# Conservation Resources Advisory Committee
## Draft Meeting Minutes
## June 4, 2014

**Meeting Facilitators:** Chair Tom Eckman; Vice Chair Charlie Grist. Participants list attached

Conservation Resources Advisory Committee chair Tom Eckman called the meeting to order at 9:30 a.m. He welcomed the CRAC members and asked for a round of introductions.

Eckman asked if there were comments on the minutes of the November 21, 2013 meeting. Eugene Rosolie made a motion to adopt the minutes. Kevin Smit seconded the motion, which passed unanimously. Eckman gave a brief explanation of the role of the CRAC. He reminded the group that the CRAC is a committee that advises the Council and is not a decision making body.

Eckman moved to the first item on the agenda. BPA along with contractors Navigant and Rob Carmichael developed an assessment of federal appliance standards and the projected savings that will result from them, he said. The presentation will get into the details of the assessment, he said, so ask whatever questions you have about how the numbers were derived. CRAC vice chair Charlie Grist noted there is a large body of analysis on savings achieved from the standards and the CRAC will be asked to comments on them.

### Federal Standards Impacts

Carrie Cobb of BPA led off the presentation, noting that the analysis quantified over 900 average megawatts (aMW) of savings by 2034 as a result of the standards. "That's like a dam got built by federal standards," she stated. Cobb explained why BPA undertook the study, indicating that the Council wants to assure energy efficiency savings occur in the region, and there are several avenues for that to happen. When we started the project, I didn't think the savings would be as big as what we found, she said.

Carmichael, who led the project while at Navigant, provided details of the analysis. He noted that Angie Lee of Navigant also worked on the project. The story here is of the appliance standards program and its impact on the region's savings, Carmichael said.

Nancy Hirsch asked if the analysis looked also at state standards. Carmichael said it addressed only federal standards. Eckman clarified that the standards in the analysis went into effect during the period of the Sixth Power Plan but weren't captured in the supply curves used in the plan. Grist added that an analysis of the state standards is on the "to do" list.

Carmichael said the federal standards will soon be transforming energy consumption in the region. He went on to explain what sector of energy consumers use the roughly 60 to 70 products covered by DOE standards: 79 percent are residential; 46 percent are commercial; and 19 percent are industrial.

Carmichael described how DOE standards are set, a process he called "long and arduous" that takes three to five years. Once a standard is announced, manufacturers typically have five years to comply with it, he said, noting there can be issues with particular products that take them off the typical path. The standards must be revisited every six years, Carmichael added. Eckman pointed out that a standard can never go backwards in terms of savings; it can just go higher.

Carmichael moved to the details of the analysis. We used 19 models that cover about 30 products, he explained. For a couple of market segments, including lighting, you had to model the entire market to see the savings, and the lighting model covered about 10 products, he said. By 2024, these have a huge impact on the region, Carmichael said. The goal of the analysis was to represent what is happening in the region because of the standards, he said, so we tracked two things: the product flow into market and the stock.

Carmichael noted that the amount of change in lighting is exciting. "If you aren't looking at the ceiling in new buildings, you will miss what's happening," he added. The computer models we used show you the impacts of these changes, Carmichael said.

He explained the approach used in the analysis, noting they use the most conservative assumptions. The approach to identifying impact from a standard can be a "roll-up" , a "shift" to or a "switch." Carmichael explained how the three approaches differ. In a roll up, only the inefficient appliances are move to the minimum efficiency. In a shift, the whole distribution of efficiencies shifts. The switch is when the market changes (or switches) and a new technology takes over, Carmichael said.

Mary Smith asked whether the switch step includes fuel switching. Carmichael said it did in the form of price elasticity. Eckman pointed out that if a market moves from roll-up to shift, there are more savings. But with a switch the results could go either way, he said. Eckman asked how the analysts addressed which choice to make.

We looked at what DOE would do and what has happened in the market, for example with refrigerators, Carmichael said. He noted there could be another variation on a switch; for example, a change to a different capacity appliance such as a water heater.

Carmichael went on to explain what happens to the installed stock when a federal standard takes effect. There are appliance failures replaced with the more efficient stock, and at some point, the stock turns over, he said. Eckman pointed out that the measures with short lifetimes have near-term effects, and those with long lifetimes have longer-term effects. Carmichael explained the savings given short-term and long-term measure lives, using the examples of distribution transformers, water heaters and the reflector submarket. He pointed out the differences in when the energy savings occur.

