TACOMA POWER

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TACOMA PUBLIC UTILITIES

October 31, 2014

Steve Crow
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Northwest Power and Conservation Council
851 S.W. Sixth Avenue, Suite 1100
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RE: Methodology for Determining Quantifiable Environmental Costs and Benefits

Mr. Crow:

Please accept our comments on the Council's issue paper released on September 10, 2014 on quantifying the environmental costs and benefits of generating and conservation resources. The Council requested responses by October 31, 2014 to questions it posed in the issues paper.

The following pages include the Council's specific questions in the order posed and are followed by Tacoma Power's response. We appreciate the opportunity to comment and look forward to working with you through the development of the Seventh Power Plan.

Sincerely,

Chris Robinson
Power Manager

Enclosure

1. Residual environmental effects beyond regulatory controls.

Question 1a: Should the Council also consider, in crafting the methodology, the residual effects a resource might have on the environment after compliance with environmental regulations?

Answer: We generally find that the Council has a specific set of well-developed skills and expertise. However, we are unaware that these skills and expertise extend to the environmental consequences associated with electrical generation facilities. As a result, we do not believe that Council staff is qualified to assess actual environmental harm or the degradation of human health resulting from residual resource emissions after compliance with environmental regulations. To do so would require a diversity of experts in fields such as epidemiology, toxicology, immunology, exposure analysis, aquatic and atmospheric chemistry, and biology (human, animal and plant) to name a few. In addition, the Council has not set up a Science Advisory Board qualified to assess any potential findings of environmental harm or degradation made by Council staff. As such, we do not believe that good public policy would support the Council including in its methodology "the residual effects a resource might have on the environment after compliance with environmental regulations."

We also question whether there is a public policy need for the Council to try and consider these effects. The federal government has a host of environmental regulatory agencies whose sole focus and purpose is to protect and enhance environmental quality throughout the nation. These agencies derive their authority from a myriad of federal statutes including the Clean Air Act, the Clean Water Act, the Solid Waste Disposal Act, Resource Conservation and Recovery Act, the Nuclear Waste Policy Act, and the Occupational Safety and Health Act. The requirements of these Acts' usually focus on protecting human health, welfare and the environment. In many cases these laws do not allow any consideration of cost in the establishment of national regulations, or subordinate that consideration to the higher level public health and environmental concerns. Given these highly protective laws, we strongly doubt that the Council could demonstrate environmental harm or degradation. Even if the Council did find some environmental harm or degradation we question whether it would be consequential. Generally federal environmental statutes require regulators to reduce environmental consequences to the point that they are either *de minimus*, or to the point where the quantitative value of the residual harm is less than the cost to avoid that harm. Therefore, the Council should carefully consider whether investigating residual environmental consequences is likely to:

1) reveal consequential harm;
2) result in changes to the resource portfolio or portfolio operations that reduce those consequences; and
3) be a good use of the Council's scarce personnel and financial resources.

The federal Clean Air Act provides several examples of stringent mandates to protect human health and welfare. The section directing the EPA to set National primary and secondary

ambient air quality standards (42 U.S. Code § 7409) does not allow any consideration of costs in the setting of public health or welfare based standards.

> **(b) Protection of public health and welfare**
> **(1)** National primary ambient air quality standards, prescribed under subsection (a) of this section shall be ambient air quality standards the attainment and maintenance of which in the judgment of the Administrator, based on such criteria and allowing an adequate margin of safety, are requisite to protect the public health. Such primary standards may be revised in the same manner as promulgated.
> **(2)** Any national secondary ambient air quality standard prescribed under subsection (a) of this section shall specify a level of air quality the attainment and maintenance of which in the judgment of the Administrator, based on such criteria, is requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant in the ambient air. Such secondary standards may be revised in the same manner as promulgated.

The Clean Air Act's section on Hazardous air pollutants (42 U.S. Code § 7412) allows consideration of costs but only after the inclusion of an "ample margin of safety" for health based emission limits.

