Northwest **Power** and **Conservation** Council

June 6, 2017

MEMORANDUM

TO: **Council members**

FROM: **Jennifer Light, Charlie Grist, and Ben Kujala**

SUBJECT: **Direction to Regional Technical Forum on Treatment of Fuel Choice**

BACKGROUND:

Presenter: Jennifer Light, Charlie Grist, and Ben Kujala

Summary: The Regional Technical Forum (RTF) needs to use a consistent framework for deciding how to estimate savings for efficiency measures where fuel choice is part of the decision to adopt a measure. The Council's direction on a framework will guide future RTF determinations of savings for measures where consumers have the option of selecting fuel source. These choices typically occur for space or water heating measures.

The potential for end use consumers to choose one fuel or another when adopting an efficiency measure has significant impact on the actual energy savings on the electric grid. Therefore, it is important to understand the baseline assumption, and whether that includes fuels other than electricity, to get the electric savings right. However, the RTF has struggled with how to estimate baselines for fuel-choice measures in advance of measure development. Recognizing the savings implications of any decision on baseline was largely a policy decision, the RTF asked staff to solicit a recommendation from RTF Policy Advisory Committee (PAC) for a decision making framework to address these measures. As a policy advisory committee to the Council, the PAC developed a policy

recommendation for the Council's consideration. Staff has also reached out to other stakeholders, primary commission staff and natural gas industry representatives, for input on the matter. Staff will present the question and feedback to date for Power Committee discussion and consideration. Staff plans to bring the question to the full Council at its July meeting for a decision and final direction to the RTF on this matter.

Relevance: The RTF savings estimates are used broadly in the region to support efficiency program planning, implementation, and evaluation. These savings estimates also are a key input to the conservation potential in the Power Plan. Given the import of these estimates, the RTF strives to reliably estimate electric energy savings, relying on data where possible, and technical judgment where necessary. Key to determining accurate savings is to have an accurate understanding of the consumption in the baseline. When fuel choice is part of a measure, a reliable representation of any potential fuel switching from other fuels to electric is critical for estimating energy savings. Without clear data on this, the RTF is seeking direction for how to proceed, being mindful of the Council's Fuel Switching Policy. The Council's Fuel Switching policy suggests taking market-oriented approaches to encouraging efficient fuel-choice decisions in the region.

Workplan: A.1.4 Conservation. Continue to lead the Regional Technical Forum and engage in the development and approval of measure savings estimates and protocols.

Background: Over the past several months, the RTF has struggled to develop a baseline from which to estimate energy savings for a handful of measures for which that baseline has the potential to include choice of other fuels. Traditionally, the RTF has addressed this in two ways:

(1) Restricting the measure in such a way to eliminate the potential for other fuels. For example, the RTF's existing heat pump water heater measure currently requires the replacement of an electric water heater in an existing house with this new, efficient option. To claim savings for this measure, efficiency programs are required to ensure that the previous water heater was in fact electric.
(2) Developing whole house new construction measures that provide multiple paths, one of which includes measures for gas-heated homes. This allows the RTF to assume that if the efficient path chosen was the "electric path" it was likely that the builder was planning to build electric already.

By restricting measures in this way, the RTF is able to establish a clear electric baseline and determine the resultant energy savings without concerns that the efficient electric option is replacing a gas (or other fuel) option.

Recently, the RTF has received a handful of new measure requests that seek fewer restrictions on confirming the existing unit. The three examples to date are:
(1) Heat pump water heater in new construction,
(2) Ductless heat pump in new construction, and
(3) Heat pump water heater with an incentive to distributors/retailers.

For the first two—new construction—there is no reliable way to know exactly what a builder would have built if it did not select the efficient electric option. It is possible that a builder might have chosen space or water heating equipment that used gas or other fuels. For the heat pump water heater being incentivized at the distributor, the program is essentially buying down the cost of the water heater for the distributor to stock and sell. Because of this, there is often no practical way to know exactly where the water heater ended up (in a new house, an existing house with an electric water heater, or an existing house with a gas water heater). For each case, the RTF is being asked to make a decision, *a priori*, as to what the builder would have built otherwise or whether that water heater would replace a gas or electric unit in order to establish a baseline and estimate savings.