Hirsch asked about the source of the study's assumptions for new construction and gas versus electricity use. Carmichael said the analysis used the Council's Sixth Power Plan assumptions.

Rich Arneson asked whether the efficiency change for water heaters could reflect a switch from electricity to gas. Carmichael said the analysis models electric to electric for water heaters. Arneson asked if there was an attempt to model something other than that switch; for example, a large electric water heater is switched out for two smaller ones. Carmichael said that possibility wasn't modeled.

Carmichael clarified that the standards used in the modeling are the Northwest component of a federal efficiency standard. The analysis also used the most recent Regional Technical Forum (RTF) savings assumptions for a measure.

Carmichael went through steps in the generic look at non-lighting products and the assumptions used. He then explained the lighting model, which is much more complicated and grounded in lumens per square foot. The story with lighting is with LEDs and the assumptions about how quickly they will

penetrate the market, Carmichael said. The analysis looks at what consumers have done and translates those to LED cost curves, he said.

Carmichael moved on to the savings attributed to the federal standards: 107 aMW, 2010-2014; 261 aMW, 2015-2019, a figure that will be included in the Council's Seventh Power Plan; and 541 aMW, 2020-2034.

Tom Eckhardt asked if the analysis gave any consideration to incentives for time of use, and Carmichael said it did not.

Cobb said the final report will be available next month and will be posted on BPA's web page. She said BPA will also post the models, which can then be downloaded, and she said BPA will revisit and constantly improve the analysis using feedback received.

Grist pointed out that one of the take-aways from the analysis is a better understanding of stock and product flow, a big driver of what is in the baseline load forecasts. The pattern over time of how savings accrue is very important since it is what utilities will see, he said. Grist noted that the onslaught of federal standards is something new. If utilities are not taking this onslaught into account, they might not be capturing the impacts, he said.

Grist went on to say there are embedded turn-over rates in the load forecast, and staff wants to use the study results and determine what it means for conservation potential. This will provide a more dynamic picture, he said. The quality of this work depends on looking at the shipment and purchase data, Grist said. We have market dynamics going on and in order to inform what's happening in between building stock assessments, we need this data, he said. One of the "eurekas" from this study is that we have a huge data need if we are going to get our arms around what is going on in these markets, Grist stated.

There were other questions about the analysis. Smith asked if the impact of utility incentive programs is incorporated into the replacement shipments. Cobb said some of the savings, 106 aMW, are already being tracked or included in programs. When utilities report lighting savings from their programs, most use "as found in the ceiling" to calculate the baseline, Grist said. In the Sixth Plan, we didn't use what was in the ceiling, we included a stock turnover assumption, he said.

Carmichael said the analysis underscores the need for data collection. Grist said for each of the computer models and products, there is a story with many things in play. He noted that the models are detailed and would benefit from others looking at them.

Hirsch asked if the Council intends to resolve the difference between utility and its own planning baselines in the Seventh Power Plan. Grist said BPA has changed its savings calculator to the Council baseline.

Lauren Gage asked about the standards process historically. Are we seeing lots of new standards? she asked. Eckman said that was the case. There were three standards adopted in the Clinton Administration, and more recently, there have been 26 since 2009.

Ralph Cavanagh noted there is tremendous movement on federal efficiency standards, which are part of President Obama's climate action plan.

Carmichael went on to explain the details of the computer modeling, beginning with the residential stock model. He listed the assumptions pertaining to such things as stock growth and new construction, and described the process the analysis used for tracking the data with workbooks and work sheets.

Rosolie asked if the assumptions were corrected for actuals. Carmichael explained how the assumptions were derived via calibration and back casting.

Hirsch noted that the results suggest where to focus marketing for the most impact. The replacement column swamps the new construction column in terms of where the impact will be, she said.

Grist commented on the difference between the federal standards and state codes. "Which caused what" is almost impossible to determine, he said, adding there is also overlap in the impacts. In every DOE rulemaking, we have this discussion, Carmichael noted.

Eckman said the virtue of the standards is that they reach into the replacement market; that is where they have their effect. A certain percent of the stock turns over and the standards capture that, he said. It is a huge benefit, Eckman added. Carmichael said the ratio is 70-20-10 percent for replacement, new construction, and retrofit savings.

