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## Northwest Power and Conservation Council

**Jennifer Anders**  
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Washington

December 2, 2014

### MEMORANDUM

**TO: Power Committee**

**FROM: Charlie Grist and Jennifer Anziano**

**SUBJECT: Regional Technical Forum (RTF) Investigation into the Monetization of Health Effects Directly Attributable to Energy Efficiency Programs**

### BACKGROUND:

Presenter: Charlie Grist and Jennifer Anziano

Summary The Regional Technical Forum (RTF) has been exploring the ability to quantify and monetize health effects resulting from changes in wood smoke emissions attributed to energy efficiency measures. As noted at the last Power Committee meeting, Staff expects this analysis will be an informative example for the Council in its development of a methodology for determining quantifiable environmental costs and benefits for the Seventh Plan.

Since Staff briefed the Power Committee on this topic in November, the RTF and the RTF PAC have met again to further discuss this work and develop their respective perspectives. Given the complexity of this topic, the RTF and RTF PAC both focused their findings around narrow questions being guided by their charters. The RTF focused on the technical considerations around the methodology for quantifying health effects from resulting changes in wood smoke emissions caused by the introduction of an energy efficiency measure. The RTF PAC focused the resources allocated to RTF's work to date and implications for staff and budget for their work going forward, should the Council decide to include the assessment of such benefits in its environmental methodology for the

Seventh Plan. These perspectives have been captured in separate memos and provided to the Council as attachments to this memo.

**Relevance** This analysis is an example of the analytical requirements and issues associated with accounting for environmental benefits from new resources off setting an existing activity and directly addresses question 3B in the Issue Paper: Methodology for Determining Quantifiable Environmental Costs and Benefits

**Workplan:** 1D. Prepare for Seventh Power Plan and Maintain Analytical Capability

**Background:** In the Pacific Northwest, a significant fraction of electrically-heated homes use wood as a supplemental fuel source for space heating. According to the Northwest Energy Efficiency Alliance (NEEA) 2011 Residential Building Stock Assessment, about 20 percent of households report using wood for heating. In electrically-heated homes with supplemental heat, wood supplies 25 to 50 percent of heating needs. Thus, efficiency programs aimed at reducing electric heat may also reduce wood heating.

In 2013, the RTF developed energy savings estimates for converting residential zonal electric heating systems to ductless heat pumps. These savings estimates were based on an analysis of the pre and post-electricity use of over 3,400 homes with existing zonal electric heating systems that installed ductless heat pumps. The analysis demonstrated energy (electricity and supplemental fuels) savings resulting from the installation of ductless heat pumps. It also showed that in homes with supplemental wood heat, people were relying more on the ductless heat pump to heat their home than they did on the previous zonal electric heating system and, as a result, were using less wood. Based on these findings, the RTF developed a method for estimating the amount of wood saved and accounted for the reduced wood purchasing costs in its cost effectiveness of the measure.

The scientific community has determined that burning wood leads to the formation of a special class of small particulate pollutants that cause respiratory, cardiovascular, and other health hazards if inhaled. The EPA has found that health benefits realized from decreased wood smoke are attributable to reduced exposure to concentrations of these particles. Because of the significant health impacts, EPA established national ambient air quality standards for these pollutants in 1997. The standards have been gradually strengthened since introduced, and were most recently updated in 2012.

Building on the above finding that the installation of ductless heat pumps reduces wood use, the RTF decided to explore the question of whether these resulting health effects could also be quantified. The RTF contracted

with Abt Associates to conduct a screening study exploring the monetization of health effects from wood smoke emission reductions in the Pacific Northwest to understand the potential magnitude of the effect. This study—which looked at large, uniform wood reductions across the Pacific Northwest—found health benefits were on the order of ten times the value of retail electricity used by the ductless heat pumps to displace wood heat.

Given the significance of Abt's findings, the RTF decided to further explore the connection between energy efficiency measures and changes in wood smoke, and the ability to quantify (both in physical and monetary terms) the resulting health effects. The RTF chose the ductless heat pump measure as an example based on its existing analysis and data available.

In November, Staff briefed the Power Committee on the project. Since then, Staff worked with the RTF to refine the report and develop a memo representing the RTF's findings around the technical considerations for this work. Staff also briefed the RTF PAC of those findings. Both the RTF and the RTF PAC have developed their own memos that provide their perspectives on this project.

