Fall 2012-2017

OPALCO Community Solar Project

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OPALCO Community Solar Project

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Environmental Impact Assessment
Environmental Studies (ENVS) 493, Fall 2017
Huxley College of the Environment
Western Washington University
OPALCO Community Solar Project

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Disclaimer: This report represents a class project that was carried out by students of Western Washington University, Huxley College of the Environment. It has not been undertaken at the request of any persons representing local governments or private individuals, nor does it necessarily represent the opinion or position of individuals from government or the private sector.
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Huxley College of the Environment

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Alyssa Rehwald
Claire Anderson

Rhea Cañas
Jendayi Edmeade

Elijah Merrell

November 9, 2017
Dear Concerned Citizens:

Enclosed is an Environmental Impact Assessment (EIA) which examines the possible and potential environmental impacts associated with the installation of a solar array on Decatur Island.

This EIA has been prepared under the guidance of Dr. Tammi Laninga, for an educational capstone course, Environmental Impact Assessment (ENVS 493), in association with Western Washington University. The following document has also been compiled within the specifications and requirements of Washington State's Environmental Policy Act (SEPA) (WAC 197-11).

The document analyzes the possible environmental effects of a 406.5 kW DC community solar PV system on Decatur Island for Orcas Power and Light Cooperative (OPALCO). The array is located on property owned by OPALCO, 2.5 miles East of the Decatur Island ferry dock, off Armitage Road, and across from Alma’s County Store. This solar array would be considered a community solar project, which allows residents to buy into portions of the array’s benefits without owning their own solar panels. The array would promote renewable energy and the benefits that come along with it. The array would require the removal of vegetation along the perimeter of the project site. OPALCO currently receives a majority of their energy from Bonneville Power Administration (BPA); the array would allow them to receive energy from a local renewable source.

Our team has assessed the current plan, an alternative plan, mitigation measures, and a no action alternative for potential environmental impacts. These alternatives/mitigations include the built and natural environment for accurate assessment for the project. Our alternative action plan would include reduction of the size of the solar array to minimize environmental impacts.

This EIA is a summary of the possible environmental impacts for the OPALCO solar array, and we hope it contains helpful and necessary data on any issued cause from the array.

Sincerely,

Elijah Merrell
Alyssa Rehwald
Claire Anderson
Jendayi Edmeade
Rhea Cañas
Fact Sheet

Project Title: OPALCO Community Solar Project

Description of Project:
The Orcas Power and Light Cooperative (OPALCO) reached out to its members about their interest in a community solar project. After deciding that there was enough interest, the utility asked solar installers to submit proposals for a ground-mounted solar array. Community solar provides an opportunity for more people to be involved in generating clean energy. OPALCO members can buy a portion of the whole array, and through virtual net metering, receive credits for the energy generated by their portion. While winters in the Pacific Northwest can be cloudy, energy generated during sunny summer days will be stored in a vanadium flow battery storage system for when it is needed. OPALCO has requested that a ground-mounted solar array be installed at their property on Decatur Island with up to 500 kW DC capacity. The panels will be purchased from Itek Energy, a solar manufacturing company based in Bellingham, WA, and barged in to the island from Anacortes, WA. Materials will then be transported about 1 mile south from the dock to the site. Construction will take place from approximately February through May of 2018. Due to likely negative impacts on the built and natural environment, an Environmental Impact Assessment (EIA) is needed. This report quantifies and assesses the significance of environmental impacts based on relevant research and information. In addition, this report offers possible alternative solutions to help reduce and mitigate negative impacts.

Description of Location:
Decatur Island is a small island located within the San Juan Archipelago of Washington state (Figure 1.1). The rural, predominantly forested island is located about 70 miles north of Seattle, WA. The island features a small community with around 70 full-time residents. Since there is no state ferry service to the island, it can only be accessed by private or chartered boat and air services. A boat ramp on the north side of the island is the only public property, while the remaining land is privately owned. The island’s electricity is provided by the Orcas Power and Light Cooperative (OPALCO), who owns a property on the island where the proposed community solar array will be installed. The OPALCO property is located at 48°30'23.6"N 122°48'16.8"W, and is adjacent to OPALCO’s existing power transmission infrastructure (Figure 1.3).

Proponent:
Implementation date: January 2018
Orcas Power and Light Cooperative
183 Mount Baker Road
Eastsound, WA 98245

Lead Agency: San Juan County

List of Permits and Approvals:
Building permit, San Juan County
Construction Stormwater General Permit, WA Department of Ecology
Land Use Clearing and Grading permit, San Juan County
Stormwater Minimum Requirement Certification, San Juan County

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OPALCO

Issue Date: Friday, December 8, 2017

Public Presentation:
Thursday, December 14, 2017 @ 3:30pm
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Bellingham, WA 98229
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Technical Terms

Albedo: the fraction of incident radiation (such as light) that is reflected by a surface or body.

Ballast pads: cement blocks that solar panels are attached to for stability

Best Management Practice: reasonable and effective practices that help minimize the negative impacts of actions and projects

Buffer: a barrier that protects something or prevents change

Glacial Outwash: sediments deposited by meltwater at the base or terminus of a glacier. Also referred to as a sandr or sandar

Grading: the process of moving, removing, or adding dirt to an area to level or slope it in a way that allows for proper site drainage

Groundwater: water below the Earth’s surface found in soil and rock fractures

Impervious surface: a surface area that prevents fluids from passing through it

Infiltration: allowing a fluid to pass through by filtration or permeation

kWh: kilowatt hours, a unit of energy commonly used in energy bills

Mitigation: lessening the impact or force of something

Precipitation: water falling to the ground in the form of rain, snow, hail, or sleet.

Solar Array: solar panels arranged into a group of any size

Sediment: any solid, undissolved material that eventually settles to the bottom of a liquid

Substation: a facility that transforms electricity between high and low voltages within an electrical generation, transmission, and distribution system

Surface runoff: excess water from precipitation, snowmelt, or another source that was not absorbed into the ground and thus flows over land

Topsoil: the upper layer of soil (2-8 inches deep) that typically contains the most organic materials
Water Table: the level below ground that is saturated with water

Wetland: land that is saturated with water, commonly referred to as marshes, swamps, etc.

**Acronyms and Abbreviations**

BPA: Bonneville Power Administration

EIA: Environmental Impact Assessment

EIS: Environmental Impacts Statement

KWAC: kilowatt hours alternating current

KWDC: kilowatt hours direct current

NREL: National Renewable Energy Laboratory

OPALCO: Orcas Power and Light Cooperative

PV: photovoltaic

SEPA: State Environmental Policy Act

USFWS: United States Fish and Wildlife Service

WDFW: Washington Department of Fish and Wildlife
Executive Summary

Background:
Solar energy acts as a renewable, low carbon emission energy source that reduces the need for greenhouse gas emissions for energy production. Community solar projects provide the public with better access to expensive solar technologies that would normally be out of reach to a majority of the public. Under the community solar model, individuals invest in an offsite solar array that is connected to the grid of the utility company. The power generated by the community solar array is distributed throughout Orcas Power and Light Cooperative’s (OPALCO) grid and adds renewable energy to the utility company’s energy portfolio that is currently dominated by hydroelectric and fossil fuel power production (Figure C.2).

On May 2nd, 2017, OPALCO issued a survey to its customers throughout the San Juan Islands to gauge community interest regarding the development of renewable energy through a community solar project. After determining that most customers supported a community solar project, OPALCO has proposed the development of a community solar project on Decatur Island, a small, sparsely populated island in the San Juan archipelago. The solar array will have a capacity of up to 500kW DC (OPALCO Request for Proposal (RFP), 2017), and the energy it produces will be available to all participating OPALCO customers.

The installation of the ground-mounted solar array on OPALCO-owned property will require modification to the existing environment. This modification has the potential to negatively impact elements of the property’s environment, including: earth and soil, existing vegetation, water quality and drainage, and the visual aesthetics of the small island environment. This Environmental Impact Assessment (EIA) will assess the potential impacts of this project to identify which elements of the environment, if any, will be adversely affected by this development. This report will identify and detail mitigation practices that could be used to negate or reduce potential negative impacts to environmental elements.

