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September 10, 2019

MEMORANDUM

TO: Council Members

FROM: Gillian Charles, John Shurts

SUBJECT: Methodology for quantifying the environmental costs and benefits of new resources for the 2021 Power Plan

BACKGROUND:

Presenter: Gillian Charles, John Shurts

Summary: When developing the new resource strategy for the power plan, the Northwest Power Act requires that the Council compare the incremental system costs of different generating and conservation resources and give priority to those resources which the Council determines to be cost-effective. In estimating the system cost of a particular resource, the Council must include any quantifiable environmental costs and benefits directly attributed with that resource over its effective life.

The Act directs the Council to develop a methodology to determine and apply these quantifiable environmental costs and benefits as part of the overall system cost of a new resource or measure.

Staff will propose a methodology for discussion with Council Members at the September meeting. While a "final" methodology is not adopted until the 2021 Power Plan itself is adopted, staff need to understand the approach in order to apply it to the resource cost analysis. Staff will incorporate feedback and bring a revised methodology to the Council in October for further discussions.

While much of the staff proposed approach remains unchanged from previous power plans, there is one area where new publications and data are available and additional attention from the Council is necessary – quantifying environmental benefits. Staff will describe the new information available and the context in which it bears consideration in the methodology.

Relevance: The development of the 2021 Power Plan is well underway and staff is working with its advisory committees to develop inputs and assumptions to use in the analysis. An understanding of the methodology for quantifying the environmental costs and benefits of new resources is necessary now in order to apply the methodology to the resource cost assumptions.

Workplan: A.4.2 Develop environmental methodology, existing system, transmission availability, renewable portfolio standards, emissions and other datasets for the 2021 Plan

More Info: To review the Seventh Power Plan’s methodology for quantifying environmental the costs and benefits of new resources, see [Chapter 19](#).

[“Public Health Benefits per kWh of Energy Efficiency and Renewable Energy in the United States,”](#) U.S. Environmental Protection Agency, July 2019

Methodology for quantifying the environmental costs and benefits of new resources for the 2021 Power Plan

September Council Meeting – Corvallis, OR

Gillian Charles, John Shurts

September 18, 2019



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Today's Discussion

- How does the Council analyze and account/reflect environmental effects in its planning?
 - What is the methodology for quantifying the environmental costs and benefits of new resources?
- Staff proposal for the environmental cost methodology for the 2021 Power Plan for Council Member consideration
 - Discuss main components, historical considerations, and staff recommendations
 - ★ Focus on environmental benefits
- Next steps: Incorporate feedback and return to the October Council Meeting



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Due Consideration and Power Plan Analysis

The Council considers a wide array of environmental effects related to the power system and integrates these effects into its analysis in a variety of ways

- Section 4(e)(2) calls for the Council to develop the scheme for implementing conservation measures and developing generating resources “with **due consideration**” for environmental quality, fish and wildlife, and compatibility with the existing system in developing a resource strategy

There are many “vehicles” in the Power Plan to incorporate these effects, and these vehicles often interact and affect one another

- The methodology for quantifying the environmental costs and benefits of new resources is one of those vehicles

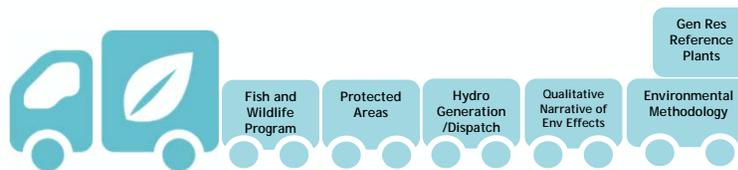


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Example: Effects of electricity generation on fish and wildlife

Development, operation and decommissioning of electricity generation has varied effects on the environment; in this example, specifically effects on fish and wildlife



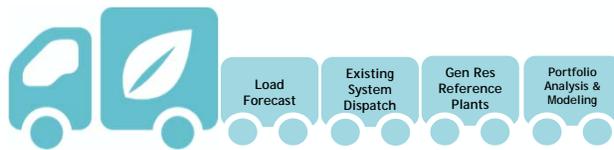
*Illustrative only; not intended to be comprehensive

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Example: State Clean Energy Regulations

Several states have adopted renewable portfolio standards and more recently, clean energy/carbon reduction policies to address emissions and climate change in the electricity sector



What is the methodology for quantifying environmental costs and benefits of new resources?