More Info: **RTF Memo:** Technical Considerations around Quantifying the Health Impacts from Changes in Wood Smoke Emissions  
**RTF PAC Memo:** Feedback on the RTF Technical Considerations around Quantifying the Health Impacts from Changes in Wood Smoke



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November 18, 2014

## MEMORANDUM

**TO: Council Members**

**FROM: Regional Technical Forum**

**SUBJECT: Technical Considerations around Quantifying the Health Impacts from Changes in Wood Smoke Emissions**

This memo reflects the Regional Technical Forum (RTF) perspective on the technical considerations involved in quantifying the health impacts from changes in wood smoke emissions that may be attributable to specific energy efficiency measures. The RTF recognizes that the ultimate question of whether health impacts resulting from a conservation measure should be included in RTF cost and benefit estimates is a question for the Council. The RTF analysis is intended to inform the Council's decision, but stops short of answering, the question of whether this specific "benefit" satisfies the requirements of the Northwest Power Act. This memo summarizes RTF technical findings from a detailed staff technical report on a methodology for quantifying health impacts related to energy efficiency measures. In summary, the RTF believes that, given sufficient resources, a methodology exists to quantify the impacts from changes in wood smoke and that the resulting benefits (or costs) may be significant for certain energy efficiency measures.

### **RTF Consensus Conclusions on the Methodology for Quantifying Health Effects from Wood Smoke**

The RTF analysis focuses on the technical considerations around a methodology used by the Environmental Protection Agency and other federal agencies to calculate the health impacts from changes in wood smoke emissions. The following subsections summarize RTF consensus conclusions around the methodology analyzed in the RTF Staff report. Generally, the RTF has the expertise to assess Step 1, but Steps 2 through 4 require expertise that is not a part of the current RTF Charter (members are not chosen for this type of knowledge and there are not research budgets or staff to conduct the work).

#### *Step 1: Quantifying Changes in Wood Use Resulting from an Energy Efficiency Measure*

- **There is a causal link between ductless heat pumps and wood use, as evidence shows that the introduction of a ductless heat pump offsets some supplemental wood use, on average.** For the ductless heat pump measure, the RTF accounts for the average wood reduction per heating zone in its savings and

cost and benefit estimates. The RTF also accounts for wood reductions in this way for other HVAC and weatherization measures.

- **Wood use changes can be quantified and would need to be determined on a measure category basis.** Ductless heat pumps were used in the example given the robustness of the data supporting the energy savings estimates. The description of methodology demonstrates that each measure that interacts with the heating system (including those that could potentially increase the use of supplemental wood heating) would need to be assessed separately.

#### *Steps 2-4: Monetizing the Resulting Health Impacts*

- **If the Council finds that health impacts from wood smoke emissions should be a part of its cost effectiveness analysis, the RTF notes that there is a methodology used by EPA to quantify and monetize impacts and is accepted as best practice.** As a body, the RTF does not have sufficient expertise to develop a methodology for quantifying the health impacts (and as noted above, this is outside the current RTF charter). The RTF was generally satisfied with the technical underpinnings of the methodology used by EPA and other regulators.
- **A more sophisticated dispersion model would be required to be consistent with EPA methodology that accounts for locational impacts of emissions and partial-year effects.** The RTF staff used the Co-Benefit Risk Assessment (COBRA) model, which looks at emissions over a single year. EPA uses this as a screening tool only.
- **The monetized value of health impacts, for at least some measures, can be significant.** Based on the RTF Staff Report, The ductless heat pump example shows that the potential health impacts are significant (the estimated benefits per unit of energy saved are on the same order of magnitude as the value of conserved electricity).

#### **RTF Feedback on Technical Issues Raised by the Ductless Heat Pump Example**

##### *Reliability of Existing Estimates for Quantifying Changes in Wood Use*

The RTF estimates of energy savings and wood smoke reduction resulting from the ductless heat pump measure rely on one of the RTF's most robust measure analyses. Specifically, this analysis is based on a large sample (3,400) of billing data and set of metering data (approximately 100 sites). The wood use change estimates for other RTF measures do not meet this same quality standard. That being said, if asked, the RTF at this time does not have a consensus position as to whether the ductless heat pump analysis is sufficient for quantifying changes in wood smoke.