Significant Impacts and Mitigations:

Earth:
Grading will disturb several soil levels which could change the way water travels throughout the site (i.e. stormwater runoff and groundwater filtration). Use of heavy machinery may cause soil compaction, as well as temporary noise and air pollution. Additionally, the proposed removal of vegetation surrounding the site will impact soil drainage potentials, increase soil pH levels leading to vegetation mortality, and increase the potential for soil erosion. Finally, the need to control weeds in and around the solar array may require the use of ecologically toxic substances, such as an herbicide, which significantly impact soil ecology.

Mitigation:
To mitigate the impacts caused by grading, it is suggested that the least amount of the site be graded as possible and the best available methods be utilized. Because the site’s elevation does not drastically vary, partial site grading may be a possibility and could result in less soil disturbance. Additionally, vegetation should only be removed if the act of not doing so would significantly impede the overall construction of the solar array. In the areas where vegetation must be removed, proper soil retention and drainage methods should be utilized as an act of remediation. With vegetation removal, monitoring soil PH levels
for a specified amount of time after construction ceases will help to combat mortality of vegetation. Finally, it is suggested that the most natural weed-control substances or methods be chosen by those maintaining the site - this would complete counteract any of the impacts that might occur if harmful substances are used.

**Vegetation:**
Weeds, grasses, and other low-lying vegetation will be at risk to damage during the construction process. Removal of vegetation on the solar array site will result in increased erosion by wind and water and increase potential harm to remaining vegetation. The increased light and heat exposure due to the removal of trees on the perimeter of the solar array site and the proximity to the solar panels may also damage vegetation. The type of management used to keep vegetation from interfering with the panels ability to absorb sunlight will determine the potential damage to remaining vegetation.

**Mitigation:**
Only the vegetation that is necessary to install the solar array will be removed. Construction workers and vehicles should pay special attention to vegetation deemed important to keep as well as any exposed roots to protect vegetation from extraneous damage. Sheep or occasional mowing would be the most cost effective and least impactful form of management for the weeds, grasses, and shrubs growing around the solar array.

**Wildlife:**
The removal of trees surrounding the solar array site will likely result in the reduction of habitat for the island’s wildlife. The removal of certain types of weeds on the site could reduce habitat for the Island Marble Butterfly, which is a species of concern and only found in the San Juan Islands. Construction is planned to begin in February and run through May which means shorter daylight hours in the winter months. Construction during the day may increase stress level and disrupt the daily activities of wildlife in the area. Nighttime construction would potentially result in an increase of light and noise which could affect sleeping habits of wildlife.

**Mitigation:**
Vegetation found on the site that could serve as habitat for the Island Marble Butterfly should be either fenced off or clearly marked to prevent damage during construction. Construction should be limited to daytime hours if possible. If not, noise and light from the construction process at night should be very limited.

**Water:**
Adding more impervious surfaces will increase surface runoff and decrease infiltration into the ground. Removal of surrounding vegetation and soil grading could further increase surface runoff as well. These activities will result in less filtered water with higher concentrations of pollutants and sediment, which could eventually flow into ocean water surrounding the island.

**Mitigation:**
Planting native vegetation around the site and impervious surfaces would make up for removed vegetation and increase water infiltration. The negative impacts of grading could be reduced through a few best
management practices such as filtering stormwater during and immediately after construction, and by improving soil quality through mulching or tilling. Maintaining a certain level of soil quality will be beneficial to surround vegetation, and further aid in infiltration.

**Aesthetics:**
The proposed installation of a ground-mounted solar array on the OPALCO property will alter the current aesthetics of the site. The proposed project will require that trees and other vegetation be removed along the southern and eastern edges of the property, and that a fence be surrounding the array. These changes will potentially alter the natural “feel” of the property. The light and glare emitted by the property may be subject to alteration due to the installation of the solar panels.

**Mitigation:**
Using natural materials in the construction of the perimeter fence and planting native vegetation around the perimeter of the array would reduce the visual impacts of the project. Reducing the footprint of the array will mitigate changes to the existing vegetation and light and glare at the property.

**Energy:**
The construction of the proposed solar array would produce the maximum amount of renewable energy at 333,036 kWh DC annually. OPALCO is currently receiving 86.8% of their energy from nonlocal renewable energy and the remaining 13.2% of that energy is provided by non-renewables. Both proposed action and alternative action would be producing a source of local renewable energy source to push OPALCO to provide their own power to their grid and away from nonrenewable energy.

**Mitigation:**
Make more efficient energy production, and lose less through transmission. As well as encourage energy conservation on the customer side, examples include: adding insulation to your home, install and use programmable thermostats, upgrade your water heater which uses Heat Pump technology, control drafts by sealing air leaks (OPALCO (B), n.d.).

**Final Recommendation:**
Due to likely adverse impacts from the proposed project, we suggest following the alternative action of reducing the solar array’s size by 25%. Although a smaller array would reduce impacts to the existing land, it would still require some mitigation. In addition, the amount of renewable energy generated would be reduced. The no action alternative would result in no impacts to the built or natural environment, however, the customers of OPALCO would not gain any benefits from supplementing their power portfolio with solar energy.
Chapter 1: Project Overview

1.1 Proposed Project

The 406 kW DC solar array will be installed next to a substation on Decatur Island. The panels will be purchased from Itek Energy, a solar manufacturing company based in Bellingham, WA, and barged in to the island from Anacortes, WA. Materials will then be transported about 1 mile south from the dock to the site. Construction will take place from approximately February through May of 2018. Since the proposed array overlaps some vegetation (Figure B.1), this will need to be removed. The solar panels will be attached to concrete ballast pads constructed on the ground. Additionally, a chain-link fence will be built around the substation and solar array. Due to likely negative impacts on the built and natural environment from these activities, an Environmental Impact Assessment (EIA) was needed. This report quantifies and assesses the significance of those impacts based on relevant research and information. In addition, this report offers possible alternative solutions to help reduce and mitigate negative impacts.

1.2 Site History

Decatur Island is roughly 3.5 square miles and is located east of Lopez Island and south of Blakely Island (Figure 1.1). There are three residential communities with about 70 permanent residents living on the island (Decatur Island, Washington, n.d.) Figure 1 shows the location of the island. The siting of a solar array is proposed for Decatur Island on land owned by OPALCO, which currently has a power transmission substation on the property. The substation connects to an underwater Bonneville Power Administration power transmission line that transmits power from Fidalgo Island to Decatur Island (Figure 1.2). The OPALCO property is zoned for commercial use and is approximately 3.7 acres in size (Figure 1.3). The site is located across the street from the island’s only store, Alma’s Country Store.
Figure 1.1. The San Juan Islands of Washington State. Decatur Island is a small island located to the south of Blakely Island and to the east of Lopez Island. The island has a year-round population of approximately 70 residents.
Figure 1.2. Location of the OPALCO substation and existing power transmission infrastructure on Decatur Island, Washington. The community solar array will be constructed on existing OPALCO property adjacent to the substation.
Figure 1.3. Location of the OPALCO-owned property on Decatur Island, Washington. Alma’s country store sits directly across Armitage Road from the property. Few residential homes surround the property.
1.3 Alternative Actions

1.3.1 Reduction of Array Size
The proposed installation of a ground-mounted solar array on Decatur Island has the potential to significantly impact the local environment. A 25% reduction in the overall size of the proposed array could reduce the severity of these environmental impacts. The current proposal would require the clearing and removal of trees and vegetation around the perimeter of the OPALCO property to accommodate the ground-mounted solar panels. Reducing the size of the array by 25%, as seen in Figure B2., would reduce the size of array to 304.9 kW DC, and power-production capability of the proposed array to approximately 249,798 kWh DC annually. A reduction in the size of the array would eliminate the need to clear trees and other vegetation on the eastern and southern portion of the OPALCO property. Additionally, a reduction in array size would require the use of fewer solar panels, fewer construction materials, and could reduce the time required to complete the project. This would have the potential to lessen emissions and pollution from the manufacturing and construction process.

