

Regional Technical Forum Meeting Notes

October 9, 2007

DRAFT

1. *Greetings and Introductions.*

The October Regional Technical Forum meeting, held at the Council's Portland offices, was chaired by Tom Eckman. The following is a summary (not a verbatim transcript) of the topics discussed and decisions made at this meeting. Anyone with questions or comments about these notes should contact Eckman at 503-222-5161.

The notes from the August 30 RTF meeting were approved with a few minor comments.

2. *Presentation, Discussion and Decision on Ductless Heat Pump Evaluation Work Scope.*

David Baylon noted that the RTF has been discussing ductless heat pumps for several months now. It is a technology that is pretty well-developed, but has not yet achieved wide use in the American market. In the context of a zoned heating system, especially one with a need for cooling, this is a possible solution, he said. The problem, from a research standpoint, is that there aren't very many of these that have actually been installed.

Baylon then provided a presentation (hot-linked to today's agenda on the RTF homepage), touching on the following major topics:

- General introduction
- Performance: 2006 federal standards require that this equipment meet an HSPF rating of 7.4
- Performance ratings and retail price summary: single-zone systems (table)
- Performance ratings and retail price summary: three-zone systems (table)
- Ductless heat pump performance in existing homes study 1 objectives: evaluate performance details for the DHP installation in situ, provide direct measures of capacity and COP in northwest climates, evaluate installation specifications and potential needs for commissioning for DHP control and interaction with existing zonal system, assess the

performance and energy savings for DHPs and assess predicted savings analysis from manufacturer's data.

- Sample size and selection (target is 6 units in similar climates to other studies – heating zones 1 and 2)
- Monitoring overview
- Monitoring details
- Site data collection
- Analysis: develop detailed assessment of COP and dependence on temperature, installation and operator controls, review relative contribution of DHP and electric resistance zonal, estimate net cooling contribution, develop savings based on metered results and compare to gross savings analysis from total billing analysis.
- Timeline: install equipment in early 2008, collect data from winter 2008 through winter 2009, evaluate data and summarize results in spring 2009
- Budgets: total budget, including detailed DHP monitoring: \$130,000
- Ductless heat pump performance in existing homes study 2 objectives: establish applicability to existing zonal electric homes, develop costs and specifications for use in applying DHPs to existing homes, establish installation specifications for DHP control and interaction with existing zonal system, assess the performance and energy savings for DHPs.
- Sample size (will be determined to meet a 90% c.i.; target sample size 25-40 homes per locality, 100-160 homes in all)
- Monitoring
- Data collection
- Analysis: develop savings estimates from billing analysis comparison before and after installation, review relative contribution of DHP and electric zonal, estimate net cooling offset from metering, develop savings based on metered results and compare to gross savings analysis from total billing analysis.
- Budgets: total budget, retrofit DHP measure: \$560,000
- Ductless heat pump performance in new residential construction: Study 3 objectives – establish applicability for heating and cooling new single-family homes, develop costs and specifications for use in applying DHPs to new homes, establish installation specifications for DHP control and interaction with supplemental zonal system or other backup heating, assess the performance and energy savings for DHPs including supplemental space heat and cooling requirements (offsets).
- Sample: 15-20 homes in 6 climate zones, about 100 homes in all
- Monitoring
- Analysis: develop savings estimates from billing analysis comparison before and after installation, review relative contribution of DHP and electric zonal, estimate net cooling offset from metering, develop savings based on metered results and compare to gross savings

analysis from total billing analysis, assess performance relative to modeled estimates using SEEM.

- Budgets: total budget, new construction: \$575,000.

Baylon noted that the three studies together are budgeted at \$1.2 million. Our task is to consider these three scopes of work and decide if these are the right things to test, Eckman said. There has been considerable interest in the region in deploying this technology, and we need to decide if these scopes of work will satisfy that interest, and if the region's utilities are interested enough to contribute to the studies. It isn't our job to get the pilot programs going, but if others are interested, we now have a scope of work to get them started.

