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June 14, 2010

VIA ELECTRONIC MAIL

Mr. David W. Danner, Executive Director and Secretary
Washington Utilities and Transportation Committee
1300 South Evergreen Park Drive S.W.
PO Box 47250
Olympia, Washington 98504-7250

RE: Statement of Issues and Positions: Docket UE-100849

Dear Mr. Danner:

This letter responds to the Washington Utilities and Transportation Commission's ("Commission") May 19, 2010 Notice of Opportunity to File Statements of Issues and Written Comments.

We hope that new rules by the Commission will be considered by the Washington State Department of Community, Trade and Economic Development ("CTED") and assist the State Auditor's office in its determination of compliance by those utilities under its jurisdiction.

Obsidian Renewables, LLC, through its subsidiaries (collectively, "Obsidian") develops solar photovoltaic facilities in the Pacific Northwest. In connection with our development plan, we intend to construct a facility that qualifies as "distributed generation" under Revised Code of Washington ("RCW") 19.285 (the "Energy Independence Act" or the "Act"). We have identified two issues related to definition of "distributed generation" as set forth in the statute and associated definitions promulgated by rule.

RCW 19.285.030(9) defines "distributed generation" as "an eligible renewable resource where the generation facility or any *integrated cluster* of such facilities has a generating capacity of not more than *five megawatts*." (emphasis added). The Commission and CTED have each adopted rules that incorporate this definition. Washington Administrative Code ("WAC") 480-190-007(8) and 194-37-040(12), respectively. The Act and existing rules are unclear in at least two respects: "integrated cluster" and "five megawatts."

<u>Issue One: The Definition of Integrated Cluster</u>

The statute says: "'Distributed generation' means an eligible renewable resource where the generation facility or any integrated cluster of such facilities has a generating capacity of not more than five megawatts." RCW 19.285.030(9). Rules adopted by CTED state that, "[i]f

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several five-megawatt or smaller projects are located in the same immediate area but are owned or controlled by different developers, each qualifies as a separate, independent distributed generation project * * *". WAC 194-37-040(12). This rule seems clear.

Rules adopted by CTED also provide a definition for integrated cluster: an "integrated cluster of eligible renewable resources means colocated projects owned or controlled by the same entity that feed into the same substation." WAC 194-37-040(16).

The CTED integrated cluster definition is problematic. First, the particular substation into which a facility feeds is not an appropriate factor to consider when the substation is owned by the local utility. This is especially true with respect to small generating facilities and development in rural areas because a single substation could service several small projects and 100 square miles or more. Unlike large generating facilities, which often require a new substation for interconnection, small generating facilities generally connect to distribution lines that may carry the power 10 miles or more to the nearest substation. In order to encourage the development of small generation and facilitate compliance with RCW 19.285 by applicable utilities, use of a utility's substation should not be a factor.

Second, the definition of an integrated cluster includes "colocated projects." This term is not defined in the statute or rules. "Colocate" is defined as "to set or arrange in a place or position; or to set side by side," and "colocation" is defined as "the act or result of placing or arranging together." Webster's Ninth New Collegiate Dictionary.

To eliminate ambiguity, an integrated cluster should only be considered in cases where two or more facilities are on the same or an adjacent parcel or parcels, sharing a common property line. The policy goal of RCW 19.285 is to encourage applicable utilities to use "appropriately sited renewable energy facilities." A geographic factor that offers both a bright line test and encourages efficient siting decisions, would best promote this policy. Projects which are nearby but not immediately next to each other should not be at risk for integration.

Possible Solution to Issue One

The Commission should adopt a rule that "an integrated cluster of renewable resources" means "two or more projects that are (a) developed on the same or adjacent parcels that share a common property line, and (b) owned or controlled by the same entity."

Issue Two: Five Megawatts

The definition of "distributed generation" and availability of the extra incentive for utilities to acquire renewable energy from distributed generation requires a facility to have "a generating capacity of not more than five megawatts." RCW 19.285.030(9). The Commission should adopt rules regarding the definition of "generating capacity of not more than five megawatts" for purposes of confirming that the facilities are "distributed generation" and that the public utilities purchasing the generation will receive credit for double the facility's output as provided under

RCW 19.285.040(2)(b). Below is a discussion, for illustrative purposes, of a suggested approach for solar.