1.3.2 No Action Alternative
The no action alternative would result in OPALCO not installing the community solar array on Decatur Island. This alternative would leave the OPALCO property in its current condition, with no modifications to any elements of the existing environment. Thus, the no action alternative ensures that no negative environmental impacts will result from the construction of the community solar array. This alternative would, however, inhibit the ability of OPALCO to produce renewable solar energy that would supplement its power portfolio.
Chapter 2: Environmental Impacts and Mitigation Procedures

The Washington State Environmental Policy Act requires projects or proposals to identify elements of the natural and built environment (listed in WAC 197-11-444) that may be impacted during the development process. WAC 197-11-402 states that an Environmental Impact Statement (EIS) only needs to address significant adverse environmental impacts from the project or proposal. This report analyzes likely significant adverse impacts to the following elements: earth, vegetation and wildlife, water, aesthetics, and energy. Each element is addressed in the following sections.

2.1 Earth
This section details the existing earth conditions for the site. In addition, it explains the impacts to earth expected from the proposed action, alternative action, and no action proposals.

Existing Conditions
Much of the proposed site for the solar array is cleared and is bordered on three sides by vegetation identified in Section 2.2.1 of this document. A small substation, currently in operation, occupies a small portion of the site. The land is relatively flat with slight changes in elevation. Due to glacial outwash, the soil is primarily made up of 5-60 in. of sandy and gravelly loam (a mixture of sand, silt, and clay) (National Resources Conservation Service, n.d). The water table can be reached at a varying depth of 12 in. to more than 80 in. based on where work is being done on site (National Resources Conservation Service, 2017). The topsoil appears largely undisturbed, however, as a separate project, the substation on the property is being moved to a different on-site location that will potentially change the existing earth conditions. Lastly, this site is within the impact zone of the Devil’s Mountain Fault complex however, due to the location of Decatur Island, seismic risk is reasonably low and therefore not of concern for this project.

Proposed Action Impact
The proposed location for the solar fixtures requires land to be graded. The intensity of the impacts caused by grading activities will depend on the total area to be leveled and the type of grading method used. This practice requires either the addition of soil to a site, the removal of soil from a site, or the moving around of existing soils on the site. Each of these methods would affect soil layering, which in turn disrupts or changes stormwater runoff, soil drainage, and groundwater filtration as well as vegetation (see Section 2.2.1) and wildlife (see Section 2.2.3).

The use of heavy machinery, although limited to the time of construction, is of concern. Grading typically involves the use of bulldozers and scrapers to move the soil around. Depending on the type of solar panels and their mounting systems, installation might require on-site equipment such as large drills. The use of heavy machinery is expected to have a minor, short term impacts on air quality due to release of airborne particles and exhaust fumes, as well as an increase of soil particles in stormwater runoff. Additionally, heavy machinery can damage or kill vegetation. It also compacts soils thus affecting soil drainage, soil air volume, and runoff/filtration patterns - all of which kill vegetation and change the features of the soil ecosystem.
Additionally, the proposed action will require the removal of existing trees, stumps and root systems bordering portions of the site. The removal of these objects will change soil drainage characteristics. By removing trees and roots - both important soil stabilizers - the site will be more prone to erosion. The removal of these elements has been proven to affect soil pH levels, which results in mortality of vegetation in the disturbed area and potentially beyond. Furthermore, the potential use of herbicides and/or other substances may be considered to control the growth of vegetation in and around the solar array. Herbicides are known to stay in soils, killing or negatively impacting important soil inhabitants. Microorganisms play an important role in soil ecology, therefore an impact to soil health may become apparent depending on what method of weed control is utilized.

**Alternative Action Impact**
The proposed ‘Alternative Action Impact’ would decrease the overall earth disturbances, however many of the actions required in the “Proposed Action Impact” would still be required. Reducing the size of the array significantly decreases the amount of vegetation to be removed. By doing this, the impacts on soil stabilization, drainage, and pH levels would be of less concern. Additionally, the reduction in size of the array potentially means that less of the site would need to undergo grading which means that soil compaction, changes to stormwater runoff and soil drainage would also be less concerning.

**No Action Impact**
There will be no impact to earth if No Action is taken.

**Mitigation**
The solar array mounting system should be chosen based on ground penetration and disturbance requirements. The PvMax Ballasted mounting system has a short assembly time, does not require heavy machinery to set up, and limits the amount of concrete foundations and supports that need to built, which greatly decreases the amount of disturbance to the earth (Schletter Inc., 2017). A Land Clearing and Grading Permit will be obtained to properly assess the extent to which the site can and will be graded, as well as the type of grading method to be utilized. Based on that information, the best possible methods for grading will be chosen.

Heavy machinery should be used on the least amount of site as possible and should be limited to certain times of day and weather conditions. These changes should greatly reduce the amount of noise and air pollution caused by the machinery, as well as how much of the soil layers on site are disturbed.

In the areas where vegetation must be removed, proper soil retention and drainage remediation practices should be implemented (see **Section 2.3** for specific methods). Soil pH levels should be monitored for a short period of time after construction ends to ensure that remaining vegetation is not drastically affected. Lastly, it is suggested that the parties responsible for site maintenance consider the most natural weed-control methods possible.
2.2 Vegetation and Wildlife
This section discusses the existing conditions of the proposed site pertaining to vegetation and wildlife. Also included are effects of the proposed action, alternative action, and no action plan for both vegetation and wildlife.

2.2.1 Vegetation

Existing Conditions
A large portion of the proposed site of the solar array has been barren for at least the past twenty years. This land is lined by trees to the east and south and roads to the north and west. The vegetation in and around the proposed site include Douglas fir, Lodgepole Pine, Pacific Madrone, Sitka Spruce, Western Red Cedar, Oceanspray, Snowberry, Horsetail, Salmonberry and Orchardgrass (National Resources Conservation Services, 2010). Weeds, grasses, and other low-lying plants exist on the cleared land surrounding the substation that is located on the site.

Proposed Action Impact
The proposed layout of the solar array requires the removal of a section of trees on the east side of the project site to accommodate the size of the entire system (Figure B1). The solar panels are affixed to the ground using concrete ballast pads that prevent the need to dig into the ground (Washington State Solar Installer¹, 2017). Vegetation will need to be removed before these mounts are put into place. Removal of vegetation may result in exposed ground that is susceptible to erosion by wind and water. This erosion may cause harm to the vegetation that remains on the site after the solar panels are installed.

Construction vehicles moving materials in and out of the site during the building process may compact the soil, contributing to erosion, as well as damaging or killing the remaining plants (City of Bellevue (A), 2017). Remaining vegetation will need to be managed to prevent shading of the panels which reduces their effectiveness. The increased light and heat exposure due to the removal of trees and proximity to solar panels may also negatively impact plants (Carroll, n.d.). Coverage created by the solar panels may affect water intake of plants below, as rain and runoff are concentrated around the edges of the panel (Beatty, 2017).

Alternative Action Impact
Decreasing the size of the solar array by 25% would require the removal of a much smaller portion of trees along the eastern perimeter of the site, or no removal at all. Instead, the smaller array would allow some or all trees to remain in place and only the vegetation located where the solar panels are placed would be removed (Figure B2). These plants would still need to be cut back on occasion to prevent interference with the solar panels. Weeds and other low-lying plants would also remain at risk to injury and increased erosion during the building process, as construction vehicles and workers move about the site.

¹ Representatives from this Washington state based solar company, who contributed information in support of this report, wish to remain anonymous
**No Action Impact**
There will be no impact to vegetation if no action is taken on this site. The land surrounding the substation would remain bare and undisturbed.

**Mitigation**
The best practices possible should be used to avoid unnecessary removal of plants on the site of the solar array. Only the vegetation that inhibits the installation or productivity of the solar array shall be removed. The construction vehicles will use existing roads to move materials into the site to reduce impacts to plants. After the installation of the solar array, the area should be reseeded with a weed free, native seed mix to discourage invasive species from inhabiting the site and to help stabilize the area and prevent erosion (Iron Horse, 2016). Although, weeds are a common occurrence within the first or second year after installation of solar panels and may not be a threat to other plant species, so they should not be cause for concern (Beatty, 2017). The plants determined to be the most important to the wildlife and ecosystem in the area can be clearly identified or fenced in to prevent damage by construction activities. Careful attention must be paid to any exposed plant or tree roots that have been determined necessary to save (City of Bellevue A, 2017).