Ken Keating noted that the sequencing of these studies is important – the first study seems essential to me, if the more extensive second and third studies are to proceed, he said. There was some discussion of the need for a larger sample size – perhaps as large as 18 homes – for the first study. The group also discussed some of the specific models and manufacturers to be included in the study, as well as the issue of multifamily homes – Baylon noted that he has not yet done that scope. One participant said that, in his opinion, multifamily offers the greatest opportunity for the penetration of this technology. He noted that there is considerable low-income housing funding available from the Housing Trust Fund, some of which could be used to fund these kinds of Energy Star measures. I would suggest that the research focus on multifamily, at least for new construction, he said. Monitoring temperatures in zones is also very important, he said – to me, behavior is the larger question.

Do we need to critique these scopes of work, or are these analytical plans appropriate? Eckman asked. We want to be sure that those who implement the study have a workable research design and scope of work. I would welcome any comments the group would like to make, Baylon said, and will be happy to put together a scope of work for multifamily. After a brief discussion, Jay Himlie said he would like an opportunity to look at the scopes of work and metering plans in more detail before the RTF endorses them.

Ultimately, Eckman said Baylon will flesh out his presentation into a written document, which will then be distributed to the RTF membership for comment within the next week. If there are no concerns about Study 1, the detailed monitoring, that could get up and running fairly quickly, Eckman said. One participant noted that his utility has some funds they could commit to this in 2007. The group discussed the possibility of convening an RTF subgroup to further refine the study designs; it was ultimately agreed to convene the subgroup, consisting of Himlie, Eric Brateng, Bruce Manclark, Adam Hadley and Jeff Harris, by telephone or email, rather than a face-to-face meeting. Baylon said he will produce a written proposal by the end of next week.

3. ***Presentation, Discussion and Decision on Proposed RTF Support of Regional Evaluation Work.***
 - a. ***Scoping and RFP Development for Review of Regional and Extra-Regional Impact Evaluations of Existing or Potential Deemed Measures.***

All of these items emerged from our discussion of the 2008 RTF workplan at the last meeting, Eckman said; this first proposal is probably the largest project on the list. The basic idea is to gather up all of the impact evaluations that have been done that might be relevant to what we're trying to do in this region, to inform the development of the Council's next Power Plan. The first step in that process is to hire someone to survey the current evaluation landscape and develop a scope of work. The cost of this effort was estimated at \$35,000.

After a brief discussion, Harris moved that the RTF approve funding for the impact evaluations scope of work, a contract not to exceed \$35,000. This motion was seconded and unanimously approved.

b. Evaluation of Savings from Door Gaskets in Refrigerated Cases.

Grist said this topic, too, has been discussed at past RTF meetings, in the context of the Energy Smart Grocer program. This was one of the more troublesome measures discussed, he said.

In response to a question from Harris, Grist said the savings from this measure are among the largest in the California program. There are a couple of things we would like to do, he said: first, to find a lab where we can do some research into the gaskets, and to install some switches to determine how long the refrigerator doors are staying open. We may have found a lab to test the gaskets, Grist added; both if these things will help us identify the actual savings from this measure.

Is this just the gasket piece, or does it also include the door closers? Harris asked. We're still working that out, Grist replied. The real question is, does this program even need any money from the RTF? A Bonneville representative said he believes that BPA has enough funding to pay for it. Eckman asked whether there was RTF agreement that this research should move forward; no objections were raised to this course of action.

c. Commercial Window-Walls.

This arose from a perceived data gap in the Commercial Building Stock Assessment, Grist said. Our thought is that we could spend about \$5,000 to do some initial scoping about what information is out there on what is available and

what is actually going on in the field, he explained. That's the first step; to scope what it would take to identify baseline practice in curtain-wall installations through surveys or interviews with manufacturers, installers and others in the industry. The second step would be to establish baseline data for the thermal characteristics of the glass being used and for curtain wall configuration details. Eklund suggested that the study focus on u-value, solar heat gain and installation details. After a few minutes of further discussion, Harris moved that this proposal be modified to include visual light transmittance along with U-values, solar heat-gain coefficient and installations details, with a cost not to exceed \$40,000. This motion was seconded and unanimously approved.

