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October 28, 2014

MEMORANDUM

TO: Council members

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 monetize health effects resulting from changes in wood smoke attributed to energy efficiency measures. Staff expects this analysis will be informative to the Council as it develops its methodology for determining quantifiable environmental costs and benefits for the Seventh Plan.

The RTF contract analysts, with support of an RTF subcommittee and RTF staff, have conducted an analysis exploring the question: Can changes in wood smoke be directly attributed to specific energy efficiency measures and, if so, can the resulting health effects be quantified both in physical and monetary terms? The analysis uses an example measure (ductless heat pumps) to step through a methodology established by air quality regulators.

There are four steps in the methodology (1) quantifying changes in wood emissions, (2) conducting dispersion modeling to quantify the resulting changes in pollutants, (3) quantifying the health effects from changes in pollutant levels, and (4) monetizing those health effects. While the RTF has limited expertise to inform Steps 2 through 4, the contract analysts

explored the underlying science behind these steps to understand how this methodology could be applied to energy efficiency measures.

The resulting analysis is captured in a detailed, technical report. The report concludes that it is possible to quantify changes in wood smoke resulting from some electric energy efficiency measures that reduce supplemental wood heating. By relying on the methodology used by air regulators, the resulting health effects can be quantified and monetized. The report recognizes that the range of estimates has wide bounds, but that even at the low end, the impacts on cost-effectiveness would be significant for some energy efficiency measures. While the report focuses on the ductless heat pump program example, staff recognize that this interaction with wood smoke may be present in any measures that interacts with a home's electric heating load when there is significant supplemental wood heating.

Both the RTF and the RTF Policy Advisory Committee (RTF PAC) have reviewed and discussed the draft report. These discussions have raised additional questions about the practical considerations of embarking on this analysis, including questions of resources, boundaries, and defining the Council role. The RTF staff are summarizing these considerations in a cover memo to the report for further review by the RTF at their November 18 meeting. The RTF PAC will also meet again to discuss the framing of these considerations and any RTF decision. The expectation is that any recommendation from the RTF and/or RTF PAC will be presented to the Council with the final wood smoke analysis at the December meeting.

Relevance This analysis speaks directly to 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 home with supplemental heat, wood supplies 25 to 50% 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 estimates were based on an Ecotope Consulting analysis of 3,400 homes. The analysis demonstrated energy 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 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 that displacing wood smoke was on the order of ten times the retail cost of energy.

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 a ductless heat pump program as an example based on its existing analysis and data available.

More Info: N/A

RTF Wood Smoke Analysis: Investigation into the monetization of health effects attributed to efficiency measures

November 4, 2014

Purpose of Today: Provide Some Background and an Update



**The technical analysis is complete, but we are still working
with the RTF and RTF PAC to frame the analysis within the
context of our work.**

Outline for Today

- Background on investigation and link to the Council decision on the environmental methodology for the Seventh Plan
- Findings from RTF staff technical report
- Highlights from RTF and RTF PAC discussions and next steps

Environmental Methodology (1)

- In the coming months, the Council will be determining the environmental methodology for the Seventh Plan
- Relevant provisions of the Northwest Power Act:
 - Section 4(e)(3)(C): Power Plan is to contain a “methodology for determining **quantifiable environmental** costs and benefits under section 3(4)”
 - Section 3(4) (definition of “cost-effective”): Estimate of all **direct** costs of a resource over its effective life, including ... such quantifiable environmental costs and benefits as the Administrator determines, on the basis of a methodology developed by the Council as part of the plan, ... are **directly attributable** to such measure or resource.”

Environmental Methodology (2)

- In September, the Council released an issue paper on Methodology for Determining Quantifiable Environmental Costs and Benefits
- Section 3. Quantifiable environmental benefits
 - "... whether the Council can and should factor into the costs of a *new* resource the "benefit" of being able to reduce some "existing" activity that has an environmental cost?"
 - "Is it possible to quantify these kinds of environmental benefits?"
 - "Can these benefits be said to be the "direct" benefits of and "directly attributable" to a new resource..?"

