



## Oregon Solar Highway – West Linn Project UPDATED March 2010 Frequently Asked Questions

***In March 2010, ODOT completed a comprehensive feasibility study on the proposed West Linn solar highway site. This FAQ is being updated to reflect those findings as well as other decisions the community and ODOT have made since beginning the investigative process. To keep up-to-date, or to submit questions and comments, visit us online at [www.oregonsolarhighway.com](http://www.oregonsolarhighway.com).***

### ***What is this proposed project?***

The West Linn Solar Highway project is a proposal to place enough solar arrays alongside the highway to generate 3.5 million kilowatt-hours of renewable energy to power Oregon's transportation system.

### ***Where is the site?***

The site is on the north side of I-205, in the south portion of the City of West Linn. On ODOT right-of-way, it is about 1/8 mile southwest of an abandoned safety rest area. ODOT acquired the acreage when it originally built I-205, because the property was a known slide area. To stabilize the land and protect the highway, ODOT created "benches" and removed the potential slide material. ODOT currently uses the site for operations and maintenance storage.

### ***Why is this location a good site for a large solar project?***

- The large acreage site in West Linn would allow for "utility scale," which lowers the price per kilowatt installed by spreading out the fixed costs of the project. Our demonstration project at the I-5/I-205 intersection showed that 1 Megawatt is about the minimum size needed to make financial sense, and larger is better.
- The West Linn site's benched land and direct southern exposure are also ideal, allowing for maximum sun exposure and easier installation and maintenance.
- The close proximity of a PGE substation permits easy access to the grid.
- Arrays would be placed so they don't interfere with future I-205 widening.

### ***Will these panels create problems for drivers and residents on the Oregon City side?***

The potential for glare from solar panels has been carefully studied over the years, with the conclusion that it is not a distraction for drivers. For example, one study showed no difference in driver behavior along an English highway after solar panels were installed. Solar panels have been installed at airports, including Denver, Long Beach, Fresno, and San Francisco, and other locations, demonstrating confidence that glare would not be an issue. In fact, solar panels are designed to absorb sunlight, not reflect it, to produce energy.



*Artist rendering of what a 3 Megawatt solar array on the West Linn site might look like, from the bluff in Oregon City to the south.*

For residents on the Oregon City side of the interstate, researchers found in the feasibility studies that while the view from Canemah Bluff will change, the impact to the existing scenic conditions will be minimal given that the visual scale of the project area is small relative to the wide panoramic landscape view. Currently, the view of this area includes ODOT maintenance equipment, supplies, and stacks of barriers 9 feet tall. For comparison, the tallest solar array would be just over 13 feet. To get an idea of what an array looks like, see the solar highway demonstration project in Tualatin at the intersection of I-5 and

I-205. (Viewable at [www.oregonsolarhighway.com](http://www.oregonsolarhighway.com))

**How many panels will it take to make a 3 Megawatt solar array?**

Approximately 13,600 panels would be used to generate approximately 3.3 million kilowatt-hours of electricity, enough to power nearly 18 percent of ODOT's electricity need in PGE service territory.

**What preparation would the site need to make it ready for the project?**

ODOT would need to address the environmental impacts of preparing the site for a solar array (see description of preparation efforts, following) because preparing the site would require:

- o Removing trees on the lower and upper benches so the array would not be shaded; and
- o Filling in a small spring-fed wetland that occurred after ODOT stabilized the slope.

**What measures will ODOT perform to address the tree removal, wetland fill, and visual impacts?**

Similar to any ODOT project, this project will follow the National Environmental Policy Act (NEPA) requirements. The feasibility studies found that, due to previous site disturbance, when I-205 was built and the area was terraced to remove the threat of landslides, there are no significant biological resources at the site. However, the studies did review the actions that would need to occur and made recommendations to offset those impacts.

For example, the project would require removing 268 trees. ODOT's policy requires planting two trees for every one removed (all necessary permits would be acquired prior to any tree removal). In addition, cut trees would be made available to other agencies, such as the Oregon Department of Fish and Wildlife, for off-site habitat enhancement. Some of the trees may be ground and re-used on the site as mulch. ODOT is also interested in opportunities to leverage the tree replanting to support collaborative community-based habitat restoration projects.

The studies also found there are no wetlands requiring special treatment; one

wetland that was inadvertently created when the site was terraced will be filled.