Carmichael went on to explain the model used for distribution transformer savings and the assumptions incorporated that relate to shipments, loss factors (efficiency level), survival rate of transformers, and load growth. He noted there is a wide range of transformer types and capacity. It is important to realize that distribution transformers drive the efficiency savings, Carmichael added.

We shouldn't treat these standards as though they are pressing the end of the envelope, Cavanagh commented. Developing the standards was a contentious process and the result wasn't cutting edge, he said. The bottom line is that there is ample room for programmatic savings beyond the standard, Cavanagh stated. DOE takes into account a lot of factors, including the impact on manufacturers and costs, Grist added.

For utilities, it is difficult to justify a program when the savings are minimal, Rosolie stated.

Eckman said the spreadsheets from the analysis will be available for anyone who wants to dive into them. This has been a big effort and it's a really detailed assessment, the first time ever we have gone this deep, he said. It's important for you to take a look at this and see the effect on your locale, Eckman said, adding that it changes the direction of some opportunities.

Arneson asked if the analysts checked the size reduction and efficiency changes of distribution transformers with utility designers. Carmichael said they had not and used DOE's assumptions.

Grist said that in the study, there is a change in the power that flows through a transformer but not the size of the transformer. There were distribution and transmission engineers who participated in the rulemaking, and this was looked at, he added.

Jeff Harris commented on the heat pump water heater (HPWH) assumptions and the association of HPWHs with climate zone. It is a real possibility people will choose another alternative based on climate zone, he said, and it's estimated that over 30 percent will go to another solution.

Fred Gordon asked whether the analysis is reporting on the direct impact of the code or whether there are upstream impacts above code included. Carmichael said 95 percent of the savings are the code and there is not an aggressive assumption about how the market will respond.

Cobb said BPA will develop a user guide for the models. You can plug in your own numbers for the calculation of savings, Carmichael added.

## CONTRIBUTION OF FEDERAL STANDARDS TOWARDS SIXTH PLAN TARGETS

Eckman explained that after the report on federal standards savings came out, Council staff compared the results to the Sixth Power Plan targets for 2010-2014 and 2015-2019. The savings will meet a portion of the savings in those periods, diminish the need for programs to target them, and reduce the load forecast going forward, he said. There will be less load growth and less conservation potential, Eckman said.

Cavanagh suggested staff call out the contribution of the standards in the Seventh Power Plan; it is part of the energy efficiency program in the region. We enumerate changes that have occurred since the previous plan so people can see how much conservation has been developed, Eckman said. Given the magnitude of this effect, we will want to highlight it, he agreed.

Cavanagh pointed out that people in the Northwest made a material contribution to the results. They are part of the conservation potential and the region made a contribution to achieving the savings, he said, adding that because of the standards, the savings don't have to be achieved through the region's programs.

Grist said it is also important to recognize we are not done yet. Many of those standards wouldn't have happened without the precursor utility programs that showed that the measures worked, he said.

Cavanagh said it is important to recognize the standards since there could be efforts to roll them back.

Gordon said ETO will probably do something that uses the numbers. He also said CRAC should talk about how to reframe the data for load forecasting. Eckman agreed the message to the public should be clear in terms of attribution and the benefits of the standards.

Grist began a presentation on the contribution of the federal standards toward the efficiency goals in the Sixth Plan. The plan called for almost 6,000 MW of efficiency over 20 years, he said. The targets in the plan were 1,200 aMW over five years and 5,845 aMW over 20 years, Grist said. He presented a graph depicting the estimated timing for how the savings could be achieved.

The federal standards generally apply to the lost-opportunity portion of savings, Grist explained, noting the estimated split between retrofit and lost-opportunity from 2010 to 2030. He listed the categories of savings that count toward the standards, including market induced, codes and standards, market transformation, programs, and non-programmatic savings

Grist went next to the savings that have been achieved annually through 2013 categorized by retrofit and lost-opportunity. And he presented goals from the Sixth Plan and estimates of where the savings would be derived in the first and second five-year periods. The question staff addressed is the proportion of savings that will be achieved as a result of the federal standards, Grist said.

He presented the projections about where staff thinks the savings from standards will accrue, stating that the largest savings will be from residential water heating and refrigeration. The contribution from five residential standards that take effect by 2015 are just under 350 aMW by 2029, Grist said. Most of the savings will occur in the second five years, 2015 to 2010, because that is when the standards kick in, he said. We are looking at a slower pace of savings through 2026 and then there is a drop because the stock has cycled through, Grist said.

