings

	Bi Level Stairwell	Bi Level Office	Integrated Classroom Lighting	Bi Level Parking w/sensors	Wireless Lighting
TOTAL AVG SCORE	4.14	3.64	3.58	3.46	2.46
TECHNICAL MERIT	4.56	4.00	4.25	4.38	2.50
RELATIVE ADVANTAGE	4.00	4.00	4.63	4.38	3.40
COMPATIBILITY	4.11	3.71	3.88	3.25	3.10
SIMPLICITY	4.44	4.00	3.29	3.63	2.22
TRIALABILITY	4.22	4.14	2.75	3.38	2.50
QUICK PAYBACK	3.00	2.00	2.14	1.71	1.13
ENERGY SAVINGS QUALITY	4.00	3.29	3.25	3.38	2.00
ENERGY SAVINGS QUANTITY	4.25	3.43	3.75	3.75	2.89
SCALABILITY	5.00	5.00	4.75	4.13	3.13
total score with weighting	53.84	47.29	46.57	44.93	32.00
RANK OVERALL	1	2	3	4	5
TECHNICAL MERIT	1	4	3	2	5
RELATIVE ADVANTAGE	3	3	1	2	5
COMPATIBILITY	1	3	2	4	5
SIMPLICITY	1	2	4	3	5
TRIALABILITY	1	2	4	3	5
QUICK PAYBACK	1	3	2	4	5
ENERGY SAVINGS QUALITY	1	3	4	2	5
ENERGY SAVINGS QUANTITY	1	4	2	2	5
DEMAND SAVINGS QUANTITY	1	3	2	5	4
SCALABILITY	1	1	3	4	5

Confirmation Meeting

Based on the scoring and comments received during the reunion session, recommendations for next steps for each of the five measures were drafted and distributed to TAG members for review.

On December 22, 2009, a one-hour meeting via telephone conference call and online webinar was convened to confirm those recommendations. Those present for the confirmation call are listed in the table below.

Lighting Technical Advisory Group

December 22, 2009 Confirmation Meeting Participants and Guests

NAME	ORGANIZATION	LOCATION
Jack Callahan	BPA Energy Efficiency	Portland, OR
Craig Ciranny	BPA Energy Efficiency	Portland, OR
Larry Giardina	City of Ashland	Ashland, OR
Jonathan Livingston	Livingston Energy Innovations	Mill Valley, CA
Rob Penney**	WSU Extension Energy Program	Olympia, WA
Michael Siminovitch	California Lighting Technology Center	Davis, CA
Jeff Smith	e2co	Boise, ID
Angie Marzano for Joseph Vaccher	Eugene Water & Electric Board	Eugene, OR
Mira Vowles	BPA Energy Efficiency	Portland, OR
Cindy Wills	WSU Extension Energy Program	Olympia, WA
Jack Zeiger*	WSU Extension Energy Program	Olympia, WA
Mark Rehley, guest	Northwest Energy Efficiency Alliance	Portland, OR

* served as facilitator

**served as recorder

The confirmation call afforded an opportunity for TAG members to review consolidated scores for the measures and to offer input to narratives describing the next steps recommended for the measures currently under consideration. Based on that input, the following recommendations were developed.

E3T 2009 Lighting Technical Advisory Group Final Measure Review and Recommendations

Bi-Level Stairwell Lighting with Occupancy Sensors

Overall Score 5.46

There has been enough study of energy savings from this measure to confidently recommend this as an effective energy efficiency measure. This is a good candidate for Fast Track implementation. The calculation of energy savings is straightforward given stairwell occupancy rates, but there are some questions about variations in occupancy rates in various stairwells. Some of the advisory group felt that further study is not warranted, while others felt a need for more extensive occupancy rate data. The main barrier for this measure is cost. At \$200 per fixture, paybacks may range to 15-20 years. Market prices closer to \$100 should be possible with increased market volume, giving this measure an attractive payback. In addition, these prices do not include installation, so questions remain concerning cost-effectiveness for a retrofit, but cost-effectiveness is probably viable for new construction. Another barrier is safety, specifically the assurance of reliable occupancy sensors.

To address the known barriers, the following actions are recommended:

- Develop and recommend a specification to ensure reliable occupancy detection, and to ensure that they are likely to fail "on".
- Perform a literature search to summarize the results of existing studies of energy savings. Use available stairwell occupancy data for different types of buildings to come up with a deemed savings rate for a particular new installation or retrofit.
- Move forward with a larger scale initiative promoting applications in public buildings without further assessment studies of occupancy patterns.
- If warranted after the literature search, install occupancy sensors in a statistically appropriate sample of buildings to fill in the gaps in the data. This should be done concurrently or following a large-scale initiative, not as a precondition.

Bi-Level Office Lighting with Occupancy Sensors

Overall Score 4.74

This is a relatively low-cost measure that can provide 70% savings. Initial reports are very positive, but more studies are needed. The main barriers are lack of application experience, complete performance specifications, remaining questions about cost-effectiveness, and robust estimates of energy savings.

Recommended actions include:

- Do several rapid studies of field installations in collaboration with the California Lighting Technology Center (CLTC).
- Obtain existing specification from CLTC. The specification may require some further development, and be written as a performance specification to accommodate various product solutions.
- Consider an initiative promoting this measure for specific applications, at least for private offices.
- Consider a follow-up study to determine related strategies in open areas.

Integrated Classroom Lighting System

Overall Score 4.73

This measure has good user acceptance and savings are substantial. It is already well-established in new construction in several markets where it has been supported by utility programs, notably in California and New York. Recommendations include:

- This measure should qualify for Fast Track for new construction or major remodels where lighting fixtures are intended to be replaced anyway.
- Cost is a big issue for retrofit applications, so there is a need to investigate the cost-effectiveness for retrofit applications. Perform a literature search of existing products and studies, adjust for NW utility rates and, based on this, define whether there is a strong basis for deemed new construction and/or retrofit rebates for specific product families with specifications.
- Finally, develop a better specification.

Bi-Level Parking Lighting with Occupancy Sensors

Overall Score 4.53

This measure has a good payback, typically 60%-70% savings, and works well. However, this measure needs further assessment. Recommendations include:

- Before spending money on a full assessment, we need to evaluate existing information more fully. Do a full literature search and investigate existing field studies. If further assessment is required, consider bundling the investigation with other bi-level applications (all with one assessment contractor), but treat them all separately. For instance, parking lot and parking garage lighting should probably be assessed separately.
- Develop a specification. The CLTC has a specification they will share.
- Create provisional deemed measures that include collection of occupancy and other key data for continuous improvement.
- Develop an incentive for parking garages separate from parking lots.
- Consider a similar measure for parks, paths, and other outdoor pedestrian applications.
- Monitor new developments and watch for potential partnering opportunities with bi-level street lighting - these are likely to emerge over the next year to 18 months.

Wireless Lighting Controls

Overall Score 3.4

It is probably too early in the introduction of the technology to move forward on this measure at this time. It is not yet cost-effective, and the good applications are still being determined. A recommendation would be to possibly find a particular application that is proving itself in the market and assess it separately.