**Does removing trees conflict with the gain of clean energy?**

Large trees and solar panels do not exist well together, as shade greatly reduces the productivity of the panels. However, the carbon emissions reduced through the use of solar power have a greater positive impact to the environment than the amount of carbon sequestered in the soil by trees. There is accepted scientific methodology used to confirm this on a site-specific basis, and that analysis, along with many others, will be performed for each solar highway site to ensure that the overall benefit of the panels greatly exceeds any losses.

**Will cutting down the trees create erosion and drainage problems?**

No. In fact, the feasibility studies show the work required to install the solar array may actually improve stormwater drainage flows. In the past, a lot of material (over 100 feet of depth in some places) was removed from the site in order to stabilize the hillside down to bedrock. The studies show current topography is stable and no significant grading will be needed to accommodate the project.



*Aerial view of the potential site for the West Linn solar highway*

**What will electricity generated at this site be used for?**

Depending on the business model used, the power generated on site could be sold to ODOT to power the transportation system just like at the demonstration project, or another option would be for ODOT to receive a site license payment for use of the land and a portion of the Renewable Energy Certificates generated by the project. For

the demonstration project at the I-5/I-205 interchange, solar energy produced by the array feeds into the grid during the day. At night, the meter essentially runs backward, as energy flows back from the grid to light the interchange. ODOT, through a Solar Power Purchase Agreement with PGE, buys the energy produced by the array at the same rate the agency pays for regular energy from the grid.

***What are the economic and financial considerations?***

- A solar array of this size is estimated to create between 140 – 150 direct and indirect jobs.
- It will cost approximately \$20 million to build this 3-megawatt site, and these costs would be paid for through a partnership similar to the one that paid for the first solar highway at I-5/I-205. It involves private financing, tax credits and public investment.

***If the site includes a bike path and/or interpretive center, will that increase crime in the area?***

West Linn city staff held several meetings on a potential bike trail and community members chose a location that runs near the solar array as opposed to higher up. Actual design and construction of the trail is a separate process from the solar highway, managed by the city of West Linn.

The community of West Linn has decided not to pursue an interpretive center.

Security measures are required around solar arrays, such as the one at I-5/I-205, and to date, they have proven effective at that site. With the addition of the solar highway to the site, security would actually be improved compared to current measures in the area.

Security features will include: security cameras, a 24-hour security response service, security fencing, and “No Trespassing” signage indicating potential penalties. Notably, the proposed project will not create new public access from I-205.

***Will property values be adversely affected by a loss of view?***

The view from Oregon City across the river from the site will change, but it will not be a loss of view. Traditionally, unless

an easement protects a view, there is no property right to a specific view without a view easement. No known study supports the contention property values would be adversely affected by solar panels. Analogous studies imply any effect would be nominal and indistinguishable from any distance or over time.

On the solar project site, highway construction staging and maintenance activities are ongoing. In the immediate area near the solar panel site, there is a school bus parking lot, a sewage treatment plant, paper mills, and a major freeway, so finding out if solar panels by themselves affected property values would be difficult.

***Will the project increase the risk of wildfire?***

The studies show the project may actually decrease the risk of wildland fire. An opinion issued by Tualatin Valley Fire and Rescue notes that developed properties tend to present lower fire risks than undeveloped properties, and the proposed project would also decrease risk by creating a fire break and improving the ability to respond to an emergency by providing new authorized-only access to the site.

***What noise will the project generate in the area?***

The feasibility studies found that the project would not result in any noticeable increase in noise levels. Twice a day, when the solar inverters start up and shut down, the project would increase noise levels by a maximum of 3 decibels (dBA) – a change in noise level that is barely perceptible to the human ear. During the remainder of the daytime, the project would increase noise levels by approximately 2 dBA – a change that is imperceptible to the human ear. At night, when the solar array is not operational, there will be no change in noise levels compared to existing conditions.

