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July 30, 2013

MEMORANDUM

TO: Power Committee

FROM: Tom Eckman, Charles Grist and Nick O'Neil

SUBJECT: Study of Non-Energy Environmental Benefits of Energy Efficiency Measures that Displace Wood Burning

The agenda for the Power Committee meeting on August 6 includes a report on a study to estimate the health benefits of energy efficiency measures that displace wood burning.

The Regional Technical Forum (RTF) is in the process of establishing or updating its savings and cost-effectiveness estimates for a wide range of residential space heating energy efficiency measures, including residential weatherization, ductless and air-source heat pumps and duct sealing. The RTF analysis to date has revealed that improvements in energy efficiency resulting from these space heating measures significantly reduced the use of supplemental wood heat in homes with electric heating systems.

The reduction in supplemental wood use has two impacts. One impact has to do with how the economic costs and benefits of the energy efficiency measure are calculated, factoring in not just the cost of the measure itself but also the effect of the cost savings to the consumer of having to buy or obtain less wood. Because consumers were able to more affordably heat their homes with electricity, they reduced their wood use. The reduction in wood use results in lower wood heating cost, either by directly offsetting the cost of purchasing wood, or indirectly by reducing the labor and other cost associated with collecting and transporting the wood to its point of use. An additional factor to consider is the price per cord of wood - when that falls, the value of the measure can be reduced.

The second impact is the important one for this discussion, concerning environmental and health benefits. The reduction in supplemental wood use resulting from residential space heating efficiency measures also resulted in lower emissions of air pollutants. Some of the emissions associated with wood burning devices such as wood or pellet stoves and fireplace inserts have demonstrated negative health impacts. Under the Clean Air Act, the Environmental Protection Agency (EPA) has established limits on the amount of fine particulates (PM_{2.5} and PM₁₀) in order to protect public health. There are 20 areas across the Northwest (e.g., Tacoma, Eugene, and Missoula) that have been designated as "non-attainment" areas by the EPA - areas that

exceed the particulate limits set by the EPA. Reductions in wood heat particulate emissions in these areas are expected to reduce impacts on human health, specifically illness and death from respiratory diseases such as asthma and COPD. In establishing the particulate limits, the EPA has developed statistical models that are able to quantify the health benefits of reduced emissions as well as estimate their economic value.

The RTF is reviewing a range of potential options for incorporating environmental (e.g., air emissions) benefits of reduced wood heat usage in its cost-effectiveness calculations for residential energy efficiency measures. The RTF does not have expertise in the area of air emissions and their impact on public health, so the RTF has convened a subcommittee to provide guidance on a possible methodology for estimating a monetary value for the health benefits from reducing wood smoke in the Pacific Northwest. The subcommittee has also been tasked with investigating the feasibility of hiring a contractor to use EPA's models to quantify and estimate a monetary value for health impacts of reduced wood smoke emissions and to assess the level of uncertainty surrounding such estimates. This subcommittee will also make recommendations to the RTF on the reliability of the estimates if included in regional cost benefit calculations. We anticipate that this work by the RTF and the subcommittee will be carried out over the course of the next several months.

Proposed Path Forward:

The RTF subcommittee's discussion of the analysis needed is just getting underway. RTF staff will keep the Council fully apprised of the subcommittee's work including any specific modeling work that may be proposed.

The cost-effectiveness of any efficiency measure or resource is to be determined by the Council as set forth in the Northwest Power Act. Section 3(4) of the Act defines "cost-effective" as a measure or resource that will be reliable and available when needed. In order to be considered cost-effective, the measure or resource must also meet or reduce consumers' demand for electric power at an estimated incremental system cost no greater than that of the least-cost similarly reliable and available alternative measure or resource. In estimating the "system cost," Section 3(4) directs the Council and Bonneville to include, among other factors, the "quantifiable environmental costs and benefits" directly attributable to the resource or measure.