- The Northwest Power Act requires the Council (1) develop and (2) apply a “methodology for determining [the] quantifiable environmental costs and benefits” of **new** electric generating and conservation resources §4(e)(3)(C)
- The environmental methodology is to
 - Consider **costs and benefits** to the **environment**...
 - And, for those costs and benefits to be **quantifiable**, recognizing that not all environmental effects can be reduced to quantified costs and benefits...
 - And, the costs must be **directly attributable** to the resource, not incidental or indirect



Terms not defined in the Act: Council uses common sense understanding, as guided by context of the Act and discussions in legislative history



System Cost

In its development of a power plan, the Act requires that the Council compare the “incremental system cost” of different generating and conservation resources...

In estimating the overall system cost of a particular *new* resource or measure, the Council must include quantifiable environmental costs and benefits directly attributed to the resource as determined by the environmental methodology

“System Cost” as defined by the Act:

“... an estimate of all direct costs of a measure or resource over its effective life, including, if applicable, the cost of distribution and transmission to the consumer and, among other factors, waste disposal costs, end-of-cycle costs, and fuel costs (including projected increases), and 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, or in the absence of the plan by the Administrator, are directly attributable to such measure or resource.” §3(4)(B)



Methodology for quantifying the environmental costs and benefits of new resources

1. Costs of compliance with existing environmental regulations
2. Environmental effects beyond regulatory controls
 - Residual and unregulated
3. Costs of compliance with proposed environmental regulations
4. Quantifiable environmental benefits ★

Four main components that make up the methodology to determine and quantify the costs and benefits of new resources; within each component are considerations to make



Thoughts to keep in mind, when developing the methodology



- Ability to **quantify** an environmental effect and apply it to the cost of a new resource
- **Availability** of (or lack thereof) quantifiable costs and benefits; or well accepted/vetted data
- Risk of **skewing** resource cost through “piecemeal” application of environmental costs and benefits
 - Not all costs and benefits can be quantified
- Reminder: Specific **direction** from the Act to develop and apply this methodology to the cost of new resources, but there are other avenues to include environmental effects in the analysis and development of a power plan
 - e.g. written narrative describing qualitative effects, scenario analysis, etc.



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1. Costs of compliance with existing environmental regulations

- Council’s planning assumes all generating and conservation resources will meet existing federal, state, tribal, and local environmental regulations
- Therefore, the estimated costs of compliance – when quantifiable – are included as part of the total system cost of a new resource
- Primary method to capturing and quantifying environmental costs and benefits in past plans

Examples: Costs of complying with fuel extraction and production, air and water emissions, land-use siting protections, waste disposal, fish and wildlife protection and mitigation.



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1. Costs of compliance with existing environmental regulations

Staff Proposal for 2021 Plan:
Continue to account for the financial costs of compliance with existing regulations in the cost of new resources.



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2. Environmental effects beyond regulatory controls

Includes both residual and unregulated effects

- **Residual** - Regulations control or mitigate *some* portion of the targeted effects from a new resource on the environment, but not *all*
 - Residual effects can be hard to quantify due to insufficient information available
 - Could also argue that residual effects should not be considered damage costs because they were excluded from regulation

Examples: Not all bird kills from wind turbine operations are prevented by regulations aimed at reducing bird kills; not all emissions from a fossil-fuel plant are controlled by regulations aimed at curbing them

- In past plans, Council has decided not to try and quantify the costs of residual effects and instead acknowledge the qualitative effects in the narrative and consider them when determining a resource strategy

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2. Environmental effects beyond regulatory controls

