December 2, 2014

MEMORANDUM

TO: **Council Members**

FROM: **Gillian Charles, Energy Policy Analyst**

SUBJECT: **Cover Memorandum: Recommendations and guidance on methodology for quantifying environmental costs and benefits of resources for use in the Draft Seventh Power Plan**

BACKGROUND:

Presenters: John Shurts, Tom Eckman, and Gillian Charles

Summary: At the September Council Meeting, the Council approved the release of the issue paper on "Methodology for Determining Quantifiable Environmental Costs and Benefits" for public comment. The comment period was open from September 10 to October 31. At the November Council Meeting, staff presented a summary of the comments received. On the agendas for the December Power Committee and Council Meetings are discussions of the methodology for quantifying environmental costs of resources. Staff is seeking guidance and direction from the Council on the methodology the staff should use to quantify environmental costs and benefits in the resource analysis for the draft Seventh Power Plan.

Relevance: The environmental cost and benefits methodology is a key piece of the Council's power plan and is integrated into analyses such as the generating resources assumptions and costs and the conservation supply curves.

Workplan: 1D - Prepare for Seventh Power Plan and maintain analytical capability; Approve environmental method for analysis

Background: The Northwest Power Act requires the Council's power plan to include "a methodology for determining [the] quantifiable environmental costs and benefits" of electric generating and conservation resources. The issue paper released by the Council for comments in September described the requirements and relevant provisions of the Northwest Power Act, described the primary method the Council has used and will use for quantifying environmental costs and benefits of new resources (estimating the costs of compliance with environmental regulations); and highlighted four topics that raise issues for public comment. These topics were:

- Residual environmental effects beyond regulatory controls
- Environmental effects of resources not yet subject to regulatory control, especially carbon dioxide emissions
- Quantifiable environmental benefits
- Environmental effects of new renewable resources

The Council received a number of comments on the issue paper. Staff circulated the comments, and summarized the comments for the Council at the November Council meeting.

More Info: The following attachment is a memo from staff to Council members with staff recommendations to resolve the relevant issues regarding the environmental methodology, along with possible alternative approaches for the Council to consider.

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

December 2, 2014

MEMORANDUM

TO: **Council Members**

FROM: **John Shurts**
Tom Eckman
Gillian Charles

SUBJECT: **Recommendations and guidance on methodology for quantifying environmental costs and benefits of resources for use in the Draft Seventh Power Plan**

Introduction and relevance

As the members know well by now, one of the requirements of the power plan is that it must include a "methodology for determining quantifiable costs and benefits" of resources. Northwest Power Act, Section 4(e)(3)(C). Quantifying the environmental costs and benefits is one part of the effort required to estimate and compare all direct costs of new resources, so that the Council is able to select cost-effective resources for the power plan's resource strategy.

As we have discussed at some length in the last few months, the Council and staff need to settle now, at least in a tentative way, on the methodology to be used for -- and described in -- the draft Seventh Power Plan. We need to do this now so that the staff can begin applying the methodology to the draft resource cost estimates that are a primary input into the resource analysis for the draft. The main element of the methodology we know already – estimating the cost of compliance with existing environmental regulations for new resources. That still leaves a set of issues about the methodology to resolve, issues detailed in past staff briefings and in the issue paper the Council released for public comment in September.

For this reason, on the agendas for the December Power Committee and then the full Council meeting are discussions of the methodology for quantifying environmental costs of resources. In what follows here, staff has recommendations for how to resolve

the relevant issues, along with possible alternative approaches. What we are looking for is guidance back from the Council on how to proceed, either confirming or modifying the staff recommendation. Consensus or head-nod guidance is preferable. There is no need at this time for a formal Council decision, although a motion and vote may be used if necessary to solve particular issues.

The discussion that follows is organized by focusing first on the methodology for quantifying the environmental costs and benefits of new resources, working step-by-step through the categories we have identified before: costs of compliance with existing regulations; how to deal with proposed regulations; residual or unregulated effects; environmental benefits. This is followed by a discussion of how the Council is to analyze the costs of the existing system resources, including environmental costs.