> **(2) Standards and methods**
> Emissions standards promulgated under this subsection and applicable to new or existing sources of hazardous air pollutants shall require the maximum degree of reduction in emissions of the hazardous air pollutants subject to this section (including a prohibition on such emissions, where achievable) that the Administrator, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable for new or existing sources
> **(4) Health threshold**
> With respect to pollutants for which a health threshold has been established, the Administrator may consider such threshold level, with an ample margin of safety, when establishing emission standards under this subsection.

The Clean Air Act's section on Standards of performance for new stationary sources (42 U.S. Code § 7411) appears to give equal weight to compliance costs and "nonair quality health and environmental impacts..."

> **(1)** The term "standard of performance" means a standard for emissions of air pollutants which reflects the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any nonair quality health and environmental impact...

These federal statutes appear, by and large, more stringent than the Northwest Power Act which directs the Council to give equal deference to both environmental costs and benefits.

> The Council's power plan is to include a "*methodology for determining quantifiable environmental costs and benefits under section 3(4)*" (Section 4(e)(3)(C) - emphasis added).
> The Act's definition of "System cost" specifically includes both "*quantifiable environmental costs and benefits...*"

Given that federal environmental regulatory agencies have specific expertise in environmental benefits and costs, and that the statutes authorizing federal regulations appear, by and large, more stringent than the Northwest Power Act, the Council should defer to judgment and expertise of these agencies. Simply put, we do not believe trying to quantify any residual environmental consequences that other federal agencies consider *de minimus* or not cost effective to address would be a prudent use of public resources.

Question 1b: Are there reasonable methods for quantifying the costs of such effects?

Answer: The federal environmental regulatory agencies have developed a litany of methods for quantifying the benefits of environmental regulations. However, to quantify the benefits, one first must determine the residual effect on environmental status. And as noted above, determining this effect is a highly technical endeavor requiring a wide range of expertise, both to choose the testing and analysis techniques to employ and then to apply those techniques. Finally, once the change in environmental status is determined, good public policy requires the results to be vetted by a science advisory board with the skill set to carefully scrutinize the quality of this work, and to judge the veracity of the conclusions.

With a fully vetted and accepted change in environmental status, the next step is to apply an economic technique to monetize that change. Various techniques that could be used are listed in a report from the World Bank (see Table below). The application of any of these techniques requires considerable training and experience that the Council simply does not have. Also, when conducting a "regulatory impact analysis" for major rulemakings, EPA considers macroeconomic and employment impacts. Any effort by the Council to supersede other federal regulations should consider these impacts as well.[1]

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[1] Regulatory Impact Analysis for the Proposed Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units, USEPA, 2014. Accessed at http://www.epa.gov/ttnecas1/regdata/RIAs/egughgnspsproposalria0326.pdf

Table 20.1: Benefit Categories and Estimation Approaches[a]

Benefit Category	*Estimation Approach*[a]
To Individuals	Property Value (hedonic price)
Health	
Mortality	Wage Compensation, Stated Preference Averting Behavior, Human Capital (foregone earnings)
Morbidity (acute, Chronic)	Stated Preference, Cost of Illness (medical, earnings, pain and suffering, avoidance), Averting Behavior
To Production/consumption	
Crops/Forests/Fisheries	Consumer plus producer surplus
Water-using industry	Consumer plus producer surplus
Municipal Water Supply Authorities	Opportunity Cost (alternative aquifer) Service Replacement (Municipal treatment, bottled water)
To Economic Assets	
Materials (corrosion, soiling)	Replacement Cost, Service Values, household production function
Property Values	Hedonic Price Models
To Environmental Assets	
Use	
Recreation	Unit Day, Stated Preference , Property Value, Travel Cost, Random Utility, Hedonic Travel Cost
Other (visibility)	Service Replacement, Stated Preference, Property Value
Passive Use (Nonuse)	Stated Preference Models

[a] Environmental Economics and Development Policy Course, *World Bank Institute, July 15-26, 2002, Washington, D.C.* **OVERVIEW OF USE OF BENEFIT-COST AND COST-EFFECTIVENESS ANALYSIS FOR ENVIRONMENTAL MANAGEMENT, accessed at http://info.worldbank.org/etools/docs/library/36508/OverviewUseBenefit-CostAnalysisandValuationTechniques.pdf**

2. Environmental effects of resources not yet subject to regulatory control, especially carbon dioxide emissions.

Question 2a: A likely approach for the Seventh Plan, along with assuming continued compliance with state renewable portfolio standards, is to use regulations recently proposed by the U.S. Environmental Protection Agency to determine the environmental costs of carbon emissions. Under Section 111(b) of the Clean Air Act, EPA has proposed regulations to control the carbon emissions from *new* power plants. Should the Council estimate the costs of compliance with the 111(b) proposed regulations and use those estimates as the environmental costs associated with carbon emissions of new resources? If so, are there considerations and difficulties the Council should be aware of in developing cost estimates out of the proposed regulations?