Weeds and other vegetation cast shadows onto the solar array and reduce the maximum potential for energy capture (Solar Choice, 2016). The spraying of herbicides, the use of browsing animals such as sheep or goats, mowing, and weed controlling fabrics have been used as methods of controlling weeds near solar arrays (Movellan, 2014). Decatur Island had over 200 sheep in the 1980s and has since reduced the number to about 60 (Decatur NW, n.d.). Given this existing population of sheep on the island, weed management using sheep is a plausible option (Figure 2.1). The location of the substation is ideal for housing a flock of sheep due to the land’s relative flatness and lack of predators (Managing Vegetation with Sheep, n.d.). Issues may arise if the weeds, shrubs, and grasses are not plentiful enough to sustain the population of sheep on the site. In this case, sheep may begin eating tree seedlings or poisonous plants. To prevent this, the sheep would be removed from the site when the foraging is low (Province of British Columbia Ministry of Forests, n.d.). Vegetation management can also be done through mowing throughout the year. The community on Decatur Island has agreed to help maintain the vegetation around the solar array through mowing the area when needed (Washington State Solar Installer, 2017). The use of herbicides and weed controlling fabrics are not an ideal form of vegetation management for this site given the negative impacts herbicides can have on desirable vegetation and the wildlife in the area, and the significant costs of the weed controlling fabrics (Movellan, 2014).
2.2.2 Wildlife

Existing Conditions
The USFWS has not identified any endangered species in or near the proposed site. However, the Island Marble Butterfly (Figure 2.2) is considered a species of concern and is only found on San Juan Island and Lopez Island in San Juan County (NPS (A), 2015). Decatur Island is located about two miles east of Lopez Island and may contain suitable habitat for this butterfly. The population has decreased over the past several years and numbers remain at very low levels. The Island Marble Butterfly relies on Tall Peppergrass, Field Mustard, and Tall Tumble Mustard for food and as a host for their larvae to eat and grow (WDFW, n.d.). It is possible these plants are found on the proposed site.

Several types of birds are documented to live within the San Juan Islands including sea birds like the marbled murrelet and tufted puffin (Outdoor Odysseys, 2011). Animals known to be on Decatur Island include the Red fox and Columbia blacktail deer (NPS (B), 2015).

Proposed Action Impact
During construction of the solar array, shrubs, grasses, weeds and trees will be cleared off the property. Although the Island Marble Butterfly has not been found on Decatur Island, this area could serve as potential habitat for the butterfly (Cauvel, 2016). The vegetation remaining after construction is complete will need to be maintained throughout the years the solar array is active. The methods used to control this vegetation may also have an impact on the wildlife dependent on these plant species.

Construction is planned for February through May which means shorter days in the winter months and potential nighttime construction (Washington State Solar Installer, 2017). This could result in excess nightly noise that would affect the sleeping habits of wildlife. Construction during the day may affect the foraging habits of local wildlife, as well as an increase in stress level due to all the activity. The solar array and substation will also be surrounded by a chain link fence (OPALCO RFP, 2017) This fence may prevent animals that have once used that site as a means for travel from migrating through that area (Hanophy, 2009).
Figure 2.2. Image of the Island Marble Butterfly. It was thought to be extinct in the early 1900s, but was found during a survey at the American Camp on San Juan Island in 1998
Source: https://www.nps.gov/sajh/learn/nature/island-marble-butterfly.htm

**Alternative Action Impact**
A 25% reduction in the array results in less habitat loss for animals inhabiting trees surrounding the site (Figure B2). The habitat of the wildlife that depend on the surrounding trees would, for the most part, remain intact. There would still be a fence surrounding the solar array and substation that would prevent wildlife from traversing through the area. The alternative action still results in potential habitat loss for the creatures that depend on the weeds, grasses, and shrubs that could be trampled during the movement of materials into the site. The method of vegetation management that is used to prevent vegetation from interfering with the productivity of the solar array will also impact the wildlife that are dependent on the weeds, grasses, and shrubs in the area.

**No Action Impact**
There will be no impact to wildlife if no action is taken on the site. The habitat currently supporting wildlife in the area, including the trees, shrubs, grasses and weeds in and around the site, will be preserved.

**Mitigation**
Plants essential to sensitive species such as the Island Marble Butterfly should be spared partial or complete removal to leave an appropriate amount of habitat for these creatures. A survey of plant species needs to be done on the proposed site to determine the specific plants located in this area. Further research and studies are needed to determine if the removal of weeds on this site will affect the Island Marbled Butterfly.

A survey of wildlife in and around the site should be conducted prior to construction to solidify mitigation measures aimed at reducing impacts on animals in the area. As mentioned in the previous section, fences should be placed around plants and trees determined to be important habitat for local wildlife to ensure they are not damaged by construction equipment (City of Bellevue (A), 2017).

Construction could be limited to the daytime hours to prevent excess light and noise at night. If construction at night is deemed necessary, warmer, more wildlife friendly lights should be used, and noise
reduced as much as possible (International Dark Sky Association, n.d.). If it is determined that this area is an important resource for food and shelter for wildlife, a more wildlife friendly fence or a fence that covers less area could be used to reduce impacts (Hanophy, 2009).

2.3 Water

The following sections describe existing water conditions at the site, potential impacts from the proposed and alternative action plans, and possible mitigation measures to reduce these impacts.

2.3.1 Surface Water Runoff

**Existing Conditions**
The San Juan Islands received an average of 27 inches of annual precipitation from 2010 to 2015 (PRISM Climate Group, 2017). This is below Washington state’s average of 38.15 inches of annual precipitation (USGS, 2005). The project site is in the middle of Decatur Island, and is more than 1,000 feet away from any body of water or wetland. Forested vegetation surrounds the site on the east, south, and west sides. Figure 1.2 shows relatively steep hills northwest of the site, and slopes downhill southwest of the site. Thus, the main sources of surface water at the site are precipitation and runoff from uphill. Surface water and stormwater that is not absorbed into the ground likely flows downhill to the southwest. An electrical substation and gravel service road are the current impervious surfaces at the site.

**Proposed Action Impact**
The proposed action requires the installer to build concrete ballast pads on the ground, which the solar panels will attach to (see Figure 2.3). This will increase the number of impervious surfaces at the site, which would increase surface runoff and decrease infiltration into the ground (USGS, 2016). Water absorbed into the ground is filtered by soil and plants, which removes pollutants and slows down the rate that water cycles through the system (USGS, 2016). The proposed project will also remove some surrounding vegetation, which will further increase surface runoff (USGS, 2016). These activities will result in less filtered water with higher concentrations of pollutants and sediment, which could eventually flow into ocean water surrounding the island.

**Alternative Action Impact**
The alternative action features a more compact solar array with fewer panels, which would affect a smaller area than the proposed plan. This will add less impervious surfaces, and no vegetation will be removed. There would be a smaller increase in surface water runoff and pollutant concentrations compared to the proposed plan.
No Action Alternative Impact
A no action alternative would not require adding more impervious surfaces or removing vegetation. As a result, surface water runoff would not be impacted by this alternative.

2.3.2 Groundwater Movement

Existing Conditions
The site is in the middle of Decatur Island, surrounds the site on the east, south, and west sides. The current soil is a mixture of sandy and gravelly loam, and the water table can be found at depths of around 12-20 inches (Natural Resource Conservation Service, 2017). The main sources of groundwater at the site are precipitation, surface water flow, and groundwater flow. Existing impervious surfaces at the site include an electrical substation and gravel service road.

Proposed Action Impact
The proposed action requires the installer to build concrete ballast pads on the ground, which the solar panels will attach to. More impervious surfaces will increase surface runoff and decrease infiltration into the ground (USGS, 2016). Water absorbed into the ground is normally filtered by soil and plants, which removes pollutants and slows down the rate that water cycles through the system (USGS, 2016). The proposed project will also remove some surrounding vegetation, which will further decrease infiltration (USGS, 2016). These activities will result in less filtered water with higher concentrations of pollutants,
which could eventually flow into ocean water surrounding the island. Additionally, any soil grading could negatively affect the soil’s ability to absorb water and filter out pollutants and sediment.

**Alternative Action Impact**
The alternative action features a more compact solar array with fewer panels, which would affect a smaller area than the proposed plan. This will add fewer impervious surfaces than the proposed plan, and will not require any vegetation to be cut. In addition, grading will affect a smaller amount of soil. These factors will result in a smaller decrease in surface water infiltration compared to the proposed plan.