***What about the costs associated with this large project?***

While the cost of solar is coming down, it is still too expensive for ODOT to buy its own panels. Tax credits, accelerated depreciation, and utility incentives are necessary to finance our solar installations. But ODOT, as a governmental entity, doesn't have a tax liability. So in order to take advantage of the tax credits and

accelerated depreciation, ODOT would enter into a public-private partnership with a third party power provider — with the demonstration project, that partner was PGE. The third party finances, owns, operates and maintains the solar installation. PGE's customers receive the benefit of the tax incentives, which makes it possible for PGE to secure renewable resources as required by law but at a lower cost to its customers. While the specifics of the business model can vary, they all include using:

- a 50 percent state Business Energy Tax Credit;
- a 30 percent federal investment tax credit;
- accelerated depreciation; and
- utility incentives available through the Energy Trust of Oregon to customers of PGE and Pacific Power (about 20 percent).

#### ***Why not use wind power instead of solar power?***

While wind turbines need sites with strong winds, solar arrays can be placed wherever there is good southern exposure to the sun. For that reason, solar arrays can be sited in communities where wind may not be possible. Also, solar arrays are less intrusive than wind turbines. Further, siting solar resources in areas close to where the energy is used saves energy that would be lost in transmission over long distances.

#### ***Why can't this installation be placed in eastern Oregon where there is more sunshine?***

Most of ODOT's electricity load is in northwestern Oregon, and ODOT gets more of its power to run the transportation system from PGE than any other utility in the state. While there is more solar resource in eastern Oregon, ODOT cannot put an array there to offset energy use in PGE territory — where most of its load is. And while ODOT has talked with another Oregon utility about a solar highway project, PGE is the only utility to date to say "yes" — showing the leadership which resulted in the nation's first solar highway project, the demonstration project at I-5/I-205.

It is likely that at some point, ODOT will have solar highway installations around the state, offsetting its energy use in each utility district.

#### ***Where else might ODOT place solar highways in Oregon?***

ODOT is exploring several locations throughout the state, focusing on an expansion of the existing I-5/I-205 project site and a new installation at the Baldock rest area on I-5 northbound. ODOT's goal is to explore as many opportunities as possible for developing renewable resources to power the transportation system with 100% green power.

#### ***Does Oregon have enough sunshine for solar to work?***

Yes, solar energy is the most abundant renewable energy resource in Oregon. According to the *Renewable Energy Atlas of the West*, Oregon has a 68 million megawatt-hour solar generation potential and could generate its annual energy use of 48 million megawatt-hours with partial development of these resources. *Solar Oregon* reports "Germany is installing more new solar energy systems per capita than any other country, yet its capitol, Berlin, receives less sun than the cloudiest location in Oregon, near Astoria."

#### ***Are there plans to make a "phase 2" enlargement of this project?***

No. Any significant later expansion is unlikely given cost considerations and the engineering challenges of locating panels on a slope.

#### ***What is the life expectancy of solar panels, and how are they dealt with when they are no longer working?***

Solar panels at the first solar highway project (I-5/I-205 interchange) used mono-crystalline modules manufactured by SolarWorld in Hillsboro and are warranted for 25 years. Based on past performance, it's likely they will produce energy much longer. For example, SolarWorld panels made 27 years ago are still producing 87% of their original power, and the world's first mono-crystalline solar panels made by Bell Labs in 1953 are still working today, 56 years later.

Solar panels can be recycled. SolarWorld, with its own recycling facilities, uses the materials as "seed" to grow new solar wafers, which make up the panels. Cells and modules made of recycled panels meet the same quality and performance criteria as modules from non-recycled materials. A

recent move toward automation has streamlined recycling processes, making production of recycled products less energy-intensive than primary production.

All Oregon Solar Highway projects will require recycling from any solar panel supplier – if the company cannot commit to recycling the panels at the end of their useful life, the vendor will not be considered.

***What about hazardous materials in solar panels?***

Any solar panels installed in the Oregon Solar Highway projects would meet strict standards for ensuring no hazardous materials are released into the environment.

***Is a byproduct of solar panel creation — silicon tetrachloride — something we should be concerned about here in the U.S.?***

No — because we have strict environmental regulations.

Silicon tetrachloride has recently gained notoriety due to news accounts of its dumping near a polysilicon plant in China. However, production facilities in the U.S., Europe and Japan account for more 99% of global polysilicon production. These facilities are subject to strict environmental and occupational health and safety regulation and enforcement.

Western plants use a closed loop process that captures system byproducts for recycling and reuse within the process loop because these recovery systems are necessary for the economic operation of a facility.

