

# Regional Technical Forum Meeting Notes

August 8, 2006

## DRAFT

### ***1. Greetings and Introductions.***

RTF chair Tom Eckman welcomed everyone to today's meeting, held August 8, 2006 in the Northwest Power Planning and Conservation Council's Portland offices. 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.

### ***2. Presentation, Discussion and Decision on Proposal to Contract with New Buildings Institute to Serve as Project Contract Manager for Phase II of Regional Rooftop HVAC Research Project.***

Charlie Grist described the genesis of this agenda item, noting that there is some debate about how well rooftop HVAC units perform. We have been discussing what to do next, in terms of getting them to perform better, he said; we formed a technical subgroup that has spent nine months talking about the research that has already been done, and the research we would like to do. The group has come up with a prioritized list of potential research, he said; the question is whether we can develop effective savings protocols and whether we can rely on the savings estimates those protocols generate. This is a two-part presentation, he said – the first part deals with the future research we would like to do, which is expected to cost about \$190,000. We also need to talk about whether the New Buildings Institute should be the contractor overseeing this effort, Grist said.

Grist provided an overview of the current status of this project, noting that the subgroup has finished the Phase II research plan. He touched on its main elements; budget estimate (\$190,000 over 16 months), and the process for soliciting voluntary funding in PNW and Northeast (BPA, Trust, Puget, Avista have already committed funding).

It would be nice if the outcome of this was a set of maintenance protocols that will provide a pile of savings once implemented, said Jim Lazar. Is that the ultimate goal of this phase, or will that come in Phase III? That is the ultimate goal, but it will depend

on how much confidence we have in the savings estimates, Grist replied. We need to figure out how the controllers are working with the sensor and the thermostats, he added; there are two proposals for estimating savings in this protocol, one monthly, one hourly. Have you talked with WSU about a similar problem we have going? another participant asked. Yes, Grist replied.

Can I get a recommendation for the New Buildings Institute to be the contractor on this project? Grist asked. This whole thing is conditional on funding, Lazar observed. We're confident that the required funding will be forthcoming, Grist replied. In that case, I move that we move forward with this, with New Buildings Institute as contractor, conditional on funding, Lazar said. This motion was seconded and unanimously approved.

### ***3. Presentation and Discussion of Monitoring and Verification of Savings from Grocery Store Refrigeration Controls.***

Grist described the background of this project, noting that it includes four measures, including door heaters, ECM controls, and evaporator fans. NRM has been operating this program in the Northeast, and we would like to expand it to the Northwest, Grist said; Jack Callahan from BPA has been evaluating the estimated savings generated by NRM's program.

Callahan then provided a presentation, using the overhead projector. He touched on the following topics:

- Pictures of various convenience store and grocery store installations, demonstrating how the data for this study is gathered
- February 7, 2005 – the RTF reviewed and approved the NRM measures and calculation methodology on a pilot basis
- March 2005 – developed M&V plan for pilot
- June 2005 – Pacific County PUD incentive offer: four stores actually included in the study (table)
- July-November 2005
- Results: baseline compressor-condenser unit duty cycle and run-time kW load
- Results by store (table)
- Post-install compressor-condenser unit duty cycle – observed vs. NRM estimate
- Reduced compressor duty cycle – observed vs. NRM estimate
- Baseline door heater duty cycle and average connected load (kW) – observed vs. NRM data (no observed data)
- Post-installation average door heater duty cycle and annual kWh per door savings – observed vs. NRM data
- Door heater controller results per stores, coolers and freezers (see spreadsheet)
- Sampling of baseline evaporator fan connected load (kW) – metered to NRM estimates – observed vs. NRM
- Post-installation average evaporator fan duty cycling (observed vs. NRM)

- Post-installation evaporator fan % savings and fan kWh per year savings from control measure – observed vs. NRM
- Evaporator fan control measure results per store, coolers and freezers
- New evaporator fan ECM motors connected load (kW) – metered to NRM estimates: observed vs. NRM
- Vendor beverage coolers observed % kWh savings
- Vendor beverage coolers summary – observed vs. NRM: 35% observed % savings vs. 36% NRM
- Store total results, by store: observed total savings (ranged from 15,971 to 109,737), total cost of measures (ranged from \$8,083 to \$31,835), benefits to cost ratios (ranged from 0.83 to 1.57)
- Recommendations: extend as pilot study for one more year; continue approval of NRM package of measures; continue approval of NRM savings calculation methodology.