4. **Northwest Energy-Efficient Manufactured Housing.** Eckman noted that there is a long history behind this program, dating back to 1986. This would be the fourth field study under the NEEM program, to verify the construction practices that are actually being used in the field and to ensure that the houses that are being fixed are actually meeting specs. Tom Hewes and Baylon led this presentation, touching on the following major topics:

- Random home study details: field study on manufactured homes built to current Energy Star specifications; work will be carried out on at least 114 units, etc.
- Specific field activities: measure tightness of building shell and duct system, measure airflow and static pressure in the HVAC system in order to calculate supply leakage fraction, measure flow rate through whole-house exhaust fan, evaluate compliance of home set-up with statewide setup rules, record other key data which have a bearing on home performance and occupant health/safety, datalog lighting, hot water and heating loads.
- Sample designs (table)
- Exterior duct leakage (previously reported) – table
- Leakage to exterior normalized to conditioned floor area (table)
- Supplemental lighting study: manufactured homes have separate lighting circuits; simple integrating CTs could provide lighting sub-metering; lighting audit would provide LPD for home; analysis would derive the average lighting run-time for the metered period; no lighting loggers required.
- Manufactured housing program: the “installed” numbers (table)
- Doing the math: total watts removed (savings): 43,892 watts, 384,494 kWh/year, total savings of \$28,837 @\$.075.
- Proposed funding (total): \$150,880
- Supplemental funding needed for lighting monitoring and audit, sub-metered DHW review and mini-split review: \$75,000

Ken Keating said that, when he reviewed this last week, the thing that struck him was, why come to the RTF for funding, when the RTF is supported by most of the

groups that are already on the proposed funding list? However, it is certainly appropriate to ask for RTF guidance and support. I guess we need a go-ahead on the other piece before we seek funding for the supplemental research, Hewes said. After a brief discussion, it was apparent that there is considerable RTF interest in this study, in particular, in the proposed supplemental research on lighting. What's the time-frame for a decision that will allow you to get into the field in a timely fashion? Eckman asked. We would like to begin fieldwork next month, Hewes replied. Ultimately, Eckman noted that the RTF is being asked for \$10,000 to support this project, plus, potentially, an additional contribution for the supplemental research; there is currently \$190,000 in uncommitted funds remaining in the RTF's FY'07 budget. There are outstanding requests for about \$145,000, he added. Harris moved that the RTF commit \$25,000 for NEEM research, including \$10,000 for the baseline study and \$15,000 for the supplemental research. This motion was seconded and unanimously approved.

5. *Scoping and RFP Development for Review of Emerging Technology Assessment.*

The second item on the list is emerging technologies and practices, which it might be possible to incorporate into a supply curve and develop deemed savings for, Eckman said – mini-splits might be one example. What's going to be available and reliable over the next decade? Again, this is a scoping exercise, estimated cost about \$30,000.

Harris moved that the RTF approve the emerging technologies scope of work, for a cost of no more than \$30,000. This motion was seconded and unanimously approved.

6. *Presentation and Discussion of Proposed Deemed or Deemed Calculated Savings and Cost-Effectiveness of New Measures for Grocery Stores: LED Case Lights and ECMs on Head Cooling Fans.*

We would like a decision today as to whether the deemed savings for these proposed measures look reasonable, Grist said. Ryan Fedie led this presentation, touching on the following major topics:

- Electronically Commutated Motors (ECMs) for compressor head cooling fans – measure, base case, proposed case
- ECMs for compressor head cooling fans – estimated savings, measure life, shape, cost, B/C ratio (6.8) etc. (table)
- Case lighting – low-temperature, T8 or T12 to LED measure, base case and proposed case
- Lighting quality attribute, fluorescent versus LED (table)

- Case lighting – low-temperature, T8 or T12 to LED: savings estimates, measure life, shape, cost, B/C ratio (0.7 for T8 to LED, 1.1 for T12 to LED)

In response to a question, Fedie said only a handful of compressor head cooling fans have been installed to date. The group devoted a few minutes of discussion to the cost-effectiveness of the lighting measures; Grist noted that the B/C ratio for the T8 retrofit option is expected to improve as the market penetration of this technology increases. The group also discussed the potential to add dimming and motion-sensing capabilities to LEDs in this use, something that is already being done in some large retail applications elsewhere in the country.

Ultimately, Harris moved that the RTF approve the savings and cost estimates for both of these measures. This motion was seconded and unanimously approved. It was noted that, once some data from this program is available, it may make sense to roll it into Bonneville's grocery store program.