The reason that knowing what the builder would have built otherwise and what water heater would be replaced is important is that these are lost opportunity measures. That is, there is a point in time—the building of a house or the replacement of a failed water heater—for which a builder or consumer has the opportunity to make an energy efficient upgrade. For all such measure, the RTF uses the average market efficiency to determine the baseline. An easy example of this is a screw-in lightbulb that burns out in your home. Because the lamp has burned out, you must replace it with one that is on the market. Since the RTF cannot know exactly what new light you will choose to buy, the RTF looks at the average purchases of all consumers buying screw-in lamps to determine a market average mix of lamps. If you then purchase an efficient LED, the savings are the difference in the consumption of the efficient LED and the market average lamp. This methodology ensures consistency with the Council's methodology for avoiding double counting with the demand forecast and the conservation potential.

When looking at a technology that has multiple fuel option, it is important to either restrict the measure to more clearly define the market average baseline or understand the potential for fuel switching. Starting with just individual examples: let's take an individual that replaces his failed, electric water heater with a new heat pump water heater. The electric savings are the difference between the new efficient option and the average efficiency of electric water heaters being purchased in the market. If, for example, another person replaces her existing gas water heater with a new electric one; this would result in negative electric savings as there is new electric load on the grid, but would also result in positive gas savings.

Since the RTF cannot restrict these measures to just the electric market, and it does not know *a priori* what a builder would have built or what water heater would be replaced, it must make an assumption about the baseline. This includes assumptions about what consumers are choosing and whether the efficiency measure itself might result in fuel switching. To find a path forward, the RTF sought policy direction on a decision making framework for how to consider other fuels in the baseline for such measures going forward.

Staff brought the RTF question, along with the Council's Fuel Switching Policy to the RTF Policy Advisory Committee for discussion and consideration. Staff also reached out to commission staff, NW Natural, and Northwest Gas Association. The goal of these discussions was to bring an RTF PAC recommendation, along with any other feedback, to the Council for consideration and, ultimately, direction to the RTF. The RTF PAC finalized their proposed framework (attached). There was one dissenting vote from Avista, who provided a minority opinion for the Council's consideration (also attached). As of the writing of this memo, staff have not yet received any official position from the natural gas utilities.

More Info: RTF Policy Advisory Committee Recommendation
Avista's Minority Opinion
Council's Fuel-Switching Policy

RTF Policy Advisory Committee Recommendation to the Council

Proposed Decision Making Framework for Measure Baselines with Fuel Choice

When the RTF analyzes a measure for which consumers have a fuel choice (ex: water heaters and HVAC), the RTF should assume efficiency programs have no impact on consumers and builders with respect to fuel choice. The PAC recognizes that this is not a perfect assumption. Markets are complex, and efficiency programs are only one factor informing fuel choice. Therefore, as a starting assumption, the RTF should assume no impact on other fuels verses electric market share. This results in a starting assumption of 0% other fuels in the baseline. At this time, the PAC does not feel there is sufficient data to inform an assumption other than 0%. The RTF and RTF PAC will continue to monitor this assumption going forward.

The RTF will develop a Research Strategy for leveraging existing market studies (example: stock assessments, market models) to monitor the change in market share and identify significant differences in market share of other fuels verses electric, relative to the Council's regular fuel choice studies (without focusing on attribution), which might result in a different assumption.