The RTF investigation aims to help inform this decision.

Example: Ductless Heat Pump Impact on Wood Smoke



Background on RTF Analysis

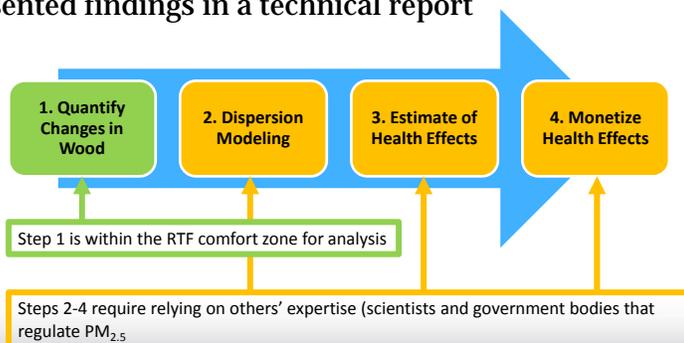
- **Efficiency Program Impact:** ductless heat pumps replacing zonal electric heating also displace some supplemental wood heat
 - RTF accounts for resulting reduction in wood purchases in cost effectiveness calculation
- **Wood Smoke Effects:** EPA and other regulatory bodies have established that pollutants from wood smoke can impact human health and the changes in health impacts can be quantified and monetized
 - Primary pollutant of interest are particles that are smaller than 2.5 microns (PM2.5)
 - Screening study showed that large, uniform changes in wood smoke in PNW (and resulting PM2.5) could result in significant health benefits valued to be greater than the value of electricity

Our Investigation Attempts to Answer the Question:

- Can changes in wood smoke (*existing activity*) be **directly attributed** to specific energy efficiency measures (*new resource*) and, if so, can the resulting health effects from those changes be **quantified** both in physical and monetary terms?

RTF Staff Analysis

- Contract analysts dug into the established process for monetizing the health effects from changes in wood smoke
- Presented findings in a technical report



The Report: What it is and is not

The analysis explores:

- An example program to understand attribution and quantification potential
- Data requirements and uncertainty throughout the quantification process
- Methodology for monetizing health effects to understand how the RTF *might* apply it to its work

The analysis does not:

- Establish a monetary value of the health effects from reduced wood smoke related to DHP programs
- Make judgments on the validity of work outside of the RTF area of expertise
- Recommend whether the RTF should include this analysis in its measure work

General Observations from RTF Discussion of Report (1)

There was general agreement (no formal vote) as to the following high level concepts:

1. Installation of ductless heat pumps directly resulted in quantifiable amount of lower wood use, hence less wood smoke emissions.
2. There is a thoroughly tested and peer reviewed process used by the EPA to convert wood smoke emissions reductions into quantifiable and monetizable health benefits.
3. Preliminary estimates of these health benefits are significantly larger, perhaps an order of magnitude, than the value of their energy savings.

General Observations from RTF Discussion of Report (1)

4. Given sufficient resources and time, the range of uncertainty surrounding the estimated monetary value of the health benefits produced by the installation of ductless heat pumps could likely be narrowed.
5. More sophisticated modeling that might narrow the band of uncertainty of health benefits will require additional resources to run and may require input data not currently available.

Upcoming Policy Question for the Council

DHP impact on wood smoke is an example that the Council may consider in its environmental methodology. In exploring this question, staff have grappled with several questions:

- **Is this a benefit?**
 - EPA, through the states, regulates ambient PM2.5 levels, the answer may be different for areas in attainment verses those in non-attainment
- **Is the benefit directly attributable to the measure?**
 - Demonstrated wood reduction with installation of ductless heat pump; connections to health impacts relies on expertise of EPA and others
- **Is the benefit quantifiable?**
 - Example demonstrates it is doable, but at a cost

Not trying to answer today...

Next Steps

- Staff refining the report and developing a cover memo to reflect previous RTF feedback
- RTF will revisit the topic at their November 18 meeting and vote on whether the cover memo accurately reflects the findings of the group
- RTF PAC will meet in late November to review RTF decision and consider its own recommendation to the Council