There are potentially different ways to determine what exactly is meant by "generating capacity of not more than five megawatts." One way to measure capacity is to base the determination on the maximum expected output the project could be expected to deliver, based on its design, to the transmission system. If the engineers expect the direct current (DC) output from solar panels to lose 15 percent of its energy value by the point the energy crosses the meter and leaves the solar facility, then simple math would suggest that 5.88 MW DC of solar panels would be expected to equate to a maximum of 5 MW AC capacity measured at the point electricity is put onto the grid. The expected energy losses from the solar panel to the meter are typically in the 15 percent range due to line losses, inverter losses, transformer losses, etc. This approach can be more complicated than one might expect, particularly over time. For example, solar panels lose one-half to 1 percent of production capacity per year. So, after 10 years, total production and peak capacity is expected to degrade 5 percent or more (10 percent or more by year 20). Also, dust and soiling can reduce solar panel production by 3-5 percent or more. This "original design engineering" method has the benefit of simplicity and was recently adopted in Oregon.

A second way to conclude that the maximum capacity of a project is not more than five MW is to limit the permitted output at the inverter (electronic equipment that converts DC power to AC power) so that no more than five MW of power is delivered to the grid. If the system production is ready to exceed five MW, the inverters halt or "clip" the surplus energy so it is not delivered. By "clipping" the power that exits the high side of the inverter, regardless of how much power the facility produces, the amount exiting the inverter on the AC side should never rise above five megawatts. Using this "operating procedures" method would allow installation of more solar panels than the original design engineering method.

The energy generation profile of a solar farm resembles a bell-shaped curve. Typically, there is no power in the early hours, increasing power as the sun rises, a brief peak period at midday, and then declining output through the balance of the day. (And, obviously, there is no power after dark.) The panels become much less efficient when they get warm, so early afternoon production in the summer drops well below design capacity. Also, during the period from fall through spring, the sun's lower profile in the horizon reduces the ability of the system to reach maximum capacity, even on very sunny days. In other words, there are relatively few hours when the system is expected to actually produce its design maximum.

With a view towards improving the total energy harvest within a maximum capacity constraint, solar developers are installing additional panel capacity and using inverter clipping to manage capacity. To illustrate, instead of building 5.88 MW of rated capacity on the DC side, one might install 6.25 MW of rated capacity. The larger system could run at full production most months of the year and most hours of the day with little prospect of exceeding five MW at any given time. For those times when conditions are ideal, the inverters clip the excess power and prevent its delivery to the grid.

From the standpoint of practicality, efficiency and economics, inverter clipping proves to be the most sensible way to achieve a generation capacity of not more than five megawatts of AC power. From a design and engineering standpoint, clipping is a simple procedure: in simplest terms the maximum output of the inverter is merely limited to the desired level – in this case five megawatts – regardless of the DC generation of the facility.

A solar facility may be designed to be theoretically capable of around 6.2 megawatts of DC power generation, with the power clipped at 4.99 megawatts AC output at the inverter. Due to the particulars of solar irradiance and the location, the facility could be capable of exceeding five megawatts AC only rarely, when generation conditions are ideal. Economies of scale favor this strategy, because the incremental costs of additional panels are less than the benefits of the incremental energy.

This strategy, which could be called "broad shoulders," widens the edges of the bell curve of solar power generation. While some energy is occasionally, yet rarely, clipped at the top of the bell curve, more total power is produced as the shoulders of the bell curve widen. Therefore, the economics and efficiency of the solar field is increased because, throughout the generation year, more total power is produced.

Possible Solution to Issue Two

Expressly approve an original design engineering method and an operating procedures method for satisfying the requirement of "not more than five megawatts."

Thank you for considering these issues and positions. We look forward to participating in the upcoming workshops.

Sincerely,

David W. Brown
Senior Principal

CC: Michelle Slater, Esq.