Moreover, the benefits of photovoltaics tend to far outweigh risks especially when compared to conventional fossil fuel technologies. According to researchers at the Brookhaven National Laboratory, regardless of the specific technology, photovoltaics generate significantly fewer harmful air emissions (at least 89%) per kilowatt-hour (KWh) than conventional fossil fuel fired technologies.

***I've read being next to electromagnetic fields can harm our health. Is this a problem with a large solar array?***

Electromagnetic radiation is all around us – it is not inherently harmful. It is in the

sunlight that strikes the earth, and it is what is converted by solar installations into useful energy while producing few electromagnetic emissions of its own. In fact, studies show even in homes just 250 feet away, electromagnetic emissions would be less than those produced by a common household appliance such as a refrigerator, washing machine or television.

The feasibility studies found that any electromagnetic fields (EMFs) produced by the proposed project would fall well below internationally recognized scientific guidelines for public exposure and would likely be indistinguishable from existing background levels produced by other human and natural sources at the perimeter of the site. In addition, current scientific and medical consensus is that no causal relationship exists between exposure to low-level power frequency EMFs and any adverse health effects. All of the equipment used in the Oregon solar highway will be required to meet the Institute of Electrical and Electronics Engineers power quality standards. See research reports at our Web site, [www.oregonsolarhighway.com](http://www.oregonsolarhighway.com).

***What about the UK report stating potential health problems?***

The Health and Survey Executive Horizon Scanning Report, produced by a government agency in the United Kingdom in July 2009, discusses potential future health and safety implications of the growing use of solar in the United Kingdom. The intent of such reports is to foster development of the resources and skills to ensure that such potential implications do not become a reality. In Oregon, such potential health and safety issues are being addressed well. The following statements in italics are from the referenced report:

- *The next generation of solar photovoltaic modules may use chemicals such as cadmium telluride or other chemicals that may present hazards in solar panel manufacturing and recycling. Solar manufacturing and recycling processes are and will be subject to regulation in the United States through state and federal environmental and occupational health and safety regulatory agencies.*
- *With more solar photovoltaic panel installations there will be the need for installation and interconnection skills.*

Oregon has anticipated installation skill requirements and trains and certifies solar photovoltaic installers through the Energy Trust of Oregon. The Public Utility Commission of Oregon regulates interconnection requirements in Portland General Electric's service area and all solar photovoltaic installations completed in PGE's service area must meet those requirements as approved by PGE.

- *Solar thermal power uses the sun's energy to heat air or water and apparently may be interconnected to gas central heating requiring plumbing skills.* There are no ODOT projects now contemplating using solar thermal power interconnected to gas central heating. Such gas interconnections are regulated in Oregon and would only be completed by qualified personnel following specific safety and code standards. Solar photovoltaic panels include no combustible gases.

***What is the energy conversion plant or process?***

The "energy conversion plant" is an inverter, which turns the direct current (DC) electricity produced by the solar panels into alternating current (AC) so it can be used on the grid. The inverters don't show up on artist renderings because the exact number, location, and size have not been designed. They will be located behind the panels just as on the demonstration project site at the I-5 and I-205 interchange, at regularly spaced intervals.

PGE has two feeder lines on the West Linn site which would put the power on the grid; no new power lines would be needed. The ease of interconnection contributes to the quality of this site for a solar array.

***What is the federal government's concern about solar arrays on public lands?***

The concerns of federal land management agencies over solar development are associated with the use of large tracts of land required for utility-scale solar development. Public lands were generally acquired for significant resource values other than solar resource development, but that's not to say that solar resource development cannot be consistent with those resource values: it does mean that care must be taken to ensure that objective

is fulfilled. ODOT is committed to ensuring that objective is fulfilled on the public lands for which it is the steward. If it can do so while also powering the transportation system with sustainable energy resources, the public interest is well served.

***Isn't the technology changing so rapidly that these solar panels will be outdated?***

The newer generation of solar panels are larger and produce more energy than the previous generation. That does not mean that the earlier panels do not perform well. The smaller panels at the I-5 and I-205 interchange have performed very well – exceeding expectations. Both Oregon and the nation have committed to investing in renewable energy resource technology to further our collective goal of developing sustainable energy sources.

*For more information about Oregon's solar highway, visit [www.oregonsolarhighway.com](http://www.oregonsolarhighway.com).*