In the course of this presentation, the RTF offered a few clarifying questions and comments. Some of the topics addressed included the learning curve associated with implementing this study, actual vs. predicted savings, the interaction between ECM motors and cycle time, and the adequacy of incentives, given the need for updated gas prices in the Power Plan. In general, said Callahan, I was quite impressed with the NRM methodology; many of their assumptions were pretty well-informed, and their estimates, in many cases, closely matched the observed data for the four stores in the Northwest. In general, we saw no problems with the NRM recommended measures. Callahan suggested that the group extend the pilot study for a year, and approve the NRM calculator, with some method of checking up on actual savings, rather than trying to establish deemed savings at this point.

After a few minutes of discussion, Eckman called for an RTF recommendation on this topic. It was moved that the RTF approve the extension of the study for one year, and approve the NRM calculation methodology as described during today's presentation. This motion was seconded and unanimously approved.

#### ***4. Presentation, Discussion and Decision on Revised Cost-Effectiveness of Energy Low Income Prime Window Replacements.***

Eckman led this presentation, titled "Proposed Revision to Low Income Prime Window Replacement Cost Effectiveness." He noted that there was an issue that came up last year regarding this measure; in response to a request from utilities, he said, I went out and sought some more information on this topic. Luckily, people had more data to share, he said; I have now incorporated that additional data into an updated version of this analysis.

Eckman then launched into his presentation, touching on the following topic areas:

- Background – why update?

- Prime window replacement cost – single-family (graph showing low- and regular-income Class 35 prime window costs, by PUD)
- Prime window replacement cost – multifamily (graph showing low- and regular-income Class 35 prime window costs, by PUD)
- Prime window replacement cost – average cost (graph showing low- and regular-income Class 35 prime window costs, by PUD)
- Prime window replacement cost – average cost (graph showing maximum cost in 2006 dollars, which zones are and are not cost-effective). According to this graph, these replacements are not cost-effective in Zones 1 and 2 when the existing windows are double-glazed.

Eckman then outlined the following proposed recommendation:

- For qualified low-income households, the RTF finds that prime window replacements are cost-effective in all heating zones when the existing window is single-glazed, and in all heating zones for multifamily and manufactured homes and in single-family homes in heating zone 3 when the existing window is dual-glazed.

The group devoted a few minutes of discussion to this presentation, offering a few clarifying questions and comments. Many of these touched on the assumed performance of the dual-pane existing windows, and the benefit-cost ratio calculation for single-pane existing window replacements. After a real-time recalculation, Eckman confirmed that his original calculations had been correct, and that all single-pane window replacements are cost-effective, but multifamily and manufactured dual-pane replacements are not cost-effective in zone 1.

Ultimately, the proposed recommendation was edited to read “...in all heating zones for single-family homes and in heating zones 2 and 3 for multifamily and manufactured homes when the existing window is metal-framed dual-glazed.” Lazar moved that the RTF endorse these recommendations; this motion was seconded and unanimously approved.

### ***5. Presentation and Discussion on Revised Retail Prices and Their Impact on Cost-Effectiveness of Energy Star Manufactured Homes.***

Eckman led this presentation, skipping down to the following revised assumptions (incremental retail price):

- Homes purchased with heat pumps would have been purchased with a heat pump, therefore heat pump costs are ignored (as are heat pump savings, except for the impact of duct efficiency on performance) – no change
- Thermal shell base case  $U_u=0.065$  – no change
- Total Energy Star package incremental retail price – original estimate \$605; revised estimate \$1,264 (2000 dollars)

- \$696 in 2006 dollars, not including EF93 DHW and EF65 dishwasher
- \$1,464 in 2006 dollars, including Energy Star dishwasher and EF93 DHW.

At the close of this presentation, Eckman noted that this is an informational item only; no RTF action is needed.