**No Action Impact**
A no action alternative would not require adding more impervious surfaces, removing vegetation, or soil grading. As a result, this alternative will not impact groundwater movement.

**Surface and Groundwater Mitigation Measures**
To mitigate impacts to groundwater movement, the applicant could plant native vegetation around the site as a buffer. This added vegetation would increase infiltration and help filter water cycling through the site (USGS, 2016). Planting vegetation would be especially effective adjacent to impervious surfaces, such as the concrete ballast pads and service road. Increased stormwater runoff could also be mitigated by using “thirsty” concrete for the ballast pads. Tarmac, a building materials company, developed this new concrete mix a few years ago (Weller, 2015). It can absorb up to 880 gallons of water per minute, allowing water to fully infiltrate into the ground below (Weller, 2015). Using this type of concrete for the ballast pads would greatly decrease the impact to stormwater runoff, and would possibly not count as an impervious surface.

The applicant could also reduce the negative impacts of grading through a few best management practices. During and immediately after the construction period, the applicant could trap and filter stormwater to remove sediment and dissolved pollutants. This is typically done through sand filtration (City of Bellevue (B), 2017). In addition, the applicant could ensure that the post-construction soil achieves a minimum quality and depth for water infiltration and filtering. A few ways to do this include mulching, tilling the soil, and maintaining at least 10% organic matter in the topsoil layer (City of Bellevue (C), 2017). Maintaining soil quality will also be beneficial to surrounding vegetation, which will further aid in infiltration (City of Bellevue B, 2017).

**2.4 Aesthetics**
The following section describes the existing aesthetics of the OPALCO property, potential impacts from the proposed action and alternative action plans, and possible mitigation measures to reduce these impacts.

**Existing Conditions**
The property where the proposed ground-mounted array will be installed has an open, grassy area that is surrounded on two sides (south and east) by forest. The existing OPALCO substation sits on the north end of the property, a short distance from Armitage Road. The property and its surrounding parcels have minimal topographic relief. Few residential homes border the property. Decatur Island’s only store, Alma’s County Store, sits directly across Armitage road from the OPALCO property. This store acts a
gathering place for members of the Decatur Island community and has a direct view of the proposed community solar project (Figure 2.4). According to a Washington State solar installer (2017), Decatur Island community members are currently displeased with the visuals of the OPALCO property as seen from Alma’s County Store.

Figure 2.4. Alma’s County Store is Decatur Island’s only store and is situated directly across from the proposed location of the community solar array. See Figure 1.1.3 for location.
Source: http://joom.dezinerfolio.com/almascountrystore.html

Proposed Action Impact
The proposed action will lead to the construction of a ground-mounted solar array on the OPALCO property on Decatur Island. The construction of solar arrays can be controversial, as the public tends to have varying opinions on the balance between positive and negative impacts. When the development of a new solar array is proposed, it is common for members of the surrounding community to voice concerns about how the solar panels will alter the aesthetic or “feel” of the area. In some cases, public concern over aesthetics leads to moratoriums on solar development. In 2017, Kittitas County in Washington State issued a three-month moratorium on commercial solar developments after determining that solar arrays had the potential to negatively impact the rural character of the county’s land (Buhr, 2017). In a similar case, the permitting of a solar array on a steep hillside in Montecito Heights outside of Los Angeles resulted in to public opposition. Neighbors voiced concerns that the array would obstruct their canyon views and that the panels would produce dangerous glare that could potentially blind motorists (Scauzillo, 2017).

The construction of the community solar array at this location has the potential to either improve or reduce the public approval of this site. On May 2nd, 2017, OPALCO issued a survey to its customers throughout the San Juan Islands to gauge community interest regarding the proposed installation of a community solar array on Decatur Island. Customers were asked several questions regarding the aesthetics of the proposed solar array. These questions aimed to identify and quantify the concern that a solar array would negatively impact the aesthetics of the island. The survey found that less than 20% of the 1,248 community members surveyed would disapprove of the project based on impacts to
environmental aesthetics. This suggests that a majority of OPALCO customers support the continuation of the project. Additionally, when asked how they would feel if a solar array was near their home, less than 25% of survey respondents said they would feel negatively or very negatively. Thus, this survey finds that most customers within the San Juan Islands do not believe that a community solar project will have a severe impact on the aesthetics or “feel” of the islands (Community Solar Survey, 2017).

The aesthetics of solar panels are dependent on an individual’s taste. There has been a general trend towards public acceptance as a growing number of people view solar panels as being beneficial. Though they may alter the appearance of the land, they are a symbol of renewable energy and progress (Tsoutsos, 2005).

The proposed installation of a ground-mounted solar array on the OPALCO property will alter the current aesthetics of the site. The proposed project will require that trees and other vegetation be removed along the southern and eastern edges of the property. The required clearing and grading will increase the openness of the property and will alter the way the property looks relative to its surroundings. In addition to the clearing of trees and vegetation, OPALCO requires that the solar array be contained by a fence. The fence must be a minimum of six feet tall and will need to surround the entire array (OPALCO RFP, 2017). It is likely that the addition of a fence will decrease the natural feel of the property and will likely cause the array to stand out from its surroundings.

The project also has the potential to alter aesthetics through the modification of the site’s light and glare reflectance. The OPALCO property is predominately clear, with a large grassy area surrounded by coniferous forests (Figure 1.3). Land with grass vegetation cover typically reflects approximately 25% of incoming solar radiation back to the environment, whereas forested areas dominated by conifers reflect about 20% of incoming radiation (Kittitas County, 2016). The albedo of the surface at the OPALCO property was measured as 0.20, which corresponds to the general reflectance values of its vegetation (Washington State Solar Installer, 2017). Solar panels are designed to absorb as much incoming solar radiation as possible for energy production, and the panels that have been proposed for use with this project are constructed with anti-glare glass that is treated with an anti-reflective coating (Washington State Solar Installer, 2017). Studies have shown that photovoltaic panels reflect approximately 30% of incoming radiation, a value like that of concrete (Kittitas County, 2016). Thus, the installation of solar panels at the property on Decatur Island has the potential to slightly increase the site’s reflection of incoming radiation. This increase, however, would be minimal, and a study by the United States Air Force concluded that the glare produced by solar panels is negligible and will not negatively impact humans or the environment (Kittitas County, 2016).

**Alternative Action Impact**

It may be possible to utilize construction practices that mitigate any negative visual aesthetics brought about by the construction of the OPALCO community solar array. A 25% reduction in the size of the solar array would reduce the footprint of the array. A reduction in the array’s footprint would eliminate the need to clear and grade the forested portion of the property and would require fewer solar panels (Figure B.2). The use of fewer solar panels would reduce the array’s contribution of light and glare to the surrounding environment.
**No Action Impact**
The No Action Alternative will not impact the aesthetics of the OPALCO property. The property’s vegetation will not be cleared, and the ground-mounted solar array will not be installed. The community on Decatur Island may continue to have negative feelings towards the visual appeal of the OPALCO property.

**Mitigation Measures**
The implementation of several mitigation measures could reduce the negative impacts of the solar array installation on the aesthetics of Decatur Island. This sparsely populated island has thick vegetation cover and few roads, lending to a “natural” feel. The use of natural fencing and construction materials in neutral earth tones would help the array blend in with its surroundings and help improve aesthetic appeal. The construction of a wooden fence around the perimeter of the array in lieu of a chain link or similar metal fence may benefit the project’s aesthetics (Figure 2.5). Another mitigation measure is planting native plant varieties along the outside perimeter of the fence to match its forested surroundings. Additionally, it may be beneficial to reduce the use of concrete in the installation process and allow grasses and other vegetation at the base of the panels to grow freely, if they do not impede the electromagnetic absorption of the panels.

Figure 2.5. Example of ground-mounted solar array that is fenced with natural wood materials. 
Source: https://www.dreamstime.com/
2.5 Energy

This section outlines the energy specifications for the proposed solar array. This includes amount of energy production, and the resulting environmental impacts. Renewable and nonrenewable energy provided to Decatur Island is discussed as well. Currently, OPALCO receives energy primarily from outside sources, although the solar array would provide a local and renewable energy source. The solar array, located on Decatur Island, would provide energy to San Juan County. The energy is distributed through OPALCO energy services.