Answer: We are not sure how the Council would use the recently proposed rule to estimate environmental costs of the recently proposed Section 111(b) regulations since according to the Regulatory Impact Analysis associated with that rule, "based on the analysis presented in

Chapter 5, EPA anticipates that the proposed EGU GHG NSPS will result in negligible CO2 emission changes, energy impacts, quantified benefits, costs, and economic impacts by 2020."[2] Instead, we recommend that the Council develop a scenario that uses the work of the *Interagency Working Group on Social Cost of Carbon* as a proxy for carbon regulatory costs. In 2010, an interagency process that included several federal agencies published estimates of the Social Cost of Carbon (SCC). The SCC estimates the value of damages associated with an incremental increase in carbon emissions in a given year. As we understand it, federal agencies typically use SCC estimates to assess the benefits of activities that achieve marginal reductions in CO2 emissions. We consider these estimates to be a reasonable proxy of potential future carbon regulatory costs. The SCC values identified are repeated in the table below.

Table 5-6. Social Cost of CO2, 2015-2050 (in 2007 dollars)[3]

	Discount Rate and Statistic			
Year	**5% Average**	**3% Average**	**2.5% Average**	**3%, 95th percentile**
2015	$6	$24	$38	$73
2020	$7	$26	$42	$81
2025	$8	$30	$46	$90
2030	$10	$33	$50	$100
2035	$11	$36	$54	$110
2040	$13	$39	$58	$119
2045	$14	$42	$62	$128
2050	$16	$45	$65	$136

Question 2b: Alternatively, should the Council use some other approach to develop environmental cost estimates for new carbon-emitting resources, such as the use of an environmental-damage or social-cost-of-carbon approach? (Note that the EPA developed its proposed regulations for both new and existing power plants using an incremental social-cost-of-carbon approach.)

Answer: See answer to 2a.

Question 2c: EPA also proposed a complicated set of regulations under Section 111(d) of the Clean Air Act that individual states are to implement to reduce carbon emissions from the *existing* power system. While the Council does not propose to use the 111(d) draft regulations for estimating the environmental costs of new carbon-

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[2] Executive Summary, pg. ES-3, Regulatory Impact Analysis for the Proposed Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units, USEPA, 2014. Accessed at http://www.epa.gov/ttnecas1/regdata/RIAs/egughgnspsproposalria0326.pdf

[3] Docket ID EPA-HQ-OAR-2009-0472-114577, *Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, Interagency Working Group on Social Cost of Carbon*, with participation by Council of Economic Advisers, Council on Environmental Quality, Department of Agriculture, Department of Commerce, Department of Energy, Department of Transportation, Environmental Protection Agency, National Economic Council, Office of Energy and Climate Change, Office of Management and Budget, Office of Science and Technology Policy, and Department of Treasury (February 2010). Available at http://epa.gov/otaq/climate/regulations.htm

emitting resources, the region might benefit if the Council assumes, in at least some of its planning scenarios, that the existing power system must comply with the proposed 111(d) regulations. To do so should affect the amount and economic dispatch of existing carbon-emitting resources, require additional resources to make up the difference, and give the region insight into the effects and costs of compliance with Section 111(d) at a regional scale. The Council also could model other scenarios, including a scenario that does not include considerations of Section 111(d), as well as a scenario that simply assumes the elimination of some percentage or all of the carbon emissions from the region's power system and estimates the cost of that scenario as well. Should the Council consider in the planning process compliance with 111(d) regulations? If so, what scenarios should the Council run and why?

