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July 15, 2011

RE: *Study of the Potential for Distributed Energy in Washington State*,
Docket UE-110667

Stan Gent, President and CEO of the Seattle Steam Company (www.seattlesteam.com) in conjunction with Tom Casten, Chairman of Recycled Energy Development (www.recycled-energy.com), a national leader in development of recycled energy opportunities, submit the following comments on Distributed Energy in Washington State, UTC Docket # UE-110667

- **The use of waste energy from Washington industrial processes to generate fuel-free electricity[1] has been largely ignored by electric utility regulation and practice, in spite of many significant advantages.**
- **The recycling of waste heat from electric generation[2], which would use the fuel twice, or heat recovery from industry[3], has also been largely ignored.**

All waste energy recycling (WER) projects and all fueled combined heat and power (CHP) projects must, by technical necessity, be local generation (Distributed Generation), and most will be in concentrated electric and head load centers. This is because waste energy flows do not travel long distances economically. WER projects utilize hot exhaust gas from an industrial or electric generation process, or burn off gas and other byproduct fuels of a process to produce heat (steam or hot water) and power, or utilize pressure drop of steam or another gas to drive a turbine and generate power.

The major advantages of WER and CHP include:

1. They use otherwise wasted energy streams to produce useful energy services such as heat and power, thus offsetting the cost and pollution of burning added fuel. **Typical projects are at least twice as efficient as electric only generation.**
2. These projects are at the load centers, thus reducing the electric load on the transmission wires avoiding line losses and new capital for electricity transmission and distribution.
    a. **Without utilizing features such as the available power factor or voltage support**, these projects can just offset the line losses on the power they generate and also reduce line losses on the remaining power flowing in the grid. We find a megawatt hour of **local generation offsets at least 1.12 MWh** of central generation, on average, and more during peak hours.

[1] Nucor Steel; Waste heat to electricity
[2] Heat recovery from Encogen in Bellingham to provide heat to WWU
[3] Ash Grove Cement; Similar to cement production in Aalborg, Denmark provides waste heat to the city.

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  b. **With power factor and voltage support**, Carnegie Mellon studies show **that local generation of one MWh can avoid up to 1.47 MWh of central generation on average and up to 2.25 MWh of central generation on peak.** Since T&D systems are planned for expected peak loads, local generation with PFS and VS create the ability to avoid or defer significant transmission capital expenditures.
  c. We are unaware of any example of utilities paying for the benefits of local generation in avoiding multiples of the local generation.
3. Most WER projects serve manufacturing that operates at high load factors, often 24/7, and thus provides base load power. If there are variations, they tend to occur on third shift or on weekends when grid needs are low. Most CHP serves thermal loads with similar high load factors and thus can operate with load factors in the low to mid 90% range.
4. District Heating Systems[4] make an ideal host for WER and CHP projects. Any CHP facility can also have electric steam generators creating the ability to use electricity to make heat when surplus wind or hydro based electricity generation exists. During times when there is access electricity the surplus electricity is used to make steam for delivery to the host, within minutes. This action will primarily displace natural gas, the fuel used in the CHP operation, leaving it in storage in the ground for later use. When there is no surplus electricity from wind and hydro, the CHP plant restarts and delivers back to the system electricity and at the same time making steam from the waste heat in the combined heat and power cycle. While it is not storing electricity (it's the gas that is stored) the outcome is the same, and it uses technology that exists today. An added benefit is that this energy switching is happening at the electric load center, resulting in improved electric performance.
5. WER and CHP projects always provide the host with an economic benefit in the form of reduced cost for thermal energy, added revenue for a waste energy stream, or, if owned by the industrial, a return on invested capital. This makes area operations more competitive, securing jobs and bolstering the local economy.
6. WER and CHP projects provide vital load stabilization to the grid manager, but are seldom paid for this service
7. WER and CHP, by using fuel twice, significantly reduce greenhouse gas emissions.

Actions/policies to enable optimal deployment of CHP/WER and other local generation

1. Change decision process on all capacity to compare the delivered cost of power from each source. Local generation has strong economic advantages over remote generation due to line loss and T&D capital avoidance, but is then compared as though all delivery costs were equal.
2. Include WER as fully eligible for clean energy portfolio standards, equal to wind or solar.

[4] Seattle Steam Company along with most University campus and military campus settings.

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3. Give fueled CHP a credit for RPS equal to 60% of the MWh of useful thermal energy recycled, which is equivalent to the fuel savings of a MWh of fuel free power.
4. Require purchasing utilities to calculate the line loss savings and to offer at least 85% of the value of those line loss savings to distributed generation.
5. Require utilities to offer 85% of the value for power factor support (PFS) and voltage support (VS) from distributed generation, in return for the generation owner giving the grid manager control over power factor and voltage from the local generation.
6. Recognize the value of local generation with PFS and VS in freeing transmission lines to carry remote wind power.
7. Seek to price transmission at a more granular level, as opposed to the BPA practice of assuming a 2% line loss, regardless of source or use point. This will sharpen the economic signal for where distributed resources have maximum value.
8. Set a goal of making CHP/WER profitable for the utility, the host, the developer and the public. This probably involves having the utility purchase the power and keeping the retail customer. It may involve allowing the utility to earn a bonus for improving generation and distribution efficiency or reducing need for capital in new transmission and distribution lines. It requires standardized and transaction light processes for long term contracts for WER/CHP power. (Conventional RFP procurement done at the utility timetable do not facilitate WER/CHP development.
9. In the absence of items 1 – 8, likely because of the inability of utilities and regulators to easily unbundle the value of these sophisticated components of power generation and transmission, for projects that provide the features discussed herein, power factor support, voltage support, high efficiency load center energy generation and the virtual ability to store energy as discussed above, **create a special power purchase agreement at a set cost per kWh** generated that will ensure such projects are financially sound. **This special power purchase may form part of the regional supply of electricity rather than one specific utility in whose region this capability geographically exists.**