There were clarifying questions about the graphs and what is included in the data.

Grist moved on to savings projected for the commercial and industrial sectors as a result of eight federal standards. The savings, which accrue from appliances such as commercial washers and walk-in coolers and freezers, are expected to be 280 aMW, he said. Grist explained the savings contribution from each of the eight measures, noting that distribution transformers are far and away the biggest driver of the savings.

Chuck Murray of the Washington Department of Commerce noted that Washington's codes include the federal standards so there is an enforcement mechanism.

Grist next explained the savings from seven lighting standards that have taken effect since the Sixth Power Plan. The lighting savings from the standards that go into effect by 2015 are over 155 aMW by 2029, he said. A lot of the savings are in fluorescent tubes and ballasts, and halogen reflector lights, Grist pointed out. He showed the estimates for annual acquisitions and noted that federal lighting standards have the greatest near-term impact because lighting equipment has a short lifespan.

The next graphs showed the combined acquisitions of residential, commercial, and industrial standards. Federal standards are estimated to save just over 100 aMW by 2014 and an additional 265 aMW between 2015 and 2019, Grist said. The numbers are out there for your review, he added.

On a cumulative basis, the total savings forecast from federal standards add up to 780 aMW by 2029, Grist said. There will be overlap between these savings and savings from the state codes, and we will try to parse these out, he said. It looks like one quarter of the lost-opportunity savings in the Sixth Plan are achieved by federal standards, Grist clarified. If things stay the same for the Seventh Plan, forecasts will be less than they would have been, he said.

The next graph was the regional retrofit and lost-opportunity savings goals in the Sixth Plan net of the standards. This is still a robust target net of standards, but their contribution diminishes utility costs significantly since conservation savings will already have been achieved, he said.

Grist offered several caveats, among them that the savings estimates are subject to further review and there is overlap between state codes and federal standards. He also said interaction between the codes and standards haven't been accounted for in the analysis. It isn't a giant effect but it is an effect, Grist said. As we tackle savings from different directions, there are interactions that change the savings potential, he added.

Next up, Grist said, is to update the progress towards the Sixth Plan targets. These include adjusting utility-reported savings and identifying incremental non-program savings, he said, noting that BPA

research shows that people are purchasing more efficient items outside utility program. Other activities include accounting for overlap and interactions in the progress toward targets, Grist said.

We hope to have a compilation of the aggregate performance in the region as a result of programmatic and non-programmatic activity, Eckman said. The federal standards study will contribute to calibrating the Seventh Plan starting points, he said.

You might also assume acceleration rates from these standards, Hirsch commented. There is a discussion to be had about that, Eckman responded, posing questions such as: How far in advance of a known standard do you run programs? What is the best use of money and where to target resources?

Gordon stated a caution about making sure to recognize that programs are an influence in markets.

### Emerging Technology Appraisal

Grist opened the presentation with a slide from Cadmus on emerging technologies. When we did the Sixth Power Plan, there were new technologies to consider and there was a spirited conversation about whether and how fast we could achieve them, he said. Cadmus looked at the first two years of achievement in five areas where there were new technologies and compared them to the projections, Grist explained. This slide reminds us that the region has mounted a good response to new things that were included in the Sixth Plan and has done great work in capturing new stuff, he said. Next, we will see what NEEA is seeing in the way of conservation potential for the Seventh Plan, Grist said.

**Mark Rehley of NEEA** reiterated that the region has made good progress on things in the Sixth Plan. He listed the technology opportunities from the Sixth Plan and said the region is ahead of the game for the Seventh Plan. We have already gotten things going with commercial and small industrial Strategic Energy Management (SEM), LED Lighting and residential behavior, Rehley said.

He noted the technology opportunities with lighting, pointing out that it is an example of getting more efficiency in terms of the energy in and the light output. We are on a similar trajectory with electric space heating, where the market is going to heat pumps and variable heat pumps, Rehley said, adding that there is lots of potential.