Answer: The Council should not consider in the planning process compliance with 111(d) regulations for three reasons. First, is that the regulations establish a specific emissions target and the compliance decisions are left up to the state. Therefore, any assumptions the Council would make regarding compliance decisions would certainly be wrong and even perhaps, misleading. Second, the rules could change a little or a lot before they are finalized. Finally, several entities claim that the EPA has over-reached its authority and have stated their intent to seek court injunctions to stop enforcement of the rule. At this point, it is unclear when these challenges would be resolved and what mandates will finally be implemented. So again, Council assumptions regarding the regulatory requirements are almost certain to be wrong.

One scenario that would be useful is a reliability analysis of the grid assuming full compliance with the proposed rule. It is not clear to us that it is even possible to meet the Natural Gas capacity factors, the renewable mandates, the conservation assumptions and still maintain a reliable electrical grid. A minute-to-minute analysis dealing with generation and load variations over a wide range of scenarios (including critical water conditions and spring run-off and summertime ramping requirements) is needed to ascertain whether grid reliability would be adversely affected should the regulations be implemented as proposed.

Question 2d: How should the Council deal with some of the uncertainties and complications of the proposed 111(d) regulations, such as the difficulty with the baseline used in the proposed rule, and the fact that this and other aspects of the proposed regulations may change in the final regulations, and the relationship of the regional approach to power planning by the Council to the state-by-state approach of the proposed regulations?

Answer: See answer to 2c (first paragraph).

Question 2e: Alternatively, should the Council take a different approach (other than assuming compliance with 111(d)) to understand and factor in the carbon costs of the existing system?

Answer: See answer to 2a.

3. Quantifiable environmental benefits.

Question 3a: Have methods and information developed in recent years that would allow for the quantification of environmental benefits to a broader degree for the resource cost estimates?

Answer: Uncertain.

Question 3b: Of most particular interest is whether the Council can and should factor into the costs of a *new* resource the "benefit" of being able to reduce some *existing* activity that has an environmental cost? For example, installing energy efficiency measures in a home where wood is burned for heat may result in less wood burning and thus reduce air emissions and associated health effects. Obviously, the Council should consider these benefits to the environment and public health in some fashion in its planning. But, is it possible to quantify these kinds of environmental benefits? And can these benefits be said to be the "direct" benefits of and "directly attributable" to the new resource, or are the benefits incidental or indirect as the result of contingent behavior choices (e.g., some people might choose to burn less wood; others might choose to burn as much and be warmer)?

Answer: We understand the attraction of including potential environmental benefits associated with an action. Particularly, the environmental benefit (or reduced harm) that occurs when a new highly regulated resource replaces an older, less efficient and higher emitting resource. However, we advocate caution before taking this step. Question 3b appears to be related to the ongoing debate at the Regional Technical Forum whether to monetize environmental benefits from wood smoke emission reduction to justify the installation of ductless heat pumps in homes with wood burning appliances. In such applications, the introduction of a DHP reduces wood smoke emissions, but actually increases the use of electricity. If this approach prevails, it will represent a significant paradigm shift from current practice. Currently, energy efficiency programs are justified primarily on the value of energy savings. This is appropriate since electric ratepayers subsidize these programs. If a measure such as a DHP is justified in large part due to health- benefits, then electric rate payers are subsidizing pollution reduction that electric generation did not create

Another concern we have with the current debate is an apparent desire to include some non-energy benefits, but not relevant non-energy costs. As noted above, there is a secondary consequence of using electricity rather than wood to heat a home. While the reduction in wood smoke is a public health benefit, it must be balanced against the environmental harm caused by the marginal resource providing electricity to the grid. And this environmental harm would include any additional carbon emissions should the marginal resource be a thermal generator.

Other examples are easy to identify, such as potential adverse consequences of installing energy efficiency measures in a home. One such consequence could be increased levels of indoor air pollution due to lower levels of air exfiltration.[4] The air pollution could be fugitive wood smoke; nitrous oxides emitted from gas cooking stoves; or, from any of the hundreds of consumer products people bring into their homes.

Another example of actions having environmental costs that could be considered is the use of natural gas turbines to integrate renewable resources. Generally, natural gas turbines are a very efficient resource. However, that efficiency degrades when the generation levels change abruptly and often. This is precisely the operating regime when these resources are used to integrate variable energy resources like wind and solar generation into the grid. The resulting inefficiency manifests itself in higher emissions of carbon and other pollutants.