If the Council determines that such health impacts should be included in future cost effectiveness analyses, the RTF suggests weighing the following considerations when determining the appropriate level of precision to quantify energy efficiency related wood use reductions:

- **Account for differences within specific heating zones.** The RTF developed its current wood use estimates based on heating zone. Health impacts, however, are very sensitive to geographic variations in wood consumption and population density. Differences in wood consumption and population density should be considered when

attempting to quantify the directly attributable health impacts of changes in wood use.

- **Use of control groups would help to account for outside drivers.** Wood use is volatile and is not necessarily tied to an energy efficiency decision. Therefore, control groups to account for outside drivers (such as burn bans) would ensure a more robust analysis.
- **A more sophisticated dispersion model may require more granular inputs.** The RTF did not spend any resources to investigate the data input requirements of the more sophisticated tools used by the EPA. It is reasonable to assume that they may require more granular data inputs at the county level.

### *Resources Requirements*

The RTF spent approximately \$100,000 on the analysis to date, plus used an additional 10 hours of RTF meeting time to review work. This does not include the resources that went into collecting the initial billing and interview data about ductless heat pumps. Further assessment will be required to understand the relationship between wood use and the installation of an energy efficiency measure. There would also need to be regular studies to understand wood use changes. The required resources are likely beyond just Council and RTF resources.

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December 2, 2014

### MEMORANDUM

**TO:** Council Members

**FROM:** Pat Smith and Jim West, RTF PAC Co-Chairs

**Subject:** Regional Technical Forum (RTF) Policy Advisory Committee (PAC)  
Feedback on RTF Technical Considerations Around Quantifying The  
Health Impacts From Changes In Wood Smoke Emissions

Since July 2013 the RTF PAC has been following the work by the RTF, Staff, and technical consultant Abt Associates around the quantification and monetization of health impacts from reduced wood smoke emissions. This work was undertaken within the context of better understanding potential non-energy benefits (NEBs) resulting from installed energy efficiency measures. Because robust data exists for ductless heat pump installations, this was selected as the best representative measure for the study.

In separate memoranda, the RTF is informing the Council of their perspective on the technical considerations involved in quantifying the health impacts from changes in wood smoke emissions that may be attributable to specific energy efficiency measures, should the Council ultimately decide that such health impacts should be included in future cost effectiveness analyses. While the RTF PAC members discussed many of the same issues that the RTF worked through, the PAC sought to arrive at a consensus opinion and feedback that is relevant to its specific responsibilities regarding the RTF. The PAC is not making an independent recommendation on the topic of health benefits from reduced wood smoke emissions, nor is it commenting on the broader issue of the methodology for determining quantifiable environmental costs and benefits.

## Feedback from the RTF PAC

The PAC agrees with the memo from the RTF to Council Members and makes several observations. The PAC notes that the memo addresses only wood smoke reductions from ductless heat pumps, and that each measure that interacts with the heating system would need to be assessed separately. Additionally, the PAC notes that while wood use estimates associated with ductless heat pumps rely on one of the RTF's most robust data sets, wood use estimates for other RTF measures do not meet this same quality standard.

While the RTF PAC acknowledges that the work to date is consistent with the RTF Work Plan and priorities, it will monitor the impacts on the RTF budget should additional analyses be recommended. The \$100K cost of this study is approximately 7% of the RTF's annual budget, and the work to date has not resulted in a consensus opinion from the RTF as to whether the analysis is sufficient for quantifying changes in wood smoke. The issue is important and complex. Any significant investment to continue this line of study would be over and above the approved RTF budget and work plan.

The PAC will also monitor the impacts on the RTF Work Plan scope should additional analyses be recommended. The activities in the approved Work Plan are challenging and crucial, and fall directly within the technical expertise of RTF members. Most activities described in the methodology for quantifying health effects from wood smoke require expertise that is not part of the RTF's capabilities or scope.

The RTF has operated with a high level of transparency around the work to quantify the health impacts associated with wood smoke reduction. For well over a year the RTF Staff has been updating the PAC on these efforts beginning with a heads-up that this was a topic of emerging importance, and following up with regular updates on the RTF's consideration of the topic, the decision to engage an outside consultant for technical expertise, RTF budget implications, recommendations for the study approach, and results of the study. The PAC and stakeholders appreciate this level of engagement.

The PAC observed a range of opinions on the RTF around this topic. Similarly, PAC members expressed a range of opinions. This is not surprising given the significance of the policy implications from this issue. The RTF PAC looks forward to the continued regional discussions on this topic.

The RTF PAC appreciates the opportunity to provide this feedback.