OSPREY SOLAR FARM - PROJECT BRIEF

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WHAT IS THE PROJECT AND WHY IS IT BEING PROPOSED?

Washington State is home to some of the most innovative renewable energy policies in the United States. These renewable energy policies set aggressive targets for new renewable energy installations within the state. The approval and permitting of this Osprey Solar Farm will enable this project to proceed to construction, and installation, assisting the state in its effort to meet these objectives and to create more renewable energy generation in Washington. The Project will deliver all of its output to the electricity grid through the Puget Sound Energy distribution system.

Project Description

The proposed solar field will occupy a single isolated section totaling 8 acres of a larger land holding. Total generating capacity for the Project will be close to 1 MWac of output. This size has been selected by both the utility and the developer as the most efficient way to connect the Project to the existing 34.5kV sub-transmission line along Highway 10. Interconnection facilities will be constructed per the engineering design documents. The project site will be west of the railroad tracks running parallel to Highway 10 and enclosed by a six-foot (6') high chain-link fence.

HOW DO PHOTOVOLTAIC SOLAR SYSTEMS WORK?

The Osprey Solar Farm is considered to be a small generator utility scale solar project. The project is not tied to an onsite consumer like a school or government facility (net metered) or a residential system such as may be installed on an individual dwelling. Unlike these other approaches to installing solar, utility scale solar projects are privately funded and produce power at a more efficient cost ratio because of the scale of the project. The energy generated by utility scale solar projects is distributed to the local utility grid, rather than to a specific residence or facility.

What is inside a solar panel?

The basic components of a PV system is the solar cell. Individual cells are connected together to form a module and encased in steel, glass and a cover film to protect the cell against environmental corrosion[1]. The most common material used in these solar cells is a crystalline silicon material, which is often called a silicon wafer[1]. In fact, in the United States, 80%-90% Photovoltaic (PV) System modules consists of this type of silicon wafer construction[2].

Can solar produce electricity even in cloudy conditions?

PV systems can operate in both direct and indirect sunlight conditions, making PV systems suitable in a wide range of geographic areas, including Washington[2].

WHAT KEY ELEMENTS GO INTO PLANNING A SOLAR PROJECT?

What market conditions make it possible for solar in Washington?

A number of criteria are examined in determining the viability of a solar project. First, general market conditions must accommodate small electric generators such as solar farm. In Washington State, individual utilities act as grid operators and allow for small generators to deliver electricity onto the local grid. Solar development also requires that state agencies support renewable energy and encourage installation of these kinds of facilities as part of the state energy supply.

Why is the Osprey Project proposed here instead of someplace else?

One of the most critical aspects of planning a solar project is working closely with the electrical grid operators to study the project. In the case of the Osprey Solar project, Puget Sound Energy (PSE) acts as the grid operator. PSE studies the project to see if the existing electrical system can support an injection of new electric generation safely and won't produce significant infrastructure upgrades for the utility, or their customers. The PSE review and study process takes into consideration all existing generators and consumers on the system. This is a very thorough and complex study process and just because a project is proposed does not mean that it can connect to the grid. Because this is a private venture, all required system and infrastructure upgrade costs will be incurred by OneEnergy Development, LLC, not PSE or their rate payers.

What kind of site is best for solar?

Ideal sites for utility scale solar projects are relatively flat, have minimal shading, and are located in close proximity to the electrical grid. Additionally, the landowner must be interested in entering into a long-term lease agreement. Finally, the site needs to meet requirements set forth by the local zoning ordinance that qualify solar as a permissible land use.

WHAT ARE THE MAIN DESIGN COMPONENTS OF THE PROJECT?

Modules

The Project will consist of approximately 4000, 3ft x 6ft, polycrystalline photovoltaic modules (solar panels) as shown in the Solar Array Layout. Each module will be capable of producing just over 300 watts of electricity under direct sunlight.

Racking System

The array will be installed using a pile-driven racking system which uses standard driven piles, also known as pin piles, as the primary foundation system to hold the

racking system for the solar panels. This plan is compliant with the recommendations of Ed Sewall Wetland Consulting, Inc. and the Kittitas County Planning Department.

What's under the panels?

The space between rows will be approximately 8 feet or more and the whole of the project will be seeded with native grasses.

Inverters

The solar farm will also contain several small "string" inverters located through the array. These inverters convert the variable direct current (DC) output of the solar panels into a utility frequency of alternating current (AC). This allows the power generated to be connected to the electrical grid. Exact choices of inverters will be identified closer to construction based on manufacturing timelines and product availability and will be built to meet local electric code.