➤ **Unregulated** – Environmental effects that are not currently under regulation

Example: Methane emissions associated with the production and use of natural gas

- Recognition that there are environmental damage or social costs of environmental effects that are not yet comprehensively regulated
 - Historically, there has been insufficient data available to determine and quantify effects into new resource costs



2021
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2. Environmental effects beyond regulatory controls

Staff Proposal for 2021 Plan:

Continue to recognize that residual and unregulated environmental effects exist and describe them qualitatively in the narrative of the plan and consider them when determining a resource strategy, including through scenario analysis

(good examples of this are the social cost of carbon and methane emissions)



3. Costs of compliance with proposed regulations

- Quantifying compliance costs with existing regulations is a primary method; an additional consideration is how to capture and quantify effects under proposed regulatory controls
- Typically dealt with on a case-by-case basis, depending on the environmental effect and the quantitative data available

Example: Potential federal carbon policy in the early development of the Seventh Power Plan. While the EPA issued a final §111(b) of the Clean Air Act prior to the Seventh Plan's adoption, staff had to determine if/how to capture compliance costs. This was done through new resource capital and operating costs.



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3. Costs of compliance with proposed regulations

Staff Proposal for 2021 Plan:

Continue to address and consider costs of compliance with proposed regulations on a case-by-case basis

Note: There are no entirely new or more stringent regulations proposed at this time. However, proposals exist to change a number of existing regulations in ways that make the regulations less strict. Staff will continue to track and monitor regulatory developments and adjust resource cost considerations as seems appropriate. Most of these changes will affect existing resources, not new resources, so the effects will be mostly seen in the existing system costs and dispatch, not in new resources costs.



4. Quantifiable environmental benefits

- In addition to costs, the Act calls for a methodology to include quantified environmental **benefits** in new resource costs.

Example: An energy efficient dishwasher or washing machine that in addition to the amount of energy saved, reduces the amount of water used

When considering environmental benefits, a key issue the Council has grappled with in the past has been whether the Council *can* and *should* factor into the costs of a new resource a quantitative estimate of the environmental benefit of being able to reduce some existing activity that has an environmental cost



4. Quantifiable environmental benefits

Historically, information and data on quantifiable benefits has not always been sufficient or well understood and the inclusion of these benefits has been very specific and isolated for some efficiency measures

- Quantification of the financial aspects of the reduction in environmental harm is often missing or quite speculative.
- Whether the reduction in the environmental harm can be “directly attributed” to the new resource is also often problematic.
- Risk of skewed resource cost comparisons when applying quantified benefits “piecemeal”; applying benefits to a few resources with quantified data available, but not for others
- Risk of applying a cost and benefit attributed to the same environmental effect, thus double counting

Council grappled with the specific issue of displaced wood smoke due to investments in heat pumps in the Seventh Power Plan, and ultimately decided not to proceed with attempting to quantify the health benefits of that specific example (more on this later...)



4. Quantifiable environmental benefits

Recent publications more comprehensively quantifying environmental benefits have been released and the Council needs to recognize the new information available and consider how it fits into its approach to developing the methodology for quantifying the environmental costs and benefits to new resource costs

- Two particular new data sources to contemplate (explained in detail over next few slides)
 - “Public Health Benefits per kWh of Energy Efficiency and Renewable Energy in the United States,” U.S. Environmental Protection Agency, July 2019
 - Washington IOUs studies (Abt Associates) to quantify and monetize the health benefits of displaced wood heat emissions from the installation of ductless heat pumps



4. Quantifiable environmental benefits: EPA’s public health benefits report

Basis of report: Recognition that energy efficiency and renewable energy resources reduce emissions from the electric power sector through a) decreasing the demand for electricity, or b) displacing fossil fuel-based generation with zero-emitting resources

- Avoided emissions may lead to public health benefits
- Lack of ability to quantify or fully reflect these health benefits when making decisions about existing/planned projects, programs, and policies