Many examples can be identified in which non-energy benefits and costs could theoretically be quantified and monetized, but it is very unclear to us if this practice is started, where it ends, and who would decide what is in and out.

Question 3c: Should the resource costs for all new non-fossil-fueled energy resources include a quantified estimate of the value of the environmental benefits of replacing existing fossil-fueled generating plants? Note that such an estimate would not affect the cross-comparison of the cost effectiveness of all the new non-fossil fueled resources?

Answer: It seems to us that if the potential future costs of carbon are taken into consideration in the analysis, as they were in the 6th plan, it would not be appropriate to include a quantified estimate of the value of environmental benefits of replacing existing fossil-fueled generating plants. Doing so would result in double-counting.

Question 3d: If the environmental benefits of a new resource in displacing existing activities cannot be quantified or cannot be said to be directly attributable[5] to the new resource, and thus not part of the methodology, how should the Council give due consideration to these environmental benefits in the plan?

Answer: Any attempt to include or consider environmental costs that are not directly faced by resource operators will drive a wedge between the 7th plan and the actual development and operation of the regional power grid. Thus, if the plan is intended to realistically represent the

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[4] The U.S. Department of Energy's Weatherization Assistance Program (WAP) has a study underway to investigate the impact of weatherization on a number of IAQ parameters in homes. Martin Schweitzer of Oak Ridge National Laboratory (ORNL) and Dan Cautley of the Energy Center of Wisconsin are leading this research. The study is called the National Retrospective Evaluation of DOE's Weatherization Assistance Program: IAQ Research.

[5] The Council concluded some time ago that it would not make sense to include as a quantified "benefit" in the resource cost estimate of one new resource (e.g., a conservation measure) the fact that the region could avoid investments in another *new* resource with an environmental cost (e.g., a coal plant). As long as the environmental costs of the second new resource are properly captured in its resource cost estimates of the second new resource, that is sufficient -- to do more would constitute double counting the same quantified effect.

development and operation of the regional power grid, these considerations can only be qualitative discussion points and not fundamental drivers of the model. Elsewise, the plan will simply not be useful to utilities within the region.

4. Environmental effects of new renewable resources.

Question 4a: For renewable resources such as wind, solar, biomass, and wave power generating plants, how should the Council, in its methodology, properly identify the environmental effects of renewable resources, identify the relevant regulatory schemes that address those effects, and quantify the resource compliance costs?

Answer: While we strongly agree that the Council's methodology reflect the true costs of all resource types, the environmental consequences of renewable generation appear to be very site specific and not amenable to regional cost estimates. As a starting point the Council could, similar to our recommendation for fossil-fuel plants, consider current state and local codes, regulations and licensure requirements as reasonably dealing with the environmental consequences associated with new renewable resources. Under this approach, the historic costs of complying with of these codes, regulations, etc. could be a first order approximation of the environmental costs.

Question 4b: Or, should the Council take a different or additional approach to identifying and quantifying the environmental costs of renewable resources in the methodology?

Answer: See answer to 4a.

Question 4c: The agencies and tribes recommend the Council support and even lead a region-wide effort to assess the suitability of sites for terrestrial and aquatic energy projects, prioritize possible in a manner similar to the Council's "protected areas" for new hydropower development, and in general examine potential site-specific and system-wide impacts to fish and wildlife. Is that an appropriate role for the Council, and do others agree with the agencies and tribes that this should be a priority use of the Council's and the region's resources? How would the Council and the region conduct and fund such an assessment, which could take years?

Answer: This seems like a departure and significant expansion of the Council's work portfolio. Also, we are not sure how useful it would be to specific renewable siting decisions given that there are numerous existing regulatory entities responsible for assessing the environmental impacts for project siting. As such, we would argue against the Council distracting itself with the costly and time-consuming diversion in work activities.

Question 4d: Whether or not the Council uses the Seventh Power Plan to initiate such a major assessment effort, how should the Council give due consideration to these effects in the resource strategy for the plan?

Answer: See answer to 4a.