Interconnection Facilities

Interconnection facilities enable the energy produced by the system to be injected into the local grid. In the case of the Osprey Solar Farm, interconnection facilities will be constructed as part of the project and will enable the output from the solar array to be delivered to the PSE distribution grid. A new utility pole will be installed on the north side of the property to allow interconnection to the existing poles on the north side of the Burlington Northern Rail Road. Interconnection will be made by running a short line between the Site and the existing Puget Sound Energy system.

Perimeter Fence

At commencement of construction, a 6' high galvanized steel chain link fence will be installed to protect the solar farm from vandalism and/or theft as well as to prevent access to the site from unauthorized individuals and protect the safety of adjacent community members. The height of the fence and/or adding security measures, such as barbed wire, can be increased or added if advised by Kittitas County.

WILL THE PROJECT INVOLVE GRADING OR PAVING?

Minimal Grading

Ground disturbance for the installation of the solar and interconnection attachment facilities will include some grading of the site. Internal drive road improvements and the individual racking systems that hold solar modules constitute the total area of disturbance for the Site. While there is some grade change on the Site that may need to be adjusted to support the efficient installation of the solar facility, the majority of the Site has very little change in grade and the piles can be installed on the existing grades. Effort will be taken to minimize the earthwork required for the construction of the concrete pads for the transformers and inverters.

Perimeter and internal access roads

In order to support maintenance of the facilities, a 20 ft buffer with interior connectors will be set aside inside of the perimeter fence on the property. Access to the site will occur through the existing entrance off of Highway 10.

Transformer Platform

The main transformer platform will be placed on a concrete slab. Typically, these concrete slabs are poured in place and constructed to the frost line in order to hold up under cold weather conditions.

WILL THE PROJECT HAVE IMPACTS ON WILDLIFE?

While transient species such as hawks, eagles, falcons, as well our osprey project namesake may occasionally use the site, the Osprey Solar Farm currently provides little wildlife habitat. The US Fish and Wildlife Service office has examined and walked the project site and provided review letters, which have been submitted to the State and the County as part of the application documents. In comparison to the previous land uses for this and other adjacent property, the proposed solar facility will dramatically reduce the amount of fertilizer and herbicides applied. Additionally the project has been specifically designed to avoid the wetlands area to the south of the project, helping to preserve existing wildlife areas.

WILL THE PROJECT HAVE IMPACTS ON CULTURAL RESOURCES?

The project has been reviewed by the Washington State Department of Archaeology and Historic Preservation for potential impacts to cultural resources. Based on feedback from this state agency no further work is required prior to construction. However, following the state PPRP and PSC requirements, in the event that any relics of unforeseen archeological sites are revealed and identified during construction, OneEnergy Development, LLC will develop and implement a plan, in consultation with and as approved by the Washington State Department of Archaeology and Historic Preservation, for avoidance and protection, data recovery, or destruction without recovery of such relics or sites.

HOW MUCH WATER WILL THE PROJECT USE?

The proposed solar project requires minimal water use. What water is required will be for vegetation maintenance and occasional panel washing.

ARE THERE RISKS OF CHEMICAL EXPOSURE?

What chemicals are inside a solar panel? Can they be exposed?

In order to provide electrical insulation and protection against environmental corrosion the panel's solar cells are encased in a transparent material referred to as an encapsulate (typically ethylene vinyl acetate, which is nontoxic). To provide structural integrity the solar cells are mounted on top of a rigid flat surface or substrate (typically polyvinyl fluoride, which is nontoxic). A transparent cover film, commonly glass, further protects these components from the elements[3]. The bottom line is that because these materials are enclosed, and do not mix with the environment, there is little if any risk for the release of chemicals to the environment[3].

The solar panels proposed for use in this project will most likely feature polycrystalline silicon modules. Crystalline silica is the primary raw material input for the manufacture of these modules. Crystalline silica, which is nontoxic, is found in the environment primarily as sand or quartz. Crystalline silicon semiconductors are also utilized in the manufacture of integrated circuits and microchips used on personal computers, cellular telephones and other modern electronics.

Does solar produce air emissions of any kind?

Because it is a non-combustion process relying on the direct conversion of solar energy into electrical energy, the operation of a solar PV facility does not produce air emissions. This differs drastically from conventional fossil-fired electric power plants. Electricity generated by solar PV facilities represents a way of meeting the region's growing demand for electric power without emitting combustion-related air pollutants[4].

The only sources of emissions from the Project will be those associated with construction activities, including site clearing, grading, and the use of construction equipment, which will be for a temporary period.

WILL THE PROJECT CREATE NOISE?

Solar panel operation consists of the passive absorption of solar radiation; the panels, therefore, are quiet during operation. The DC/AC inverters however emit a low level hum while operational during daylight hours.

Noise During Construction

During construction noise levels will be limited to the hours between 7am and 7pm as per Kittitas County code[5].