Avista's Minority Opinion

To the members of the Power Council:

We at Avista have some discomfort in using a zero gas baseline in calculating the electrical savings from midstream, new construction and retrofit before burnout measures based on the fact that gas makes up over 60% of the actual market. We understand that while fuel switching is small given the barriers in place for switching from natural gas to electric in retrofit situations, the low cost of natural gas and the lack of understanding of the costs of operating even high efficiency electric appliances make the midstream and new construction areas problematic. We have witnessed electric utilities on our borders offer incentives to developers to not bring in natural gas to the development at all. While these types of things seldom happen, it is not zero. Also high incentives on electric devices and little or no incentives on natural gas devices can give the impression that it is better to go with electric. Finally, fear is being used to direct people from using natural gas. The example being in the PAC meeting where one member used the term "go gas, go boom", a completely inappropriate reference. Because of all of these reasons, the value is not zero and the immediate impact to the region will be an over estimated savings from these measures. Our preference would be to have a completely different savings value where natural gas is available and one where it is not. But in lieu of that our preference is to start instead with a reasonable estimate of 2% to 6% natural gas to electric conversion. It should have little impact on the cost effectiveness of the measures, but will reflect the actual conditions in the marketplace. In short, we believe these measures will not only help electric only utilities, but our customers in areas where gas is not available, but we do not believe in starting with a zero value knowing that is not correct. We know and continue to communicate to customers that are trying to control costs and minimize their energy footprint, that the end-use of natural gas will remain an economic and attractive option for consumers [into the future] and that, as such, fuel switching should continue to occur in some measure.

Dan Johnson, PE
Director, Energy Efficiency

The Council's Fuel Switching Policy

The Council recognizes that there are applications in which it is more energy efficient to use natural gas directly than to generate electricity from natural gas and then use the electricity in the end-use application. The Council also recognizes that in many cases the direct use of natural gas can be more economically efficient. These potentially cost-effective reductions in electricity use, while not defined as conservation in the sense the Council uses the term, are nevertheless alternatives to be considered in planning for future electricity requirements.

The changing nature of energy markets, the substantial benefits that can accrue from healthy competition among natural gas, electricity and other fuels, and the desire to preserve individual energy source choices all support the Council taking a market-oriented approach to encouraging efficient fuel decisions in the region.

Direction for the RTF on Treatment of Fuel Choice

Jennifer Light, Charlie Grist, and Ben Kujala

June 13, 2017

Presentation Overview

- Provide background on the question being asked and how it came about
- Reminder of the Council's fuel switching policy
- Describe engagement with stakeholders and their input on the direction

Background

Why are we here?

- The RTF is seeking a decision making framework for how to estimate savings for measures that might result in fuel switching.

Why does this matter?

- If some portion of new electric units replace existing gas units, there are negative electric (but positive gas savings)
- RTF aims to get reliable electric savings estimates, and therefore is seeking a way to properly account for this potential impact on electric savings

Reminder on How the RTF Estimates Savings

Lost Opportunity Measures

1. Something has died and needs to be replaced (examples: lighting, appliances, water heaters, etc.)
2. New load is being added to the system (example: new construction)

Because someone is required to purchase something new, savings are determined by taking the difference in energy use between the average unit on the market and the efficient option

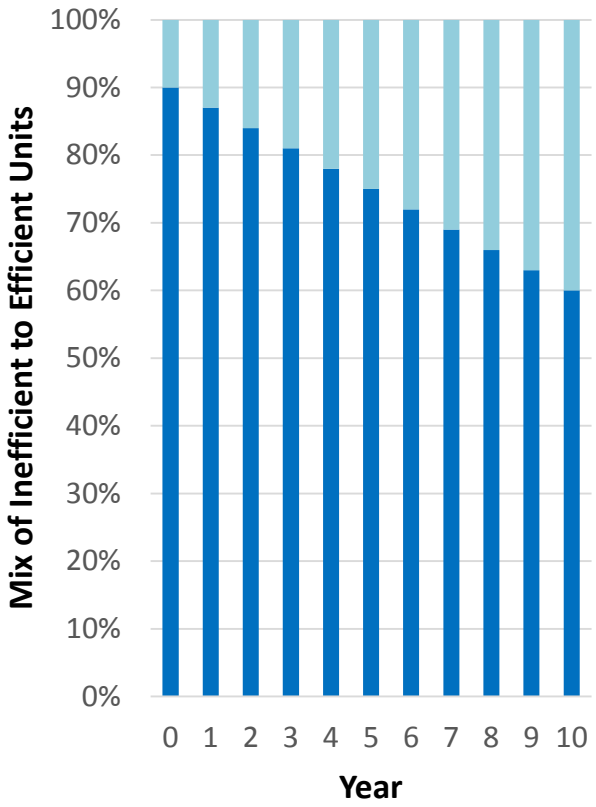
Reminder on How the RTF Estimates Savings

Lost Opportunity Measures

Demand forecast assumes some improvements in consumption over time.