When determining the cost effectiveness of high-efficiency clothes washers and dishwashers, the Council has historically included such *economic* benefits as the cost reductions resulting from lower water and detergent consumption. But the quantification of environmental costs or, especially, *environmental benefits* that are directly attributable to a specific measure or resource always presents both technical and policy challenges. And in this instance the determination is different from the cost-effective determinations the Council has made in the past. The Regional Technical Forum's work on the issue can provide the Council with the technical analysis necessary to make the appropriate cost-effective determinations for the various residential heating efficiency measures.

Note that the health impacts study is just one step in a process of estimating the environmental benefits of residential energy efficiency measures. The staff will return to talk with the Committee in future meetings about the broader technical and policy aspects of determining quantifiable environmental benefits and costs.

Quantifying Health Impacts of Wood Smoke

**Power Committee
August 6, 2013**



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Outline

- **Regional Act requirements**
 - and RTF Guidelines
- **RTF identified wood smoke emission reduction due to electric efficiency measures**
- **Health impacts from wood smoke particulate reduction can be estimated in monetary values & possibly significant**
- **RTF looking at options for health impacts study**
- **This is a head's up, no Council action needed yet**
 - Including health impacts as quantifiable in monetary values is new territory for Council and RTF



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Regional Act Context: Section 3(4) Cost-effectiveness

“System cost” is defined to mean “an estimate of all direct costs of a measure or resource over its effective life,” including, “among other factors”:

- cost of distribution and transmission to the consumer, if applicable
- waste disposal costs
- end-of-cycle costs
- fuel costs (including projected increases)
- *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*



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RTF Guidelines

- RTF Guidelines describe analysis of costs & benefits
- RTF Guideline (section 4.5) address “other non-energy” cost & benefits
 - “should be included in a measure’s cost analysis if it can be sufficiently demonstrated to the RTF that the impacts are significant and monetizable.”



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Wood Smoke & Particulates

- Multiple residential efficiency measures have been shown to reduce wood heat use
- Wood smoke contains small particles (PM-2.5), which are the major health problem
- There is a quantifiable relationship between mortality rates for COPD and fine particulate (PM-2.5) concentrations in air
- It's a significant issue across the PNW
 - NW has 20 *non-attainment* areas for PM-10/2.5, including Tacoma, Eugene and Missoula
 - Another 14 areas near the edge
 - Health impacts may also be significant in non-attainment areas



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Quantification of Health Impacts is New Analytical Territory

- Only prior health issues related to indoor air quality impacts of weatherization
 - Health impacts not directly considered in cost-effectiveness analysis
 - Mitigation required for potential impacts of increased radon gas concentrations resulting from home weatherization
- Why include health in cost-effectiveness now?
 - Fine particulate causes measurable health impact
 - Areas of high wood heat penetration in PNW
 - Demonstrated *direct* and *significant* impact of residential efficiency measures
- Tools to quantify impact and estimate monetary value of health benefits are now available from air quality field



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RTF Actions

- **Cursory review to date (June)**
 - Wood smoke emissions offset value could be high
 - One estimate 2x to 20x value of electricity savings
- **RTF recognized need for analytic help from air quality and health experts**
- **Subcommittee created**
 - Review alternatives methods and models
 - Determine availability of model data requirements
 - Assess potential to arrive at estimated monetary value of health benefits from reduced wood smoke emissions



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Analytical Issues To Be Addressed by RTF Subcommittee

- **Scope of analysis:**
 - What health impacts should be included?
 - COPD or others too?
 - What emissions should be considered?
 - PM-2.5, air toxics, VOC, NO_x, HAPS?
 - What geographic area should be included?
 - State/utility boundaries & cross-boundary issues
 - Should the net impact of increased emissions from replacement generation be included?
 - Time frame of analysis
- **Which models are most appropriate for use?**
 - Several options are emerging
- **Cost of analysis: \$20K to \$200K+**



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Potential Council Issues, But No Action Needed Yet

- Council may want to ask RTF Policy Advisory Committee (PAC) to review policy implications of RTF analysis and findings
- Council may be ask to determine if RTF's quantification of monetary value of specific health impacts meet conditions of Act
- Council may be asked to incorporate RTF's findings into Seventh Plan