In categorizing the opportunities, he used the analogy of catching waves of opportunity and being caught in riptides that pull you in another direction. As an example of a wave, he pointed to what occurred with flat screen televisions in the Sixth Plan. When the Sixth Plan came out, there was trepidation about the move to flat screen TVs and the way they were increasing load, Rehley said. But there was a wave occurring with people replacing TVs more frequently as new screen sizes and technologies became available, he said. That turnover afforded an opportunity for injecting a technology into the marketplace that would have a big impact, Rehley explained. The Northwest and California partnered with national “big box” retailers, who control 80 percent of retail sales, to move toward stocking Energy Star products, he said. As a result, consumers bought Energy Star products because that was what was available in the stores, Rehley said.

He said new waves could include “the connected home,” adding that Google, Nest, and Apple are involved in a lot of activity to get “real estate within the house” to offer new services. We want to see if there is a place to interject energy efficiency into this wave, Rehley said. There are a lot of risks here

with the potential for many devices to be connected that could increase load; on the other hand, there will be the potential for lots of data to be collected about energy use, he said.

Rehley used the example of clothes dryers as a possible rip tide. He explained factors that would stand in the way of increasing the energy efficiency of clothes dryers, even though there is considerable savings potential with the heat pump dryer.

CRAC members had comments about the dryers. One member suggested the condensing washer/dryer combination could catch on with apartment dwellers, where there is less space for a traditional washer and dryer installation. Harris pointed out that one of the challenges with market transformation is the need to think in terms of market segments. Increasingly, we need to work on how to apply things to particular market segments and keeping the market context in mind is important as we go to the Seventh Power Plan, he said.

Rehley went on to list other promising opportunities for energy efficiency in the residential, commercial and industrial sectors. He also described action plans "to catch a wave" in each of the sectors. There is a lot of "rip tide" momentum that would drive us the other way, Rehley said. We have to commit to supporting the long term, consistent investment that's needed to address the riptides, he concluded.

Hirsch asked if more work will be done to incorporate behavioral approaches to efficiency savings into the Seventh Power Plan. Eckman said there are some behavioral measures in the Sixth Plan. He said the issue in the plan is that curtailment of energy use without compensation is not energy efficiency under the statute, he stated. There is a fine line between what you promote and what counts – you may save electricity, but it doesn't qualify as energy efficiency, Eckman said.

There was more discussion about the distinction between curtailment and efficiency and about behavioral measures.

Grist said SEM is being tried on a pilot basis in the commercial sectors. We'd like results of these behavioral pilots –we'd like to take them apart and look at them, he said. Cavanagh pointed out that there are sophisticated efforts going on to try social networking to effect change. There is a fair amount of data on this, and I hope you reach out and see what there is in the region, he added.

Deborah Reynolds added a caution about looking at the Opower Program. It isn't purely a behavior-based program, she said.

Harris asked how the Council will treat cost reductions in emerging technologies and how it will look at pricing over time. We will have a discussion specifically about that, Eckman responded. We'll bring it back – it is a big issue, he added.

**Jack Callahan of BPA** continued on the topic of emerging technologies. He said he is focused on technologies that BPA can move into its programs. Callahan explained the emerging technology pipeline at BPA which entails steps beginning with a concept, moves to lab/field testing, and then into pilot programs. A lot of technologies "never get over the hump" of what it takes to get into the market, he said.

Callahan went over an example of the pipeline process, using LED lighting, noting that at one point, "it really started to move. "  Things keep moving through the pipeline and some represent big opportunities

and others represent small things, he said. We try to find things that are big, scalable and the timing is right to move them into the program, Callahan said. For example, heat pump water heaters are starting to move, he added.

Callahan said BPA has four focus areas right now: variable capacity heat pumps; roof-top units (RTUs); energy management (EM); and LED lighting. They are right for BPA, right for the region, and right in terms of timing, he said. He went on to describe the four areas and technologies in more detail. With regard to variable capacity heat pump, BPA needs to be a leader, Callahan said, adding that there are some areas in which BPA has reasons not to lead. But this is a great time to focus on heat pumps, he said. There is lots of innovation going on and lots of products coming forward, Callahan said.

He described the opportunities with rooftop units, EM and LED lighting and advanced controls. With regard to rooftop units, there are a couple of new technologies emerging, Callahan said. While EM "is sort of faddish," there are core technologies that will make a difference in this area, he commented. With LED lighting, there are a lot of manufacturers doing LEDs well, Callahan said.