Example:

- 90% of the existing stock is inefficient
- Sales data show that the current market mix is 60% inefficient and 40% efficient
- Every year 10 units burn out and must be replaced; the forecast assumes these are replaced at today's market mix of 60/40
- This results in efficiency improvements in the frozen efficiency demand forecast over time

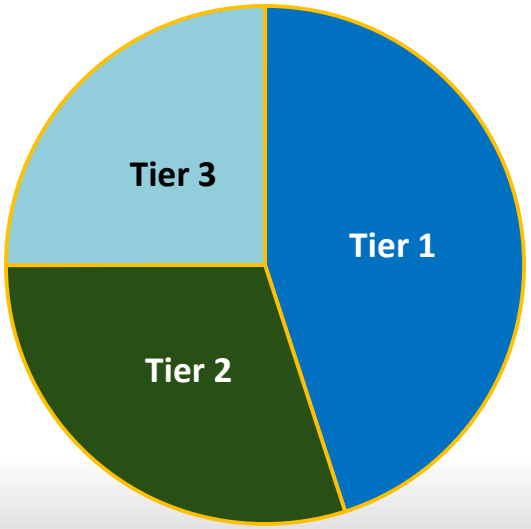


Reminder on How the RTF Estimates Savings

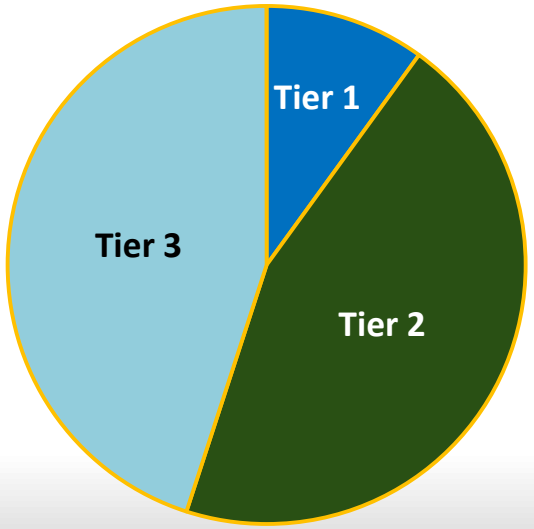
Lost Opportunity Measures

Savings occur when there is an improvement in efficiency of the market mix of units being purchased

Market Mix in Year 1



Market Mix in Year 10



Reminder on How the RTF Estimates Savings

Lost Opportunity Measures

- John's lamp burned out and he needs to replace it
- He goes to the store and buys a new efficient LED bulb
- Savings are estimated by looking at the difference in efficiency between the lamp that John bought and the average efficiency of all the lamps bought by Johns and Janes in the region

Reminder on How the RTF Estimates Savings

Lost Opportunity Measures

- John's lamp burned out and he needs to replace it
- He goes to the store and buys a new efficient LED bulb
- Savings are estimated by looking at the difference in efficiency between the lamp that John bought and the average efficiency of all the lamps bought by Johns and Janes in the region

The challenge comes, when the market options include a mix of gas and electric equipment…

Heat Pump Water Heater Example

Installation of a new heat pump water heater replacing an electric water heater in existing homes.

Residential Hot Water Market

85%

+ gas water heater 45% ➡ 78% inefficient, 22% efficient

+ electric water heater 55% ➡ 98% electric resistance, 2% heat pump

15%

+ gas water heater 90% ➡ 72% inefficient, 28% efficient

+ electric water heater 10% ➡ 95% electric resistance, 5% heat pump

Approximate numbers

Heat Pump Water Heater Example

Installation of a new heat pump water heater replacing an electric water heater in existing homes.