Noise During Operation

The only noise generated from the electrical equipment at the facility will be from the transformers and inverters at each pad. As utility scale solar generating power facilities become more common, more studies have been done demonstrating the low impact of noise during operation.

The noise that is emitted from the project comes from the inverter locations. The specific inverter has not been specified for this project however we can use a common inverter, the Eaton SMax 250KW as an example. This inverter has higher decibel rating of 80dB. At the source the 80dB sound is equivalent to the sound of a doorbell or a coffee grinder[6].

Noise reduction occurs at 6 dB per double the distance. So, the 80dB level 100 feet away from the inverter would experience a level of approximately 40 dB, which is about the level of a quiet residential area or a quite library. Moving another 200+ feet further from the inverter will reduce the dB levels even more dramatically and will be virtually inaudible[6].

WILL THE PROJECT CREATE ELECTROMAGNETIC FIELDS?

Electromagnetic fields (EMFs) are invisible fields of electrical and magnetic force associated with the movement of charged particles. EMFs are produced by natural sources, such as the movement of liquid magma below the earth's crust, as well as human-made sources, most often involving the production and distribution of electricity. EMFs also arise from the operation of electronic equipment and appliances in our homes and businesses such as computers, televisions and refrigerators[7].

The strength of electric and magnetic fields is directly related to the magnitude of the voltage and current in the system; the stronger the voltage and current, the stronger the electric and magnetic fields. Like sound, electromagnetic fields weaken at an exponential rate with increasing distance from the source. The source for EMF's on solar facilities will be at the inverter locations. A recent study in Massachusetts notes that the magnetic field at an inverter was between 150mG and 500mG depending on the type of inverter tested [6]. For comparison, the magnetic field from a vacuum cleaner six inches away from the motor is 300 mG and decreases to 2 mG three feet away. At a distance of 150 feet from the inverter, the field rating dropped to 0.5mG [3].

The strength of the electric fields is further weakened, or shielded, by common materials including buildings, trees, fences and walls. In this case several acres of solar panels may assist in further diminishing both the noise emitted from the inverters as well as electromagnetic fields.

In summary, the strength of the electromagnetic fields produced by photovoltaic systems is no greater than those exposed to EMF during normal use of standard household appliances[6]. PV system EMF levels do not approach levels considered harmful to human health established by the international Commission on Non-Ionizing Radiation Protection (ICNIRP) [7].

WHAT ARE THE VISUAL IMPACTS FROM THE PROJECT AND HOW WILL THEY BE ADDRESSED?

Glare

Photovoltaic solar panels are designed to absorb, not reflect, sunlight in order to convert it into electricity. A monocrystalline silicon solar cell, such as those proposed for this project, absorbs two-thirds of the sunlight reaching the panel's surface. Therefore, only one-third or thirty percent of the sunlight reaching the surface of the solar panel has the opportunity to be reflected. That is to say any glare created from the panels will not be significantly more than the current farm use.

Surface reflectivity of typical site materials[11]:

45% Dry Sand
30% Crystalline silicon solar panels
25% grass type vegetation

20% needle-leaf coniferous trees
10% broadleaf deciduous trees

Visual buffers/landscaping plan

The terrain in the area is relatively flat, and stationary views toward the project site are limited to the homes immediately adjacent to the property boundary. In order to adequately screen the project from these homes, the Osprey project will ensure sufficient landscape buffers are in place.

HOW DO GROUND-MOUNTED SOLAR PV ARRAYS INFLUENCE THE PROPERTY VALUES?

Limited evidence from real estate appraisal methods has not revealed any influence on property values from solar farm development. Expert opinion from a recent siting case in Massachusetts, for example, concluded that utility scale photovoltaic energy systems that are not visible from surrounding properties would have no impact on their market values[4].

With a minimal vertical profile, the Project would be largely out of sight from nearby properties, particularly after landscape buffers are established. Post-construction views toward the Project from Highway 10 and nearby stationary observation points would change from open cropland to a landscaped buffer of trees and shrubs, but would still be consistent with views that characterize rural Kittitas County.

WHAT ADDITIONAL MEASURES ARE TAKEN TO ENSURE PUBLIC SAFETY?

What is the risk of Lightning hitting the solar project?

The project has been designed to provide lighting a direct, low resistance path to ground. All components of the proposed solar farm will be grounded as required by code. Additionally, protection will be provided by the mounting system for the individual panels, which will consist of metal poles driven directly into the ground.

Is there higher risk for fire at solar farms?

The principal risk from a lighting strike is a resultant fire. In the event of a fire, as with any structure, it is theoretically possible for hazardous fumes to be released in the near vicinity, and inhalation of these fumes could pose a risk to human health. However, researchers do not generally believe these risks to be substantial given the short-duration of solar system fires and the relatively high melting point of the materials present in the solar modules[1].

Will there be fencing around the project?