7. *Decision: Scope of Work for Vending Machine Program Development.*

Charlie Grist said the vending machine subcommittee is recommending that the RTF move to Phase 2 of this project, designing program delivery alternatives and testing them with implementation partners, with the goal of developing a regional program. The subcommittee is also recommending that either Cadmus or Quantec be approached to conduct this work. The group devoted a few minutes of discussion to the nuances of this project, touching on options to encourage early retirement of middle-aged and older machines, the goals and intentions of the market actors, the need for further market characterization work, measure testing and verification elements. The group also clarified that this agenda item is really an additional market and technical research, rather than a program development effort.

Ultimately, Harris moved that the RTF accept the subcommittee's recommendations, with the clarification that the next phase of research be focused on scoping the cost and feasibility of program delivery alternatives and testing them with implementation partners. This motion was seconded and unanimously approved.

8. *Project Updates.*

- Night Light Controller for Hotels and Motels.*** Grist said no data is available on this measure yet, but the project is underway.
- Commercial Rooftop Economizer.*** Grist said the report on the first phase of laboratory testing of commercial rooftop economizer is now being reviewed by the technical advisory committee. The report contains some

- c. **Heat Pump Commissioning Impacts.** Bob Davis provided a table on this topic, noting that, at its last meeting, the RTF looked at the cost of the heat pump measure. There was quite a range – from \$400 to about \$5,000. In the context of the actual programs BPA is involved in through its utilities, there is quite a range of response to the PTCS requirements, especially in markets where there are a lot of manufactured homes. We decided to re-examine the components of the savings for new construction – box spec vs. commissioning – in the heat pump measure, he said; this is our attempt to do so.

Essentially, if you use the HPA-3 – HSPF 8, SEER 13, you get a \$275 cost, 1,082 kWh in savings (in Portland), and a cost of 0.021 \$/kWh, Davis said. If you go to YSA – HSPF 8.5, SEER 14, you get an \$825 cost, savings of 1,531 kWh, and a cost of 0.045 \$/kWh.

The group devoted a few minutes of discussion to the commissioning aspects of this issue; Mark Johnson said his sense is that commissioning, by itself, is just barely cost-effective, but if you combine it with controls, then the B/C ratio turns positive. Eckman spent a few minutes going through what is already in the PTCS specs, noting that only three of the configurations (commissioning, controls and duct sealing) are cost effective in retrofits. More combinations are cost-effective in new construction. Johnson said Bonneville is interested in knowing what the numbers are for a new heat pump in an existing home. That wouldn't work, Eckman said – it would be worse. He said he is willing to do some more work on this issue if it would be helpful to Bonneville. Johnson said he will discuss this issue with Eckman after today's meeting.

9. New Buildings Specifications.

Mira Vowels led this presentation. She said these specifications were developed by the New Buildings Institute, and have been discussed extensively with the RTF's new buildings subcommittee. She said seven measures have been identified so far, including lighting power density, cooling system minimum efficiency level, effective window u-value, window solar heat gain coefficient, integrated design of HVAC system, lighting controls and enhanced economizer.

The specs are still undergoing some minor revisions, she said; I have run them past a number of engineers and designers, both inside and outside of Bonneville, and anticipate that they will be providing comments later this week. Keating said that, in his view, in terms of improving current practice, this package is a stretch –

you're asking for a lot, he said. Any discussion of maintenance service contracts? One participant asked. Not specifically, although there is provision for a tenant improvement manual and building owner education, Vowels said. Would there be an opportunity to tie the incentives into a maintenance performance contract? Another participant asked. No – maintenance will be up to the owner, Vowels replied.

I expect that, as we finish up our rooftop economizer specs approach finalization, they may morph somewhat, Grist said. And who will be overseeing whether or not these specs are being met? Baylon asked. The design professional, Vowels replied. My concern is that there aren't 10 architects in the entire country who would understand this spec, Baylon said.

After a few minutes of additional discussion, Vowels asked for RTF approval of these specifications, with a few minor corrections. It was so moved and seconded, then unanimously approved.

10. Next RTF Meeting Date.

The next meeting of the Regional Technical Forum was set for November 9. Meeting summary prepared by Jeff Kuechle, NWPPCC contractor.

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