Residential Hot Water Market

+ gas water heater

+ electric water heater

+ gas water heater

+ electric water heater

Meaning, we can check that:

- ❑ A heat pump water heater is installed
- ❑ It went into an existing home
- ❑ It replaced an electric water heater

Heat Pump Water Heater Example

Installation of a new heat pump water heater replacing an electric water heater in existing homes.

Residential Hot Water Market

+ gas water heater

+ electric water heater

Market average efficiency:
98% electric resistance water heaters
2% heat pump water heaters

+ gas water heater

+ electric water heater

Approximate numbers

Heat Pump Water Heater Example

Purchase of a new heat pump water heater.

Residential Hot Water Market

85%

+ gas water heater 45% ➡ 78% inefficient, 22% efficient

+ electric water heater 55% ➡ 98% electric resistance, 2% heat pump

15%

+ gas water heater 90% ➡ 72% inefficient, 28% efficient

+ electric water heater 10% ➡ 95% electric resistance, 5% heat pump

Approximate numbers

Heat Pump Water Heater Example

Purchase of a new heat pump water heater.

Residential Hot Water Market

+ gas water heater

+ electric water heater

+ gas water heater

+ electric water heater

Meaning, we can check that:

- ❑ A heat pump water purchased

But, we don't have any other information as to where the water heater went…

Heat Pump Water Heater Example

Purchase of a new heat pump water heater.

If we think new units can go anywhere in the market…

Residential Hot Water Market

+ gas water heater

+ electric water heater

+ gas water heater

+ electric water heater

Market average efficiency:
Accounts for the mix of gas and electric options, and their respective efficiency levels, across the mix of housing stock in the market.

Heat Pump Water Heater Example

Purchase of a new heat pump water heater.

If we think new units can go anywhere in the market…

Residential Hot Water Market

85%

+ gas water heater 45% ➡ 78% inefficient, 22% efficient

+ electric water heater 55% ➡ 98% electric resistance, 2% heat pump

15%

+ gas water heater 90% ➡ 72% inefficient, 28% efficient

+ electric water heater 10% ➡ 95% electric resistance, 5% heat pump

Estimated savings: 280 kWh and 50 therms

Approximate numbers

Heat Pump Water Heater Example

Purchase of a new heat pump water heater.

If we think new units only end up in houses that would otherwise be electric…

Residential Hot Water Market

+ gas water heater

+ electric water heater

+ gas water heater

+ electric water heater

Market average efficiency:
Accounts for the different electric efficiency levels between the two housing types.

Heat Pump Water Heater Example

Purchase of a new heat pump water heater.

If we think new units only end up in houses that would otherwise be electric…

Residential Hot Water Market

85%

+ gas water heater

+ electric water heater → 98% electric resistance, 2% heat pump

15%

+ gas water heater

+ electric water heater → 95% electric resistance, 5% heat pump

Estimated savings: 1,250 kWh

Heat Pump Water Heater Example

Purchase of a new heat pump water heater.

Depending on how you define your market, the savings will vary significantly.

Residential Hot Water Market

+ gas water heater

+ electric water heater

+ gas water heater

+ electric water heater

Market Option	Savings
All products	280 kWh electric savings 50 therms gas savings
Only electric products	1,250 kWh electric savings

Fuel Switching Policy

The Council recognizes that there are applications in which it is more energy efficient to use natural gas directly than to generate electricity from natural gas and then use the electricity in the end-use application. The Council also recognizes that in many cases the direct use of natural gas can be more economically efficient. These potentially cost-effective reductions in electricity use, while not defined as conservation in the sense the Council uses the term, are nevertheless alternatives to be considered in planning for future electricity requirements.

The changing nature of energy markets, the substantial benefits that can accrue from healthy competition among natural gas, electricity and other fuels, and the desire to preserve individual energy source choices all support the Council taking a market-oriented approach to encouraging efficient fuel decisions in the region.