Tom Karier has been working on a proposal for the quantification methodology. He asked that it be included and available for the Power Committee and Council discussion next week. Member Karier's proposal follows this memorandum in the packet.

Methodology for Determining Quantifiable Environmental Costs and Benefits of New Generating and Conservation Resources

(1) Estimated costs of compliance with existing regulations.

(a) In general this is not an issue, other than to make sure as we do the work that we capture the proper range of regulations and reasonable estimates of costs, and explain those effects and costs (and display the costs) as clearly as we can.

(b) With regard to new coal plants, the staff perspective is that the siting of a new coal plant in the region is so unlikely -- largely because the costs and regulatory hurdles are so high -- that the staff is not planning to put detailed cost estimates for new coal plants into the regional portfolio model.[1] This would mean that the environmental effects, applicable regulations, and cost estimates for regulatory compliance for a new coal plant would be described in the draft power plan but not quantified to the level of detail for new resources that will be part of the model. Is the Council ok with this approach?

(c) Carbon emissions from new sources are not yet subject to a federal emissions regulation, but may be soon, so…

(2) Estimated costs of compliance with proposed regulations, especially for carbon emissions.

(a) Staff is recommending that the best way to deal with carbon emissions from new resources is to assume as a likely risk an estimate of the costs of compliance with the proposed regulations issued by EPA under §111b of the Clean Air Act. These regulations are due to become final in January 2015, and assuming that happens, this quickly becomes part of the category above. Even if there is some delay, some sort of regulatory limit on carbon emissions from new plants beyond those already established by Northwest states seems likely, and should be considered a likely risk. And the choice to focus on the §111b proposed rule is also made easier by the fact that new-generation gas plants will comply with the carbon emissions limits in that rule, and we already have estimates for the capital and operating costs of those gas plants.

(b) The Council may want to take a different approach to quantifying the costs of carbon emissions from new generating plants, or add additional considerations or approaches. If so, we will discuss that as part of the next issue. The task at this point is

[1] For example, Oregon and Washington legislation set carbon dioxide emissions limits for new electric generation facilities at 1100 lbs per kilowatt-hour, which effectively prohibits the construction of new coal-fired generation in those states. Montana law requires the Public Service Commission to limit approvals of new equity interest in or leases of a facility used to generate coal-based electricity to facilities that capture and sequester at least half of the CO2 emissions.

to provide guidance on how to deal with the proposed regulation for new carbon-emitting plants.

(c) Estimating the costs of compliance with the §111b regulations for a new coal plant would be a substantial effort – it is not clear any new plant could comply without expensive and uncertain carbon capture. Plus new coal plants are also the subject of new proposed regulations regarding coal ash and the air quality standards for ozone. But as noted above, the tentative assessment by staff is that it makes little sense to develop detailed estimates of the costs of new coal plants and incorporate those into the regional portfolio model, as the costs of meeting existing state-level requirements already indicate that new coal plants are not a cost-effective resource for the region. Unless the Council is interested in a different approach, the staff is not planning to develop detailed environmental cost estimates for new coal plants.

(3) Residual environmental effects/environmental damage/social costs approaches.

(a) Here, the first issue is whether as a general rule the Council wants staff to try to incorporate costs within this category, whether that means an effort to quantify the costs of (a) residual environmental effects after regulatory compliance or (b) environmental damage/social costs for environmental effects not yet comprehensively regulated, such as an environmental cost of the methane emissions related to the production and use of natural gas. One approach would be for the Council to direct the staff to use existing information to determine reasonable cost estimates (or a range of cost estimates) where possible for residual and unregulated environmental effects and add those to the base new resource cost estimates.