The Japanese developed a technology for variable capacity heat pumps that works very well, and there are other technologies that are working very well, he continued, noting that more U.S. manufacturers are getting into the market. Callahan described his contacts with manufacturers in Japan and his visit to Japan to learn more about the technologies. These companies are thinking globally, and environmental considerations and energy efficiency are at the core of the products, he said, adding that the United States will see more Japanese products in the market. He went on to give details of several technologies that are in the works by Japanese manufacturers.

Callahan said a take-away from his trip to Japan is that a product has to fit the market niche. A product in use in one country does not necessarily work when it is imported somewhere else, he pointed out. Callahan went on to describe Japanese HVAC technologies and explained why they will work well in the U.S. market.

There is a connection between what BPA is investigating and what will become available in the U.S. market, Ken Eklund said. The products will be a better fitted to our market as a result of the lab and field testing BPA is doing, he said.

Callahan went on to describe the heat pump products that are being developed for various applications, including manufactured homes and cold climates. There is a lot of advancement in this technology, he said. The CRAC had questions about the price of the heat pump products. Harris said the dual purpose technology is very significant. If you are doing both space and water heating, it is more cost effective, he said.

As we develop the Seventh Power Plan, we need to figure out a way to have utilities promote some of these technologies without the constraints of cost-effectiveness, Smith commented. Callahan said there is a benefit to trying out these technologies while they are still in flux so there is an opportunity to tailor products to the market.

He described activities going on in the RTU marketplace, noting advances in technology that are transforming RTU products. Hirsch asked if BPA has looked at small package chiller units. Callahan said cooling plays a very small part in commercial settings. The biggest electricity use is in the fan, he said,

adding that compressors don't run that many hours and "you get very little savings." It's a small niche and there are no technologies that have market momentum on their own, Callahan said.

He moved on to energy management with "smart connected devices." With most EM, it is hard to deliver and verify performance, Callahan said. The important thing is to assure the performance data goes back to manufacturers to improve their products, he said. Callahan noted that the smart devices are a very fast moving technology – a lot of the performance is in the software.

That is an important point for the measurement community, Grist said. If these systems provide instantaneous feedback, it would cut the time and speed up the cycle "to know what we are doing," he said. Callahan agreed that it is important to get a large quantity of data at lower cost. He explained a project that captured aggregated hour-by-hour data from 900 linked thermostats during the month of February.

He went on to LED lights, noting they are ramping up in energy efficiency programs. Callahan described a number of products and said BPA is doing studies on the applications. The future of LEDs is in the fixture replacement cycle, he said. LEDs are a huge market and our engagement will be tactical, Callahan said. Absent utility intervention, we won't realize the potential and it will be a big lost opportunity, he stated.

Callahan wrapped up his presentation by saying there are many promising new technologies ahead. He reiterated the areas of BPA's emerging technology focus: energy management, variable capacity HVAC, RTUs, and LEDs. There is a big distinction between technical potential, market potential and program delivery potential, Callahan pointed out. The weightings BPA came up with to determine the potential is 35 percent is technology potential; 26 percent is market potential; and 25 percent is program delivery potential, he said. There are other factors besides technology that matter quite a bit, Callahan concluded.

Dave Warren asked if BPA is investigating the potential with server farms. We haven't touched big server farms and it is one area that BPA has a hard time "getting its arms around," Callahan responded.

In response to a question about ductless heat pumps in manufactured homes, Callahan said studies have been done and there is a DHP study posted on BPA's web site.

**Jack Zieger of the Washington State University Energy Program** said he has been working with the Energy Efficiency Emerging Technologies (E3T) program. At Charlie (Grist's) request, we went through our database of 400 and came up with 80 of the most promising technologies, Zieger said. He described several technologies on the list, including $CO_2$ heat pump water heaters, saying they are three times more efficient than resistance water heaters. Zieger provided specific features of the HPWHs and explained their function.

He went on to describe opportunities with data centers, explaining that E3T had an advisory committee that came up with areas of potential savings. Data centers tend to be quite conservative in terms of making changes, Zieger said. He listed the areas where savings could be achieved and noted that with data centers, when you save energy in the center you also save it in the HVAC. We include behavioral and programmatic strategies in our emerging technologies, Zieger said. The most important thing to getting the savings is to have the IT managers responsible for energy bill, he added.