Fuel Switching Policy Context

- Last reaffirmed in March 2015
- Some form of market-oriented approach has been used since the First Power Plan in 1982
  - Current policy states 1) Changing nature of markets and 2) desire to preserve individual energy source choices "support the Council taking a market-oriented approach"
- The 7th Plan, Appendix N: Direct Use of Natural Gas has the latest iteration of the Council's study of consumers decisions and market trends

Fuel Switching Policy Implications

- Originally, the fuel switching policy was to prevent switching from electricity to natural gas end-uses as a form of conservation – i.e. **direct** and intentional measures designed to displace electricity with gas (or wood) and call it electric conservation
  - The natural gas companies also argued after the first power plan that energy efficiency payments would incentivize the use of more electricity
- Improvement in electric end-use technology and electric generation along with concerns about carbon dioxide emissions from natural gas end-uses have the potential to push markets and/or regulation toward broader electrification
- Efficiency program incentives on end-use technologies could tip the balance on decisions comparing natural gas to electric appliances – even when the incentives are intended to displace less efficient electric or gas appliances

Implementing the Council's Fuel Switching Policy at the RTF

What does it mean to take a "market-oriented approach to encouraging efficient fuel decisions in the region"?

Residential Hot Water Market

+ gas water heater

+ electric water heater

+ gas water heater

+ electric water heater

- If we include some level of gas in the baseline, therefore implying that at least some fraction of gas units change to electric, does that conflict with this policy?

Implementing the Council's Fuel Switching Policy at the RTF

What does it mean to take a "market-oriented approach to encouraging efficient fuel decisions in the region"?

Residential Hot Water Market

+ gas water heater

+ electric water heater

+ gas water heater

+ electric water heater

- If we include some level of gas in the baseline, therefore implying that at least some fraction of gas units change to electric, does that conflict with this policy?
- If we focus only on electric units, will we get the savings right?

Engagement with the RTF Policy Advisory Committee

- RTF PAC is an advisory committee to the Council on policy and funding issues for the RTF
- Brought this question to the RTF PAC in February, continued the discussion at their May meeting
- RTF PAC voted on a framework recommendation to bring to the Council
  - Avista was the dissenting vote and has provided their own recommendation

PAC Recommendation

- The RTF should assume efficiency programs have no impact on consumers and builders with respect to fuel choice
- Therefore, the RTF should *start* with the assumption of 0% other fuels in the baseline
  - RTF PAC does not feel there is sufficient data at this time to inform an assumption other than 0%
- The RTF and RTF PAC will continue to monitor this assumption
  - RTF will seek research focused on monitoring market share changes with respect to expected changes based on economic studies, which might change this assumption
- RTF PAC recognizes this is not a perfect assumption
  - Markets are complex
  - Efficiency programs are only one factor informing fuel choice

Full recommendation in packet

Avista Minority Opinion

Avista did not agree with the rest of the PAC and submitted a minority opinion

- Discomfort using 0% gas in the baseline for midstream, new construction, and early replacement measures as gas is over 60% of the market
- Understand fuel switching is small, yet know it *is not zero* which will result in overstated electric savings
  - Evidence of electric utilities offering incentives to not bring in gas
  - Disproportionate incentives (more for electric) can give the impression that electric is better
  - Fear is used to direct people from using natural gas
- Recommendation
  - Preference for different savings value where gas is available and where it is not.
  - Alternatively, start with a reasonable estimate of 2% to 6% gas to electric conversion to reflect actual market conditions
- Avista recognizes these are good measures for electric utilities and for customers in areas where gas is not available
- Avista communicates to customers trying to control costs and minimize their energy footprint, that the end-use of natural gas will remain an economic and attractive option for consumers [into the future] and that, as such, fuel switching should continue to occur in some measure.

Full recommendation in packet

Other Stakeholder Engagement

- Commission staff
  - MT and WA commission staff engaged in the PAC discussion and voted on the recommendation
  - ID and OR commission staff were unable to attend the meeting, but previous discussions suggest alignment
- NW Natural and the Northwest Gas Association
  - No specific response from either group yet, but anticipate some additional input on the topic in advance of the July Council meeting

Next Steps

- Ultimately, staff is seeking clear direction on a framework for the RTF to enable them to move forward on measure development
- Bring this to the full Council for decision in July
  - Include any additional stakeholder feedback at that time