2.5.1 Energy

Existing Conditions
San Juan County currently uses 215,000,000 kWh or 215,000 MWh of energy a year (OPALCO, 2015). OPALCO provides energy to citizens through Bonneville Power Administration (BPA). The current fuel mix is 86.8% Hydroelectric, 11.2% Nuclear, 1.2% Coal, 0.7% Natural Gas, and 0.1% Biomass and Waste (OPALCO (A), n.d.). Currently, OPALCO provides 8.43 members per mile of energized line through BPA energy (BPA, 2014). San Juan County has the highest affordability gap in Washington State due to a seasonal service economy. The high demand for hydroelectric power has led to a continual increase in price (BPA, 2014).

Proposed Action Impact
In accordance to OPALCO’s request for proposal, the proposed action would ideally generate up to 500 kW DC (OPALCO RFP, 2017). To obtain accurate results of the array, a hypothetical model at 406.5 kW DC was generated on the PvWatts website run by the National Renewable Energy Laboratory (NREL). The generator allowed for specific qualities in OPALCO’s request for proposal to be inserted. Washington solar panel manufacturer, Itek, produces a 72-cell: 350-370-watt energy SE model for the panels being used on this array. Energy production by year would be 333,036 kWh DC, which is anticipated to decrease by less than 1% annually (Itek “Limited Warranty”, 2017). After 25 years it is anticipated to generate 29,145.7 kWh DC annually. The total anticipated energy generation for the entire 25 years is 774,486.67 kWh (Table C1). Figure 2.6, shows that by 2035, OPALCO anticipates receiving one third of their total energy from local renewable sources. The proposed array is estimated to create a 20% increase in solar energy produced, according to OPALCO’s numbers.

To produce maximum results in energy production, the panels will require occasional cleaning. Cleaning frequency will depend on the amount of soiling that is produced on panels. Soiling on panels can decrease the energy production of the panels. The ideal cleaning frequency can by determined by monitoring energy output before and after cleaning (Itek, n.d.).

In research done by Lazard, it is shown that community solar energy is significantly cheaper than rooftop residential solar, compares closely to coal, and is significantly cheaper than nuclear power (Waxler, 2017). Nuclear power is the most prevalent energy source next to hydroelectric in both the OPALCO fuel mix and the BPA fuel mix (Figure C.2). Lazard research also confirms that there has been an 86% decrease in cost for solar power within the last eight years (Waxler, 2017). From this, it is inferred that solar prices will continue to drop and become even more affordable.
In July, 2017 the Washington State legislature passed SB 5939 to create incentives for residents to implement solar power. The bill will modify taxes to incentivize renewable energy, including PV solar systems (Solar Washington, n.d.). Not acting would prevent OPALCO and San Juan residents from benefiting from incentives, unless they take personal action towards residential panels.

![Figure 2.6. OPALCO Energy Resources Predictions](https://www.opalco.com/wp-content/uploads/2015/12/OPALCO-2015-IRP-Overview.pdf)

**Alternative Action Impact**
The alternative action, which would result in the installation of fewer panels, would reduce the production of energy. This would then affect how much nonrenewable energy would be required. Currently 13.2% of OPALCO’s energy is generated from nonrenewable sources, and the 86.8% of renewable energy is nonlocal energy. The proposed array would produce roughly 333,036 kWh DC annually, which could replace partial energy now provided by nonrenewable sources. Within the alternative action, it would reduce the solar array by 25%, this would alter the array size from 406.5 kW DC to 304.9 kW DC. Consequently, it would produce 83,238 less kWh DC annually, reducing from 333,036 kWh DC to 249,798 kWh DC.

**No Action Impact**
If no action is taken, the OPALCO service area would continue receiving 13.2% of its total energy from nonrenewable energy sources (OPALCO (A) n.d.). Installation of the solar array would not continue. OPALCO would not have access to local and renewable energy. Nonrenewable energy prices provided by BPA could increase, and according to Lazard renewables should continue to drop. San Juan County has the largest affordability gap in Washington, meaning higher prices could be detrimental to the county’s residents.
Mitigation Measures
Mitigation efforts in this section would include making more efficient energy production, and lose less through transmission. Ways to encourage energy conservation on the customer side is shown in Figure 2.7; examples include: adding insulation to your home, install and use programmable thermostats, upgrade your water heater which uses Heat Pump technology, control drafts by sealing air leaks (OPALCO (B), n.d.). OPALCO offers rebates to customers through their Energy Efficient Program (OPALCO (C), n.d.)

Figure 2.7 OPALCO Energy Savings Pyramid (Mitigation Techniques for Saving Energy)
Chapter 3: Summary of Findings

3.1 Summary

Thorough analysis and consideration of possible impacts to elements of the Environment listed in WAC 197-11-444 has produced the following conclusions about OPALCO’s proposed community solar project:

1. The benefits of supplementing solar energy into OPALCO’s portfolio outweigh the negative impacts of installing the solar array. The solar array will provide the OPALCO grid with an annual source of renewable energy, with an annual energy production of approximately 333,036 kWh DC. This has a potential to reduce the need for non-renewable energy and could result in a more sustainable future for OPALCO and its customers.

2. The following significant impacts were identified:
   ○ Increased soil degradation from removal of vegetation
   ○ Decrease in natural soil drainage capabilities
   ○ Increase in susceptibility to wind and erosion
   ○ Increase in plant species’ exposure to heat and light
   ○ Decreased habitat and migration routes for wildlife in the area
   ○ Increase in wildlife anxiety levels during construction
   ○ Increased stormwater flow resulting in decreased groundwater infiltration
   ○ Interference with the natural feel of the environment on Decatur Island
   ○ Increased emittance of light and glare to the environment
   ○ Increased amount of local renewable energy

3. The alternative action provides a compromise between minimizing the solar array’s negative impacts and supplementing OPALCO’s portfolio with more renewable energy. The alternative action eliminates the need to clear the forested portions of the property keeping existing habitat intact and will limit the impact on the property’s aesthetics. Reducing the size of the solar array by 25% will decrease the annual energy production to 249,798 kWh DC.

3.2 Decision Matrix

The decision matrix shown below provides a look at the impacts the installation of a solar array on Decatur Island would have on the environmental elements discussed in this report. The proposed action has the worst score (-7) in the matrix equating to the greatest damage to the environmental elements combined, out of the proposed action, alternative action, or no action plan. The decision matrix also shows that the alternative action is slightly worse (-3) than taking no action at all (-2). While the score shown for the alternative action suggests that it would be better to not build the solar array, the long term positive effects of renewable solar energy generation will eventually outweigh the initial negative impacts to the environmental elements discussed.
Table 3.1 Decision Matrix showing the severity of impacts to the proposal site

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<th>Alternative Action</th>
<th>No Action</th>
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<tr>
<td>Earth</td>
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<tr>
<td>Vegetation and Wildlife</td>
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<td></td>
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<tr>
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<tr>
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<td>Groundwater Movement</td>
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<td>Energy</td>
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<td><strong>Totals</strong></td>
<td><strong>-7</strong></td>
<td><strong>-3</strong></td>
<td><strong>-2</strong></td>
</tr>
</tbody>
</table>

**Key**

- 0 = No Impact
- -2 = Strong Negative Impact
- -1 = Moderate Negative Impact
- +1 = Moderate Positive Impact
- +2 = Strong Positive Impact
References


Kittitas County CDS. (2016). Iron Horse SEPA Checklist Revised [PDF].


# Appendix A: OPALCO Request for Proposals

## Request for Proposal (RFP)

Orcas Power and Light Co-op  
OPALCO SOLAR RFP, 2017  
Issued: 9/1/17  
Due Date: 10/13/17

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I. INTRODUCTION

A. COMPANY OVERVIEW

The Orcas Power and Light Cooperative ("OPALCO" or the "Company") is a member owned, non-profit cooperative utility providing energy services to San Juan County since 1937. The Company is issuing the "2017 OPALCO Solar RFP" to procure up to 500kW DC capacity of solar photovoltaic resource. The solar capacity to be developed and sold to OPALCO will also be referred to as "the Project".