4. Quantifiable environmental benefits: EPA's public health benefits report

EPA approach to quantify *near-term* benefits from reduced emissions (SO₂, NO_x, and PM_{2.5}) uses avoided emissions rates based on 2017 electricity generation and results in \$/kWh values for energy efficiency, solar, and wind

- Divided U.S. into ten geographic regions
 - “Northwest” includes large swathes of Nevada, Utah, Wyoming

Sulfur dioxide (SO₂), nitrogen oxides (NO_x), particulate matter (PM_{2.5}) are emissions that contribute to health impacts, including respiratory diseases



Figure ES.1. AVERT Regions.

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4. Quantifiable environmental benefits: EPA's public health benefits report

Regional policies (RPS, Washington CETA) and planned coal unit retirements mean that the northwest electricity grid – and its emissions - will be changing over the next 5-10 years, and beyond

- EPA's report provides single values, based on 2017 electricity dispatch, and advises that the **values should not be used past 2022**
- With increased reliance on zero-emitting resources and less coal in the resource stack, the avoided emissions rate for the region will be changing → lead to a lower \$/kWh health benefit in future years

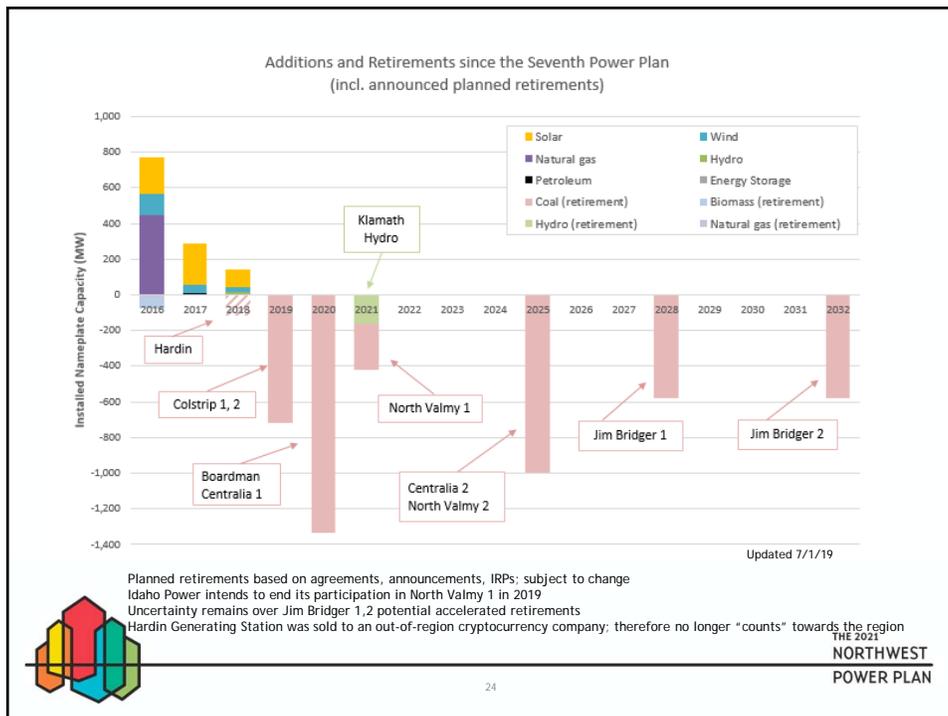


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4. Quantifiable environmental benefits: EPA's public health benefits report

Should the Council decide to pursue this approach, **significant additional analysis** would need to be undertaken to:

- Narrow EPA's "NW" estimates to the region,
- And, extend the \$/kWh values through the 20-year planning period of the 2021 Power Plan
- ❖ With no new coal plants being developed in the region, and existing units planned or considered for retirement, the amount of coal displaced by new energy efficiency and renewables will be declining – and therefore the health benefits value will be less significant
- ❖ In addition, there is concern that applying these benefits but not others (for example reductions in methane when natural gas is displaced by EE and renewables) risks skewing the resource cost and portfolio analysis