At commencement of construction, a 6 foot high galvanized steel chain link fence will be installed to protect the solar farm from vandalism and/or theft as well as to prevent access to the site from unauthorized individuals and protect the safety of adjacent community members.

Are there annual conformance reviews?

The level of frequency for routine inspections of the solar panels, and routine maintenance, has not been determined at this time. However, according to state law and the local approval conditions, the Project will be monitored remotely, with system operators identifying needed inspections and associated maintenance.

WHAT WILL HAPPEN DURING CONSTRUCTION?

Erosion and Sediment Control

Strict adherence to all Kittitas County Erosion and Sediment Control ordinances will be maintained at all times as well as compliance with any and all state environmental mandates. Site construction activities leading up to Project operation are anticipated to take approximately five to seven months. No special housing, healthcare, or food facilities will be required as part of the Project's activities.

Construction Materials

Construction materials will generally consist of wood, concrete, aggregate ad metal. To the extent possible, these materials will be procured from local and/or regional sources where they are available in sufficient quantity at competitive prices.

Construction Activity

Construction activities will include trenching of underground electrical cables, construction pads for the inverters, transporting materials, and assembling, erecting and wiring of the solar panels.

Transportation During Construction

Major material and equipment will be delivered by tractor-trailers and offloaded by construction vehicles (lulls, tracked vehicles, and front loading equipment). A staging area will be utilized for unloading of equipment and materials. Daily construction traffic will include cars, pickup trucks, and other personnel vehicles.

WHAT WILL HAPPEN ONCE THE PROJECT BECOMES OPERATIONAL?

Transportation During Operation

There will be limited traffic to and from the solar array during operation. Traffic will mostly be limited to maintenance crews for mowing and vegetation maintenance which will be seasonably dependent. Quarterly to yearly maintenance on the solar array components will most likely occur, along with weekly site visits for any operational issues that may arise during normal operation.

Vegetation Maintenance

Upon complete construction of the solar facility, the project will create and abide by a prepared Vegetation Resources Management Plan for the solar facility. The Vegetation Resources Management Plan will be prepared in accordance with regulatory agency guidance from Kittitas County.

During the life of the project a vegetation management plan will be in place to maintain and control appropriate vegetation so as to minimize the potential for fire and control the spread of noxious weeds. The project area will be maintained so that it is clear of all combustible materials, waste and vegetation that could create a fire hazard.

- Ground cover grassed will be maintained to a total height of no taller than six (6) inches.
- All brush and vegetation debris will be removed from the site prior to construction.

WHAT WILL HAPPEN WHEN THE PROJECT REACHES THE END OF ITS LIFE CYCLE?

As required by state law, OneEnergy Development, LLC will create a Decommissioning Plan to estimate decommissioning, dismantling, and disposal cost for the Project. Funding mechanisms to cover this Decommission Plan cost will be secured via a faithful performance bond payable to the State of Washington to ensure that decommissioning costs are not borne by the County and/or State at the end of the useful life of the Project.

The financial guarantee shall be in place prior to commercial operation of the Project. Every ten years, over the life of the Project, an updated estimate of decommissioning costs shall be prepared by OneEnergy Development, LLC to adjust for inflation. The Decommissioning Plan should include provisions for the safe removal and proper disposal of all components of the PV project, including any components with rare or valuable materials, as well as components containing hazardous or toxic materials. The decommissioning plan should maximize the extent of component recycling and reuse, where possible, and ensure all components are handled in accordance with applicable federal, state, county, and local requirements.

APPENDIX: OTHER SOLAR PROJECTS IN WASHINGTON

PRECEDENT PROJECTS IN THE PACIFIC NORTHWEST

Ellensburg Community Solar [9]

- 57.6 kW solar farm owned by the city of Ellensburg, developed by City of Ellensburg, Washington State University Energy Extension, and the Bonneville Environmental Foundation
- Local residents and commercial utility customers financially support this project
- 120 polycrystalline modules (phase 1)

Wild Horse Wind and Solar Facility[10]

- 500kW solar farm owned and developed by Puget Sound Energy
- 6 acre solar farm operating since 2007
- 2,723 photovoltaic modules

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3. Clean Energy Results – Massachusetts Department of Energy Resources
   http://www.mass.gov/eea/docs/doer/renewables/solar/solar-pv-guide.pdf

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6. Center for Hearing and Communication – Common environmental noise levels
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7. Scaling Public Concerns of Electromagnetic Fields Produced by Solar
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8. Kittitas County Code Title 14: building and construction
   https://www.co.kittitas.wa.us/cds/building/permit.aspx

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   http://nwcommunityenergy.org/solar/solar-case-studies/chelan-pud

10. PSE Wild Horse Wind and Solar Facility
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11. Potential Impacts from the Reflection of Proposed Solar Panels
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