II. GENERAL INFORMATION

A. RFP SCHEDULE

<table>
<thead>
<tr>
<th>Event</th>
<th>Target Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issue RFP</td>
<td>9/1/17</td>
</tr>
<tr>
<td>Intent to Bid Deadline</td>
<td>9/15/17</td>
</tr>
<tr>
<td>Site Visit</td>
<td>9/19/17</td>
</tr>
<tr>
<td>Bidders Questions Due</td>
<td>9/25/17</td>
</tr>
<tr>
<td>Proposals Due</td>
<td>10/13/17</td>
</tr>
<tr>
<td>Selection</td>
<td>10/27/17</td>
</tr>
<tr>
<td>Execution of Contract</td>
<td>11/3/17</td>
</tr>
<tr>
<td>Project Commercial Operation, no later than</td>
<td>6/30/18</td>
</tr>
</tbody>
</table>
B. COMMUNICATIONS

All communications from companies responding to this RFP ("Bidders") to OPALCO, including questions pertaining to this RFP, must be submitted via email. OPALCO will determine whether to respond directly to Bidders via email, direct phone call, or conference call. All submittals, questions, and communications shall be conducted through the following single point of contact:

Russell Guerry
Manager of Engineering and Operations
Orcas Power and Light Cooperative
360-376-3589
rguerry@OPALCO.com

C. ELIGIBILITY REQUIREMENTS FOR RESPONDENTS

1. INSURANCE REQUIREMENTS
   Bidder will complete the Bidder’s Insurance Proposal located in Appendix B.

2. FINANCIAL INFORMATION AND CREDIT REQUIREMENTS
   Bidder must provide the following information:
   a. Submit financial statements for the last three (3) years.
   b. Provide a minimum of three (3) financial references.
   c. Provide a completed I-9 & UBI#.

D. COMPANY RESERVATION OF RIGHTS AND DISCLAIMERS

OPALCO has prepared the information provided in this RFP to assist interested persons and entities in making a decision whether to respond with a proposal. OPALCO reserves the right to modify, change, supplement or withdraw the RFP at its sole discretion. No part of this document or any other correspondence from OPALCO, its employees, officers or consultants shall be taken as legal, financial or other advice, nor as establishing a contract or any contractual obligations. All communication between Bidders and OPALCO shall be conducted in writing.

OPALCO makes no representations or warranties regarding the completeness of the information contained within the RFP and does not purport that this RFP contains all of the information needed for Bidders to determine whether to submit a proposal. Neither OPALCO nor its employees, officers or consultants will make, or will be deemed to have
made, any current or future representation, promise or warranty, expressed or implied, as to the accuracy, reliability or completeness of the information contained within the RFP or any other information provided to Bidders.

Bidders who submit proposals do so without legal recourse against OPALCO, or OPALCO’s directors, management, employees, agents or contractors, due to OPALCO’s rejection, in whole or in part, of their proposal or for failure to execute any agreement with OPALCO. OPALCO shall not be liable to any Bidder or to any other party, in law or equity, for any reason whatsoever related to OPALCO’s acts or omissions arising out of, or in connection with, the RFP process.

OPALCO reserves the right to reject, for any reason, any and/or all proposals. OPALCO further reserves the right to waive any irregularity or technicality in proposals received, or to consider alternatives outside of this solicitation, at its sole discretion, to satisfy its capacity and energy needs. In addition, OPALCO reserves the right, in its sole discretion, to modify or waive any of the criteria contained herein and/or the process described herein.

No Bidder will have any claim whatsoever against OPALCO, its employees, officers, or consultants arising from, in connection with, or in any way relating to this RFP. Without limiting the generality of the foregoing, each Bidder agrees, by and through its submission of a proposal, that rejection of a proposal will be without liability on the part of OPALCO, its employees, officers, or consultants, nor shall a Bidder seek recourse of any kind against any of the foregoing on account of such rejection. The filing of a proposal shall constitute an agreement of the Bidder to each and all of these conditions. Each Bidder and recipient of this RFP is responsible for all costs incurred in evaluating, preparing and responding to this RFP. Any other costs incurred by any Bidder during negotiations are also the responsibility of the Bidder.

E. CONFIDENTIALITY AGREEMENT
Bidders will be required to execute a mutual confidentiality agreement prior to entering into final negotiations.

F. NOTICE OF INTENT TO BID
Bidders shall respond to this request via email to confirm their intentions to submit a proposal no later than date listed in RFP Schedule.

III. PROJECT INFORMATION
A. RESOURCE DESCRIPTION
OPALCO is asking Bidders to propose to design, procure, and construct a solar photovoltaic facility at the location described in more detail in
Appendix A. The proposals should have pricing for two systems with each having a nameplate rating no larger than 500kW AC.

1. System #1 shall include a Tier 1 module selection of the Contractor’s choosing, with emphasis on production efficiency and cost effectiveness.
2. System #2 shall include a Tier 1 Made in Washington solar module.

B. POINT OF DELIVERY

1. BONNEVILLE POWER ADMINISTRATION (BPA) BALANCING AUTHORITY: The Project will interconnect under the BPA Balancing Authority Small Generator Interconnection Process (SGIP). OPALCO intends the Bidder will prepare and submit on behalf of OPALCO the interconnection application to BPA, with OPALCO support.

2. ORCAS POWER AND LIGHT ELECTRIC COOPERATIVE (OPALCO): The specified point of connection will be at the secondary 480v side of a new OPALCO supplied and installed transformer. A detailed location map is included in Appendix A.

C. DRAWINGS AND DOCUMENTATION

1. PARCEL MAP: A parcel map for the proposed property that shows the property lines and associated easements that must be considered is located in Appendix A.

2. STATE HISTORIC PRESERVATION OFFICE (SHPO) REPORT: A SHPO report for the entire property is located in Appendix C.

3. HABITAT ASSESSMENT REPORT: A report for the entire property is located in Appendix C.

4. SAMPLE SOLAR LAYOUT: Proposed location for solar array must integrate with the sub-station expansion and future development. Adequate setbacks must be maintained from the tree line at the lot lines with allowance to extend up to the County easement to the west. Appendix A

5. TOPOGRAPHY DRAWINGS: As seen in Appendix A.

D. ENVIRONMENTAL ATTRIBUTES

OPALCO will be the sole recipient of the environmental attributes of the Project.
IV. STATEMENT OF WORK

The Bidder shall be responsible for all aspects of the design, procurement, construction, and commissioning of the facility, including, but not limited obtaining all necessary permits to construct the facility. Without limiting the foregoing, OPALCO shall be responsible for all items noted in Section 5.

The following will be the responsibility of the Bidder.

1. PERMITTING: The Bidder will be responsible for all building permits with the Authority Having Jurisdiction, and all associated costs. OPALCO will work with successful contractor with Land Use permitting.

2. SITE MODIFICATIONS: The Bidder will determine the extent of the site modifications necessary including but not limited to civil engineering, access roads, foundation design, site modifications, and grading. Inclusions shall be listed in the RFP response.

3. DISTRIBUTION UTILITY INTERCONNECTION: The Bidder will be responsible for the interconnection application with Orca Power and Light Cooperative, and all required utility interconnection infrastructure to interconnect the Project.

4. DELIVERIES: Bidders will be responsible for all transportation, shipping, unloading, barging service, boat rentals, etc. associated with project development and installation. Bidders are encouraged to coordinate activities with OPALCO to minimize these expenses.

5. ENGINEERING, PROCUREMENT, AND CONSTRUCTION: The Bidder will be responsible for all Engineering, Procurement, and Construction (EPC) to deliver a fully operational Photovoltaic (PV) system to OPALCO. OPALCO will provide oversight during EPC process. A geotechnical report on the entire property is required.

5. MONITORING: an online dashboard for reading the Project’s real time production shall be procured, installed, and commissioned by Bidder. The monitoring must be revenue grade and be displayed for a minimum of 10 years.

6. COMMISSIONING: Bidder must provide a 3rd party commissioning report listing compliance with contracts, manufacturer recommendations, and industry accepted minimum standards such as IEC 62446. Any non-compliant issues must be addressed prior to final payment. Bidder will provide a pre-commission testing procedure, commissioning start-up with performance capacity
check and production metering and verification at 3, 6, or 12 months.

7. FENCING: Bidder shall provide a minimum of 6’ chain link fence around the perimeter of the Solar Project. Bidder shall not assume this fence to be in place prior to construction for security of the construction site.