Zieger described a number of technologies related to laundry facilities, including heat pump clothes dryers, commercial $CO_2$ washers and condensing dryers, which he said could be a big winner. He moved on to describe various types of super premium motors and how energy savings could be achieved, as well as how changes are occurring with electronics to gain efficiencies. For example, the same technologies that are used in laptops and cell phones could be used to bring about efficiencies with desk top computers, Zieger said.

Another group of emerging technologies are in the industrial area, he continued. These include compressed air systems and whole building performance, Zieger said. With the latter, he said, there is an outcry for integrated design strategies, as well as building performance standards and how to measure them.

Zieger noted that the technologies he described are examples, but there are 100 more to consider for the power plan. All of them are housed in the E3TNW.org database, he said. Zieger concluded by explaining ways to access the data and illustrating how it can be sorted and searched.

**Fred Gordon and Ted Light of Energy Trust of Oregon** discussed how to roll new technologies into the energy efficiency supply curves for the Seventh Power Plan. Gordon pointed out that the region achieved a lot of energy efficiency in the first five years of the Sixth Plan with technologies that were not in the supply curves. "We are horrible at forecasting technologies" and this is a look at how to roll the new technologies into the energy efficiency supply curves, he said.

Light began by describing the new way ETO proposes to use to evaluate emerging technologies. He laid out the steps in the process: consider the range of technologies; predict future improvements in cost and savings; be realistic about the odds of a technology coming to fruition; and define incrementally to a conventional measure.

Light also described the risk factors associated with emerging technologies, from market risk to technical risk to data source risk. ETO attempts to evaluate the risks associated with the technologies, he said, and presented a table listing the risk considerations for each of the factors. Light went on to a series of questions to be posed in the evaluation of risk.

He reported that ETO's examples of emerging technologies include LEDs, advanced HVAC, advanced refrigeration, solar water heating, heat recovery ventilation, $CO_2$ heat pump water heaters, gas absorption and heat pump water heater. Light presented graphs of the cost-effective potential of the savings associated with emerging technologies for electricity and natural gas.

There is room for improving our process, Light said. Are we evaluating the right risks? Are the risk factors appropriately scaled? he said. We could also include more emerging technologies, Light said, adding that "the more tickets you have in the raffle, the more likelihood you will win."

The CRAC asked questions about the ETO evaluation. Kevin Smit asked if the Council staff is considering the ETO approach for the Seventh Power Plan. We've not engaged in any forecasting in the past, Eckman responded. That doesn't mean we might not stray from that path, but we don't put uncertainty into the energy efficiency supply curves, he added.

This is a first stab at correcting an error we know exists, Gordon said. This is something we want to address in the Seventh Plan, Grist said. Eckman suggested it could be explored within the resource modeling.

### Update on Seventh Plan

Eckman provided an update on progress toward a Seventh Power Plan. Sometime this year we will have energy efficiency supply curves and will continue the analysis next year, he said. The Council expects to have a draft plan by fall 2015, Eckman stated. In order to meet that schedule, the Council has to have the Regional Portfolio Model (RPM) complete so the analysis can proceed, and if we don't hit that milestone, it will delay things, he added.

Eckman said in the last quarter of 2014 and the first quarter of 2015, staff will be tweaking the supply curves. More data will be forthcoming from NEEA as principle inputs to the supply curves, he noted. The regional load forecast is being developed and will be complete this summer, Eckman said. Staff will be reviewing the technologies over the summer, and in about October, we will be bringing you an inventory to look at, he said. We should have some quantification by early to mid-December, Eckman added. You can send suggestions at any time you want, he stated.

The RTF has done a lot of work on residential measures that we will move into the curves, Grist pointed out. Lighting will be the biggest number among the residential measures, Eckman said. There is still considerable potential, and it still has a sizeable impact, he said.

Grist said the federal standards workbooks will be posted to the website soon. Those will form the basis for our load forecasts and potential for the next plan, he said. Grist added that there will be more input to consider from the federal standards. There are four more announced and eight more will come up before the end of the year, he said, adding that DOE has hit its target in most cases for getting the standards out.

The CRAC meeting adjourned at 4:04 p.m.