### **6. Presentation, Discussion and Decision on Revised Deemed Savings and Cost-Effectiveness of Energy Star Dishwashers.**

Eckman also led this presentation, touching on the following topics:

- Energy efficiency trends for dishwashers (graph)
- Distribution of efficiency levels for models listed in Federal Trade Commission 2005 database (graph)
- Baseline options
- Refresher – allocation of savings
- Reduced hot water use increases energy factor – but it's not the only way (graph)
- Alternative hot water use assumptions (table) model average water use savings, curve fit)
- Impact of alternative hot water use assumptions on annual savings (graph)
- Results assuming EF65 incremental cost of \$8 – curve fit water use (table)
- Results assuming EF 65 incremental cost of \$8 – actual model water use (table)
- Impact of alternative water use assumptions on savings and cost-effectiveness (table)
- Consolidated retail price data from Oregon tax credit database (graph)
- Sample results from the deemed savings calculator for this measure
- Is there really an incremental retail cost? (graph)
- Minimum retail price vs. energy efficiency
- Oregon tax credit dishwasher retail price data

Eckman finished with the following slide: “So what should we assume for incremental cost of EF65 vs. EF60?”

- Staff proposal – use 2<sup>nd</sup> order polynomial curve to fit to minimum retail price vs. efficiency data
- Alt 2: Use 3<sup>rd</sup> order polynomial curve to fit to average retail price vs. efficiency data
- Alt 3: use average difference in retail price
- Alt 4: use minimum difference in retail price.

Lazar expressed the concern that there are few dishwasher models rated higher than EF65; Eckman agreed that this is the case. The group devoted a few minutes of discussion to this presentation, offering a few clarifying questions and comments, most touching on Eckman's assumptions. Ultimately, it was moved and seconded that the RTF endorse Eckman's revised deemed savings calculator for Energy Star

dishwashers; this motion carried unanimously. In response to a question, Mark Johnson said this topic needs to be revisited no later than January if it is to be implemented in a timely fashion.

### ***7. Presentation, Discussion and Decision on Revised Deemed Savings and Cost-Effectiveness of Energy Star Freezers and Refrigerators.***

Eckman finished today's meeting with a presentation titled "Analysis of cost and savings values for revised Energy Star freezers and refrigerators." Among his topics:

- Original refrigerator results corrected for "weighting" error (table)
- Proposed resolution of outstanding issues – side-by-side refrigerators represent a growing share of the market and the market share data used to derive "any refrigerator" values is 10 years old; use 2005 shipment weights from AHAM.
- Incremental cost data derived from both tax credit and online retailers appear to indicate that Energy Star costs for this configuration are 9-10 times higher than other configurations – use manufacturer cost data from DOE TSD.
- Corrected original refrigerator cost assumptions compared to DOE (table)
- Product shipment weights used to derive "any refrigerator" values (graph)
- Revised refrigerator results – DOE TSD cost and 2005 market shares (table)

After a brief discussion, there was a motion to adopt the deemed savings calculator and cost-effectiveness calculations as revised; this motion was seconded and unanimously approved.

### ***8. Other.***

Bonneville would like to get started on some measures concerning new buildings, starting with lighting measures, said Grist. Bonneville has chosen five lighting technologies to promote, Grist explained. Currently, we have a calculator for the retrofit of existing buildings, but in a brand-new building, we don't have a pre-existing condition to compare the new measures to. What we're proposing, for new buildings, is what I would call a deemed savings calculator, patterned after the one for retrofits, except the baseline will be the code LPD for the jurisdiction the new building is located in, Grist explained. The biggest questions are, should we do this or not, and second, what baseline should we use? We have started by using the assumptions in the Fifth Power Plan regarding new-building lighting, he explained. The other option is to use the codes that are on the books for the various jurisdictions, said Grist.

Grist went through the lighting types BPA would like to promote, including T5, ceramic metal halide and linear fluorescent. Jay Himlie suggested that the baseline for this measure be divided up by the code in each state and region. Should the baseline be the lower of the jurisdictional code, or the criteria in the Fifth Power Plan? Grist asked. After a few minutes of discussion, it was agreed that the calculator should be modeled on the existing retrofit lighting calculator, and that it would be most appropriate

to use local jurisdictional code as the baseline assumption. Bruce Cody moved that the RTF move forward with developing the new lighting calculator, and that the baseline should be based on code. This motion was seconded and unanimously approved.

The group also briefly discussed the feasibility of developing a credit that will encourage developers to install ECM motors, as well as improved duct sealing.

***9. Next RTF Meeting Date.***

The next meeting of the Regional Technical Forum was set for Tuesday, September 19. Meeting summary prepared by Jeff Kuechle, NWPPCC contractor.