8. NEGOTIATED DISCOUNTS: Because OPALCO may be eligible for discounts or other incentives, Bidder will review all major material costs with OPALCO prior to purchase.

9. PAYMENT AND MILESTONE SCHEDULE: OPALCO requires a payment schedule that lines up with critical milestones of project construction.

10. COMMUNICATIONS EXPECTATIONS: Bidder will be required to respond to all communications from OPALCO within 2 business days, unless otherwise specified.

V. EXCLUSIONS
The following will be the responsibility of OPALCO.

1. PROJECT FINANCE: OPALCO will provide the capital needed to construct the project and will negotiate a payment schedule with the awarded Bidder.

2. SITE PREPARATION: OPALCO will clear the entire parcel of brush and trees to allow for better solar access and prep the site for installation. Bidders shall not assume significant grading to overcome any topographical features.

3. Systems Control and Data Acquisition: OPALCO to provide Systems Control and Data Acquisition (SCADA) to integrate the PV and battery systems.

VI. REQUEST FOR PROPOSAL CONTENT

Proposals for the “2017 OPALCO Solar RFP” must be submitted electronically by the due date. Each proposal must be contained in a single PDF file and formatted in the following manner. Additional supporting documentation may be included as appendices, where clear references are provided to the applicable section.
A. PROPOSAL FORMAT:

1. EXECUTIVE SUMMARY:
   a. The executive summary shall provide an overall description of the Project with key benefits to OPALCO and other elements distinguishing the Bidder’s proposal. The executive summary shall be accompanied by one or more Bid Summary.

2. PRICING:
   a. Bidder shall provide the total system pricing with the following breakdowns:

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
<th>Price per Watt-DC</th>
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</thead>
<tbody>
<tr>
<td>Modules and Inverters</td>
<td></td>
<td></td>
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<tr>
<td>Electrical Materials</td>
<td></td>
<td></td>
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<tr>
<td>Site Prep and Materials</td>
<td></td>
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<tr>
<td>Installation Labor</td>
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<tr>
<td>Eng. &amp; Design Fees</td>
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<tr>
<td>Interconnection Upgrades</td>
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<tr>
<td>Additional Warranty/O&amp;M (if applicable)</td>
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<td></td>
</tr>
<tr>
<td>Total Price</td>
<td>$00.00</td>
<td>$00.00</td>
</tr>
</tbody>
</table>

3. EXPERIENCE AND QUALIFICATIONS:
   a. BIDDER EXPERIENCE: describe the pertinent experience to the proposed Project. Provide references from similar projects. Utility experience preferred.
   b. GENERATING FACILITIES: describe the number, size, and type of solar facilities placed in service. Describe 3-5 site installations, including construction dates.
   c. RESOURCE SUPPLY: describe the Bidder’s ability to provide adequate resources to execute the Project, specifically pertaining to solar module, inverter, and racking procurement within the Project’s development timeframe. Also describe any subcontracting agreements with quality control and assurance provided by Bidder.

4. TECHNICAL INFORMATION
   a. DRAWINGS: provide a one-line diagram and a conceptual drawing of the proposed array overlaid to the existing parcel.
   b. PRODUCTION: provide an excel-based third party production model such as PVsyst or equal, showing loss diagram with derate factors, and estimated yearly production in kWh for a 25-year project lifetime.
c. PROJECTED PROJECT SCHEDULE: provide a schedule for the Project from contract execution to commercial operation with pertinent milestones.
d. ENVIRONMENTAL COMPLIANCE PLAN: include a description of how the Project will comply with environmental laws and regulation. Provide a description of the applicable permits and assessments required, with proposed solutions.
e. PROPOSED FACILITY EQUIPMENT: Bidder shall provide the proposed project components specifications. Solar module manufacturers shall be “Tier 1” as defined by Bloomberg New Energy Finance. All manuals shall be provide as specified at the completion of construction.

5. WARRANTIES:
   a. PROPOSED EQUIPMENT WARRANTIES: list the duration of the equipment warranty for modules, inverters, transformers, and racking hardware.
   b. WORKMANSHIP: list the duration of applicable workmanship warranties.
   c. TOTAL SYSTEM WARRANTY: if applicable, provide the system warranty and services provided by Bidder.
   d. Operations & Maintenance (O&M) SERVICES (OPTIONAL): Bidder shall provide details on their O&M offering such as on-call, pro-active monitoring, preventative maintenance, vegetation management, panel cleaning, and associated costs.

VII. BID EVALUATION AND SELECTION

A. GENERAL
   OPALCO will evaluate proposals based on the reasonableness of project execution and the lowest cost of energy.

B. PRICE FACTORS
   OPALCO will favor those projects proposals that provide the lowest levelized cost of energy for the lifetime of the system, estimated at 25 years.

C. NON-PRICE FACTORS
   1. EXPERIENCE
      a. Project Development Experience
      b. Design/Build Experience
      c. Project Ownership/O&M Experience
      d. Financial Capability
   2. TECHNOLOGY
      a. Equipment Quality
      b. Manufacturer volume, health and reputation
c. Technical Feasibility

d. Equipment Supply Control

e. System Efficiency
Appendix A: Location Details

A. Location Parcel Map
B. Sample Solar Layout
Appendix B: Insurance Requirements

Comprehensive General Liability, Property Damage, Personal Injury and Automobile Insurance

The Bidder shall maintain on file at OPALCO or include with his bid a current certificate of insurance confirming coverage and showing OPALCO as additionally insured on such insurance. Minimum amounts and units of insurance coverage required are as follows:

1. Comprehensive General Liability with Broad Form Property Damage, Broad Form Contractual, Personal Injury, including other coverage on Broadening Endorsement; Explosion, Collapse, and Underground (XCU) Coverage; Products and Completed Operations; and Owner’s and BIDDER’s Protective.

   Bodily Injury and Property Damage Liability: $1,000,000. Combined Single Limit

2. Owned Automobiles and Automobiles under long-term lease, including Hired Automobiles and Non-Owned Automobiles.

   Bodily Injury and Property Damage Liability: $500,000 Combined Single Limit.

Workers Compensation and Employer’s Liability Insurance

Bidders with Employees are required to carry Workers Compensation Insurance for their employees in compliance with Washington State Department of Labor and Industries (L&I) regulations. Bidders with employees shall submit an Employer Liability Certificate (Certificate of Coverage) from L & I as a condition of eligibility to enter into a Contract to perform Work under this Master Agreement. OPALCO reserves the right to verify Workers Compensation Insurance account status prior to entering into a Contract to perform Work under this Master Agreement and during the term of any such contract. Failure to maintain Workers Compensation Insurance may be grounds for termination.

Bidders who are self-insured in lieu of maintaining Workers Compensation through Washington Dept. of Labor and Industries shall provide proof of such insurance and conformance with L&I’s requirements for self-insurance.

Bidders hiring subcontractors in lieu of employees shall notify OPALCO prior to the use of such sub-CONTRACTOR on any Contract and must obtain approval of OPALCO prior to any such use of subcontractors.

OPALCO shall receive a minimum 30 day notice in the event of cancellation of insurance required by this agreement.
Appendix C: Reports

*To be provided to successful bidder.*
Figure B.1. Potential layout of the proposed solar array from OPALCO’s Request for Proposals
Figure B.2. Alternative Action Layout showing a 25% reduction in solar panels
### Appendix C: Energy Resources

Table C.1: The energy produced by the solar array on Decatur Island over its 25-year lifespan with 0.5% degradation per year (NREL PV Watts Calculator)

<table>
<thead>
<tr>
<th>Year</th>
<th>Energy Production kWh</th>
<th>Year</th>
<th>Energy Production kWh</th>
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Figure C.1: NREL Washington Solar Radiation Resource Range
Source: https://www.nrel.gov/gis/solar.html
Figure C.2: Bonneville Power Administration 2016 Power Mix
Itek SE 72-Cell Solar Module

We offer solar modules of unsurpassed quality that exceed performance expectations at an affordable price.

- Industry-leading efficient monocrystalline silicon PERC cells
- Certified PID-free above and beyond the industry standard
- Full quality check of every module along the production line
- Impact-resistant, anti-glare solar glass
- Building the highest efficiency PERC modules in the USA

Connect with us: www.itekenergy.com | info@itekenergy.com

Figure C.3: Itek 72-Cell Solar Panel Model