The staff recommendation in general, however, is not to try to develop quantitative cost estimates related to these effects and add them into the new resource cost estimates. There are a number of reasons for this. One reason is that in most cases the existing information is simply not sufficient to develop reasonable quantitative estimates of costs for these effects, and certainly impossible without the significant reallocation of staff resources to this one task. Another is that while information may be sufficient to incorporate costs of this nature for a very few environmental effects, (such as the “social cost of carbon” estimates developed by the US Interagency Working Group on Social Cost of Carbon, depending on how reasonable people feel these estimates are), the lack of consistent treatment across the range of residual and unregulated effects would likely skew the new resource cost comparisons in an unreasonable way. Third, it is useful to be able to compare new resource costs at the level of the costs actually imposed on the power system itself, as the costs of adverse environmental effects have already been internalized to a great degree through regulation. The Council then gives consideration to residual and unregulated environmental effects that are hard to quantify through other means, including scenario analysis and possibly qualitative risk adjustments or contingencies in the resource strategy. Is the Council comfortable with continuing this general approach?

(b) With regard to carbon emissions from new resources and the "social cost of carbon" estimates in particular – which is the issue of greatest interest:

(i) *If* the Council agrees with the recommendation above to use compliance with the proposed §111b regulations as the basis for the environmental costs of carbon emissions from new resources, the issue here becomes whether to supplement or add to those costs with an estimate of the residual costs of carbon emissions, based either on the US Interagency Working Group's estimate of the social cost of carbon or some other method. The staff recommendation is *not* to. That is, our recommendation is not to try determine a social cost estimate for residual carbon emissions to add to the new resource costs that already assume compliance with the proposed §111b regulations, for all the general reasons noted above. Instead, if the Council is interested in seeing what effect a social cost of carbon estimate would have on the cost and risk of alternative resource strategies, our recommendation is to run a scenario or scenarios where one value or a range of values for the social cost of carbon is added into the model for both new and existing carbon emitters.

(ii) But, of course, *if* the Council decides *not* to use compliance with the §111b regulations as a basis for the environmental costs of carbon emissions from new resources, the Council will have to settle on some other approach for the carbon emissions costs of new resources. The Council could choose to add in the "social cost of carbon" estimates into the resource costs in some reasonable way, or add a range of cost estimates as a risk factor as was done in both the Fifth and Sixth Power Plans.

(c) As detailed in previous briefings and in the issue paper, one other issue that has at least a relationship to this category concerns new renewable resources. The staff will work to include the environmental compliance costs for new wind towers and solar energy installations and other renewable generating resources. But beyond that is the question whether the Council should consider the residual and cumulative effects of the siting of renewable resources (such as wind towers) on wildlife and habitat to be both so significant *and* within the Council's purview as to require the Council to become involved in some fashion in an assessment of the effects on wildlife of new renewable resources and the development of protective measures where necessary. State fish and wildlife agencies and Indian tribes recommended that the Council do so, in the Fish and Wildlife Program amendment process. Commenters on the recent issue paper from state and federal energy agencies, utilities, and energy conservation groups took the opposite stance, recommending the Council not get involved and commenting that the siting agencies and procedures are sufficient to address these effects.

For a number of reasons, staff is recommending that the Council not commit significant resources to an effort like this as part of the development of the Seventh Power Plan. Yet we are also cognizant of the near-consensus group of fish and wildlife agencies and tribes sufficiently concerned about these effects to recommend action by the Council. We recommend finding ways to highlight these concerns and heighten the

consideration of the adverse effects of renewable resource development on wildlife and habitat in the agencies with jurisdiction in these matters.

(4) Quantified environmental benefits.

(a) Setting aside for the moment the particular “wood smoke reduction” issue, in general the analysis and choices here are similar to those in the “residuals” category discussed above. In concept, this issue is about whether and how to account for the environmental benefits that occur when an existing harmful environmental activity can be reduced or eliminated by an investment in a new power system resource.

The only example even close to this concept that has been factored into the resource cost estimates has been the investments in new energy-efficient clothes washers or dishwashers that not only save energy but reduce the amount of water and soap used, directly saving the same consumer money, savings that can be and are quantified as part of the resource cost estimates for the washers. The reductions in the amount of water and soap also benefit the environment, although the broader environmental benefits even in this example have not been quantified.