4. Quantifiable environmental benefits: WA IOUs studies on displaced wood smoke

Puget Sound Energy, Avista, and PacifiCorp were directed by the Washington UTC staff to conduct studies in their service territories to quantify and monetize the health benefits of wood smoke emissions displaced by the installation of a new ductless heat pumps (energy efficiency measure)

- Analysis was based off of 2016 report by the Council's Regional Technical Forum (RTF) that explored the relationship between changes in wood smoke emissions and health impacts
- Abt Associates was the contractor for all studies



4. Quantifiable environmental benefits: WA IOUs studies on displaced wood smoke

While new location-specific information is available to quantify these benefits since the last power plan, there remains the same issues the Council contended with before:

- Are these reductions in wood smoke **directly attributable** to the **installation** of efficiency measures?
 - Available values rely on assumptions/extrapolations derived from comparative measurements of reductions in electrical energy use and absent the consideration of consumer behavior

How does consumer behavior play a role?

- Example: While some consumers may might choose to burn less wood after the installation of a ductless heat pump, others may choose to burn the same amount as before in order to be warmer. How do we account for this in the value of the benefit?



(continued on next slide...)

4. Quantifiable environmental benefits: WA IOUs studies on displaced wood smoke

- By applying quantified benefits to the cost of *some* efficiency measures to account for this one environmental effect, are we skewing the resource cost comparison with measures that have environmental benefits that are not quantified?
- Are there efficiency measures that can lead to an **increase** in wood smoke? (e.g. an energy efficient refrigerator releases less waste heat into the house and theoretically could increase the heating load – which could be met with wood-burning stoves/fireplaces)
- Additional analysis and/or contract funds would be necessary to extrapolate the WA utility data to the region



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4. Quantifiable environmental benefits: WA IOUs studies on displaced wood smoke

Given the remaining considerations regarding “directly attributable” quantification of benefits and risk of skewing measures inequitably, staff proposes that the Council continue to handle this particular issue of quantifying displaced wood smoke as in the past, by:

- Recognizing and qualitatively describing that particulate emissions from wood burning are a well-documented health concern and the installation of new electrical energy efficiency measures in the right circumstances can correlate to reductions in the burning of wood, and thus less particulate emissions.
- In addition, the Council could include language in the power plan to recognize that states, local governments, and utilities are more than justified in pursuing these measures based on the societal and health benefits, even if they are not explicitly used in the comparison of resource and measure costs



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2021 Power Plan

4. Quantifiable environmental benefits

Staff Proposal for 2021 Plan:

Recognize that additional sources of information and data attempting to quantify environmental benefits have become available in the last few years, but continue to use discretion in trying to apply these benefits to the cost of new energy efficiency measures and resources. Rather, staff proposes that the Council could strengthen the language in the plan surrounding these environmental benefits and encourage regional planners to consider them when making new resource decisions.



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2021 Power Plan

Summary: Proposal for methodology for quantifying the environmental costs and benefits of new resources

Staff Proposal for 2021 Plan:

1. Continue to account for the financial costs of compliance with **existing regulations** in the cost of new resources.
2. Continue to recognize that **residual and unregulated** environmental effects exist and describe them qualitatively in the narrative of the plan and consider them when determining a resource strategy
3. Continue to address and consider costs of compliance with **proposed regulations** on a case-by-case basis
4. Continue our approach to environmental benefits in the 2021 Plan: Not attempt to include quantified environmental benefits in new resource costs beyond the few historic examples, and yet emphasize in other ways the value of certain resource choices in helping to mitigate other harmful environmental effects.



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Next Steps

October Council Meeting: Staff to incorporate any feedback from Council Members and bring a “final”* methodology for discussion and “approval”**

As always, the Council welcomes all comments and feedback from stakeholders regarding this or any issue



** thumbs up

* Of course nothing is ever “final” until the plan is adopted, but we need an understanding of the methodology ahead of time in order to apply it in the analysis.

