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October 14, 2014

Steve Crow
Northwest Power and Conservation Council
851 SW 6th Avenue, Suite 1100
Portland, Oregon 97204
VIA Email to: comments@nwcouncil.org

RE: Comments on *Issue Paper: Methodology for Determining Quantifiable Environmental Costs and Benefits*

Dear Mr. Crow:

Thank you for the opportunity to comment on the above referenced issue paper. My comments below are brief and narrowly focused. Staff may determine that these comments are not directly responsive to the questions framed in the issue paper. In that event, could you see to it that my comments below are given appropriate consideration elsewhere in the Power Plan development process?

Energy System Resilience and Subduction Zone Earthquake Emergency Response:
Impacts of Distributed Solar Energy (DG PV) Supply Systems

Environmental cost benefit analyses are usually concerned with how the environment responds to and is affected by the energy supply system. These comments go to the question of how the energy supply system is affected by and responds to the environment, in this case an earthquake with significant damage to the electric grid.

It is well known that the Pacific Northwest is overdue for an earthquake of large magnitude with highly damaging effects on electric utility infrastructure. The risk has a high probability of occurring, and will be extremely damaging when it does occur.

The topology of the energy production system can either enhance or degrade the emergency response to an earthquake event. At present, the electric energy supply system design topology is dominated by large-scale remote generation. Distributed solar generation (DG PV) sources are sparsely developed.

In a subduction zone earthquake the grid will be down for a period of weeks to perhaps months. Energy from the grid will be unavailable during the disaster response. Diesel and gasoline fired emergency generators will likely run out of fuel within days. Almost all of the relatively few presently installed fleet of DG PV systems have older inverters designed to disconnect from the grid and de-energize, resulting in DG PV systems that will provide no energy services in the event the grid goes down.

Distributed solar energy systems can now be built with modern inverters that enable the DG PV system to safely “island” when the grid is not available, and produce energy locally during daylight hours. These DG PV systems can be built to any scale from less than a kW to hundreds of kW. In neighborhoods they can be built on homes, businesses, community centers, gasoline service stations, schools, churches, medical centers, local government buildings and similar facilities.

In the event of a major earthquake, broadly and densely dispersed DG PV systems can provide limited but valuable energy services to homes and neighborhoods. This capability could be of extremely high value. In a post-earthquake scenario DG PV systems could be available to power communications, refrigeration, medical first aid and life safety facilities, fuel and water pumping, first responder emergency services and other critical and useful energy loads. Lighting could be available after dark if modest battery capability is built into the system.

In short, a diversified power system topology, with significant DG PV capacity built into local neighborhoods, will likely be more resilient than a power system with sparsely developed DG PV resources.

The Council should evaluate the costs and benefits of a power supply system in which DG PV is widely developed to enhance power supply system resilience. Investigate scenarios in which DG solar is built out at various market penetrations, over various time scales, with realistic installed cost forecasts, and with realistic earthquake damage probabilities.

I think the Council should examine and evaluate these questions:

- Will the Northwest be *more resilient in the event of natural disaster* with an energy supply system design topology that includes broadly and densely dispersed DG PV supply sources that can provide energy services during an extended outage?
- What economic value should be assumed for such a topology?
- The cost of energy from DG PV systems is still quite expensive compared to many other sources, though the costs are falling steadily. How should DG PV system costs in the Council's model runs be adjusted to reflect the resilience value?
- What state level policies and electric utility business models would effectively cause the development of broadly and densely dispersed DG PV energy supplies?

Thank you for the opportunity to comment on these matters.

With best regards,

Chris Robertson
Principal

CC: Margi Hoffmann