## June 4, 2014 CRAC Participants List

| **In Person** | | |
|---|---|---|
| Dick Adams | PNUCC | dick@pnucc.org |
| Rich Arneson | Tacoma Power | rarneson@cityoftacoma.org |
| Larry Blaufus | Clark Public Utilities | lblaufus@clarkpud.com |
| Kevin Cooney | Navigant | kevin.cooney@navigant.com |
| Ken Eklund | WSU Energy Program | ecklund@energy.wsu.edu |
| Tom Eckman | NWPCC | teckman@nwcouncil.org |
| Lauren Gage | BPA | lsmgage@bpa.gov |
| Cameron Gallagher | Nexant | cgallagher@nexant.com |
| Wendy Gerlitz | NW Energy Coalition | wendy@nwenergy.org |
| Danielle Gidding | BPA | dngidding@bpa.gov |
| Fred Gordon | Energy Trust of Oregon | fred.gordon@energytrust.org |
| Charlie Grist | NWPCC | cgrist@nwcouncil.org |
| Bob Gunn | SEINERGY LLC | bob@seinergy.org |
| Hossein Haeri | Cadmus | hossein.haeri@cadmusgroup |
| Therese Hampton | Public Generating Pool | thampton@publicgeneratingpool.com |
| Nancy Hirsch | NW Energy Coalition | nancy@nwenergy.org |
| Jess Kincaid | Oregon Dept. of Energy | jess.kincaid@state.or.us |

| | | |
|---|---|---|
| Allison Marc | BPA | arrobbins@bpa.gov |
| Eli Morris | PacifiCorp | eli.morris.@pacifiCorp.com |
| Tomás Morrissey | PNUCC | tomas@pnucc.org |
| Chuck Murray | WA Dept. Commerce | chuck.murray@commerce.wa.gov |
| Mike Murray | Benton PUD | murraym@bentonpud.org |
| Jon Powell | Avista Utilities | jon.powell@avista.corp.com |
| Stan Price | NEEC | stan@putnameprice.com |
| Cory Read | Idaho Power | cread@idahopower.com |
| Eugene Rosolie | Cowlitz PUD | erosolie@cowlitzpud.org |
| Gurvinder Singh | Puget Sound Energy | gurvinder.singh@pse.com |
| Kevin Smit | EES Consulting | smit@eesconsulting.com |
| Craig Smith | Seattle City Light | craig.smith@seattle.gov |
| Mary Smith | Snohomish PUD | mesmith@snopud.com |
| Marty Stipe | Oregon Dept. of Energy | marty.stipe@state.or.us |
| Bud Tracy | Unaffiliated | tracyb@atc.net.net |
| John Walkowiak | Tacoma Power | jwalkowiak@cityoftacoma.org |
| Phil Welker | PECI | pwelker@peci.org |
| Dave Warren | WA PUD Association | dwarren@wpuda.org |
| Jack Zeiger | WSU Energy Program | zeiger@energy.wsu.edu |
| | | |
| **By Phone** | | |
| Ralph Cavanagh | NRDC | rcavanagh@nrdc.org |
| Brian Dekiep | NWPCC | bdekiep@nwcouncil.org |
| Tyler Dillavou | BPA | tjdillavou@bpa.gov |
| Bo Downen | PPC | bdownen@ppcpdx.org |
| Tom Eckhart | UCONS | tom@ucons.com |
| Lakin Garth | Cadmus | lakin.garth@cadmusgroup.com |
| Erik Holman | Cascade Energy | erik.holman@cascadeenergy.com |
| Ross Holter | Flathead Electric Co-op | r.holter@flathead.coop |
| Don Jones, Jr. | PacifiCorp | jr_don.jones@pacificorp.com |
| Angie Lee | Navigant | angie.lee@navigant.com |
| Chad Madron | NWPCC | cmadron@nwcouncil.org |
| David Nightingale | WA UTC | dnightingale@utc.wa.gov |
| Elizabeth Osborne | NWPCC | eosborne@nwcouncil.org |
| Graham Parker | PNNL | graham.parker@pnnl.gov |
| Rob Penney | WA State Energy | penney4@energy.wsu.edu |
| Cory Read | Idaho Power | cread@idahopower.com |
| Deborah Reynolds | WA UTC | dreynolds@utc.wa.gov |
| David Sherpher-Gaw | WA State Energy | gawd@energy.wsu.edu |
| Bill Thomas | Northwestern | bill.thomas@northwestern.com |
| Travis Walker | Cadmus | travis.walker@cadmusgroup.com |
| Jennifer Williamson | BPA | jcwilliamson@bpa.gov |