Reasonable quantitative estimates for environmental benefits of this nature are generally lacking (and definitely lacking without a significant staff effort), and the effects are rarely as direct as with the consumer savings. To the extent that a few examples might exist of a reasonable quantification of environmental benefits of this nature, to incorporate figures for a few environmental benefits of this type but not for most could again lead to oddly skewed resource cost comparisons, and to a situation in which some resources are compared on the basis of costs and benefits the power system directly bears to other resources that include a value not borne by the power system. The recommendation from staff is not to try to engage in piece-meal quantification of environmental benefits to add to resource costs.

(b) With regard to the “wood smoke reduction” issue: This issue stems from the fact that investments in new energy efficiency measures such as ductless heat pumps directly reduce the burning of wood for heat (wood purchase savings that can be and are quantified in the costs of the conservation measure) and thus reduce particulate air emissions. The reduction in particulate emissions benefits the environment and human health, especially in areas that are not in attainment with particulate emissions standards. The question is whether and how to account for these benefits in assessing the costs of the energy efficiency measures.

The general principles described above apply here, too, with these particulars: If the Council desires the staff to make an effort not only to quantify the health effects but also monetize those benefits, we will take on the task. However, it may not be possible within the time frame for development of the Seventh Plan. The report of the “wood smoke” analysis conducted by the RTF indicates that while quantifying is conceptually possible, it has not yet been done, and a great deal of work and staff time would be needed to do

so. Moreover, were reliable estimates eventually developed it appears likely that the environmental and human health benefits (or costs) dwarf the energy savings benefits for these few measures, leading to a skewed or unbalanced power system resource cost comparison.

For these reasons, the staff recommendation is *not* to spend staff resources to try to quantify these benefits and add them directly into the base resource cost estimates for these measures. Yet we are mindful of the very real human health benefits that result from these investments and the resulting reduction in particulate emissions, benefits clearly emphasized in comments to the Council on the issue paper. As the staff has discussed with the Council before, the Council also has the responsibility under Section 4(e)(2) of the Power Act to give due consideration to "environmental quality" and other matters when crafting the power plan's new resource strategy. In this light, our recommendation is to develop the conservation supply curves without including an estimate of the health benefits, but then separately describe the environmental and health benefits associated with the relevant measures. These descriptions would note the significance of these benefits, and make clear to entities in the region that investments in these measures may well be justified by the social benefits of reduced particulate emissions, regardless of whether the measures are cost-effective on energy benefits and costs alone.

Future costs of the existing power system, including environmental costs

The issue with regard to the existing power system and its individual generating resources is not the same as for new resources. The specific requirement in the Northwest Power Act with regard to the methodology for quantifying environmental costs and benefits does not apply – the purpose for that provision, as noted above, is to be part of the cost comparison and selection of cost-effective new conservation and generation resources.

What is important with regard to the existing system in the power plan analysis is to capture as best we can what are the real costs the system and its owners will bear over the next 20 years, including the risk of new costs, a system into which new resources and their costs must be integrated. In this regard, only two categories of environmental costs apply as part of making sure the cost and generation analysis of the existing system is as accurate as possible:

(1) Cost of compliance with existing regulations. The task here is to make sure the existing system cost estimates that are entered into the resource portfolio model capture the proper range of regulatory costs going forward for the existing plants. This includes operating costs and (if possible) any new capital costs, such as might be needed to comply with the new mercury rule). This is not an easy task. Staff will discuss with the Council how likely it is that the staff will be able to incorporate reasonable estimates for these future costs into the RPM.

(2) Cost risk of regulation for emissions and effects not yet comprehensively regulated or subject to proposed regulatory revisions. This issue is mostly about carbon emissions, but proposed fly ash and ozone regulations are also pending. And at some level there may be a risk of additional methane emissions regulations.

(a) With regard to carbon emissions, in theory this is the same issue as the Council faced in both the Fifth and Sixth Plans: Again, the analysis will assume system compliance with RPS requirements, and the *new* resource cost estimates can be handled as described above. Otherwise, there are no existing Clean Air regulations controlling carbon and other greenhouse emissions from the existing system. But as described below, there might be such regulations in the future, even the near future. The Council will have to do something in the power plan development process to recognize and analyze that risk. That doesn't mean that the Council has to do the same as last time, just that the task or challenge is essentially the same. Here are the options:

(i) Proposed regulations under §111d of the Clean Air Act. Staff recommends that the Council not try to include in the existing system's future costs a value representing compliance costs related to the proposed §111d regulations. These costs are too uncertain, for many reasons. This includes the fact that even if EPA finalizes these regulations in 2015, implementation is still many steps away. It may make sense,

instead, if the Council desires, to analyze some §111d compliance scenarios, especially a regional approach.

(ii) Carbon costs as a risk premium, based on possible carbon policy/regulations. This is essentially what the Council did in both the Fifth and Sixth Power Plans. The Council could do the same again this time, and it may make the most sense conceptually. If the Council decides to follow this approach, staff recommends that rather than trying to put a range of costs as a risk into the model in nearly every case/scenario (as in the Sixth Plan), it may make more sense to model just a few scenarios with a bookend of costs, or bookends and a middle (a middle based on, for example, an assumption that the "social cost of carbon" figure represents a measure of possible risk costs), and assess how these scenarios affect what happens to the resulting resource strategies.

(iii) "Social cost of carbon" estimate. It makes little sense to staff to use a social cost of carbon estimate as *the* future operating carbon costs of the existing system. As developed by the US Interagency Working Group on Social Cost of Carbon, the "social cost of carbon" is an estimate of the economic damages associated with a small increase in carbon dioxide (CO2) emissions, conventionally one metric ton, in a given year. The task for the Council with regard to the existing system is to model as best we can the future real operating costs of the system, including the risk of certain costs being added, and not just to add a factor representing the estimated "damage" of carbon emissions into the base costs estimates. Instead, if the Council is interested in the effect of incorporating a "social cost of carbon" value, the staff recommends running a scenario in which we add a social cost of carbon value to both new and existing resources and assess what happens.

(iv) The staff recommendation then is to handle this issue largely or completely through scenarios that test different approaches to future carbon emissions and carbon costs for the existing system, and then comparing the resulting resource strategies and costs. We recommend the Council (with the assistance of, among other, the RSAC) chose a set of scenarios for the staff to run that seem of the most value, including among the choices scenarios that model the effects of:

- progressive reductions in carbon emissions from the existing system
- hitting certain target carbon emissions limits
- incorporating bookend costs or a range of costs or both as risk
- incorporating the EPAs social cost of carbon estimate
- regional compliance with 111d

(b) With regard to other proposed regulations, especially the proposed fly ash and ozone regulations, staff still needs to assess whether sufficient information exists to include as a risk factor a reasonable range of cost estimates related to possible compliance. The proposed ozone regulation would be particularly challenging, as it proposes a revision to an ambient air standard, not an emissions limit, and so there will be many steps between even a new standard, revision of state implementation plans,

and then regulations on individual emitters. Cost information related to the proposed fly ash regulation may be more available.

(3) and (4) Costs relating to residual and unregulated effects and the quantification of environmental benefits to society. Not relevant with regard to analyzing existing system costs, unless these will have an actual effect on operating costs of the system by being internalized through regulations or other programs.

[From Tom Karier – December 1, 2014]

Existing System: (2) Risk of regulation for emissions and effects not yet regulated.

From the Sixth Plan:

"In other cases increased regulation is likely, but details have not been settled. In the Sixth Power Plan, this is the case with carbon control policies. While many states have renewable portfolio standards and limits on emissions from new power plants, carbon pricing policy is being actively discussed but is still highly uncertain in terms of its level and structure. Renewable portfolio standards and new plant emissions limits are included in the Council's analysis as existing regulations. However, carbon pricing policy is quantified as an uncertainty. Several scenarios explore the likely effects of different levels of carbon pricing on resource costs and choices."

Proposal

Many states have renewable portfolio standards and limits on carbon emissions from new power plants. These policies are included in the Council's analysis as existing regulations for those states. However, additional carbon regulations are being developed by the U.S. Environmental Protection Agency and new carbon pricing policies may also be implemented in the future in some states and at the federal level. Such pricing policies currently exist in California, Northeast states, and the province of British Columbia. While new carbon policies are expected sometime in the future, the timing, details, and cost impacts are uncertain. To the extent that future regulations are developed, they are likely to be informed by estimates of the social cost of carbon and mitigation costs among other considerations. Consequently, in the Seventh Power Plan the cost of future carbon regulations or policies is quantified as a future risk. In addition, several scenarios explore the effects and costs of various carbon emission futures for the Northwest, including scenarios that apply a social cost of carbon, that achieve a coal-free and carbon-free future, as well as a scenario that reflects the present situation with no new carbon regulation in the Northwest.

As the Council considers various scenarios it expects to evaluate the likelihood that certain resource strategies will meet the requirements of EPA's 111(d) for the region as a whole. The success of the Council's effort will depend in large part on the clarity of the final regulation.

New Resources: (4) Benefits

From the Sixth Plan

Consideration of Environmental Benefits

"For some resources, primarily efficiency improvements, there are associated environmental benefits. Where quantifiable, the Council counts these as a cost savings. For example, high

efficiency clothes washers not only save energy, they also reduce water and detergent use. These are treated as positive environmental externalities in the Council's planning. The direct environmental benefit of reduced electricity use is not credited as an environmental benefit against the cost of conservation, but is instead reflected as reduced costs of avoided generation technologies."

Proposal

Consideration of Environmental Benefits

Some resources, such as energy efficiency, can also create environmental benefits. The Council will be more likely to include these benefits in its cost effective calculation if there exists a clear quantifiable, cause and effect relationship between the action and the benefit. If there is a benefit but the magnitude is uncertain, the Council may simply estimate the power benefits because that defines the funding role for utilities and Bonneville.

The Council will be less likely to include such benefits in any calculation if environmental costs also exist which can't be quantified. Including one and not the other will not necessarily improve the calculation.

It was recognized in recent plans that high efficiency clothes washers not only save energy, they also reduce water and detergent use. These are treated as positive environmental externalities in the Council's planning. Another example under consideration is the benefit of reduced wood smoke from more efficient electrical heating equipment. In this case the Council expects to limit its efforts to estimating the power benefits of measures that could support a broader initiative to reduce wood smoke.

The Council recognizes that its core competency is in the area of regional energy modeling and planning. It has limited expertise and resources in the area of quantifying environmental costs and benefits associated with electrical generation facilities and conservation measures. The Council relies on and defers to the EPA, and its vast resources, expertise, and litany of methods to quantify environmental benefits and costs, including residual environmental costs. Moreover, with its limited expertise and resources, the Council is generally cautious about estimating and selecting particular environmental costs or benefits of particular resources. A poor estimate or selective application of these estimates may unreasonably skew the resource cost comparisons if not applied on a systematic, consistent basis across all resource options.

Recommendation and Guidance on the Methodology for Quantifying Environmental Costs and Benefits of Resources

John Shurts

Tom Eckman

Gillian Charles

December 9-10, 2014

Quick Review

- Council released issue paper on Sept 10 on the environmental costs and benefits methodology for draft Seventh Power Plan
- Public comment period Sept 10 – Oct 31
  - Received 23 comments from stakeholders
- Council discussed summary of comments at November Council Meeting
- December Council Meeting – staff is looking for guidance from the Council on the methodology to use in the resource analysis for the draft Seventh Plan

Environmental Costs and Benefits Methodology for **New Resources**

1. Estimated costs of compliance with existing environmental regulations
2. Proposed environmental regulations and estimated costs of compliance as a risk
3. Approach on residual environmental effects/damage/social costs
4. Approach on quantifiable environmental benefits

Treatment of **Existing Resources** in Terms of Environmental Costs

1. Estimating cost to existing system of compliance with existing environmental regulations, including new regulations adopted since Sixth Power Plan
2. How to analyze the risk of costs imposed to deal with emissions and other effects not yet subject to comprehensive environmental regulation, but the subject of proposed regulations or likely regulatory policy, in particular:
   - Carbon dioxide emissions
   - Coal fly ash proposed regulations