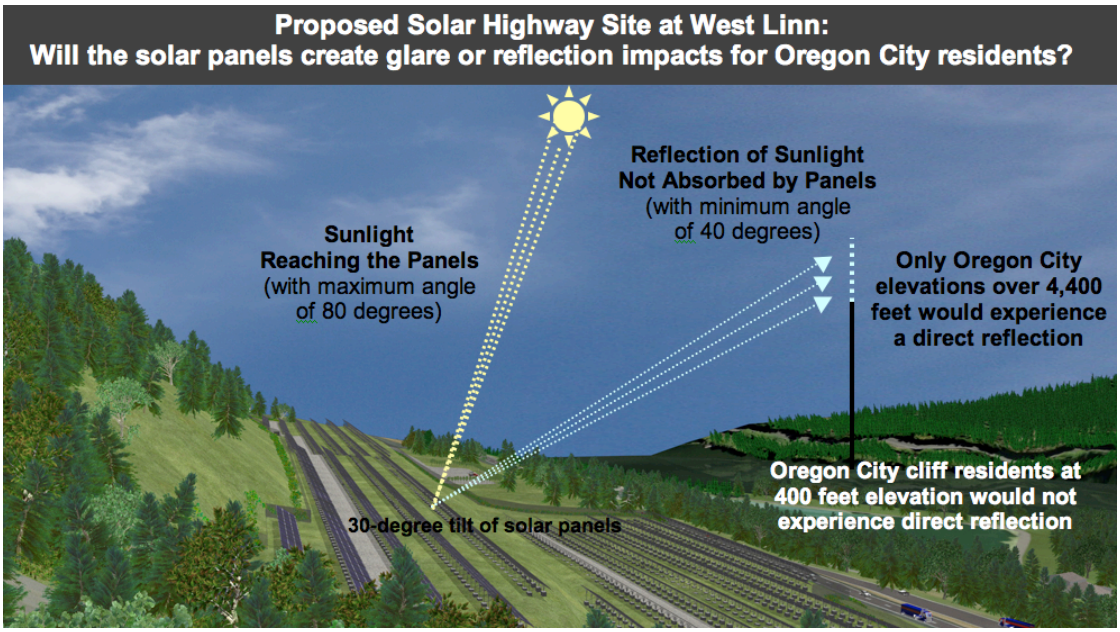
Potential Impacts from the Reflection of Proposed Solar Panels



Does a solar panel absorb sunlight or reflect it?

Photovoltaic solar panels are designed to absorb sunlight in order to convert it into electricity. The more sunlight that is absorbed, the more energy that can be produced. A monocrystalline silicon solar cell, similar to those used at the Solar Highway Demonstration site, absorbs two-thirds of the sunlight reaching the panel's surface. This means that only one-third of the sunlight reaching the surface of a solar panel has a chance to be reflected.

How does an anti-reflective coating on panels reduce the amount of sunlight that is reflected?

An anti-reflective coating or glass can reduce the sunlight that is reflected and increase the amount of sunlight that is absorbed. Most solar panels are now designed with at least one anti-reflective layer and some panels have multiple layers. These measures further reduce reflectivity.

Is the amount of reflected sunlight from the solar panels a concern?

The reflectivity of a surface, or albedo, varies with the type of material that covers it. These solar panels have a reflectivity of around 30% – similar to the reflectivity of current site surface materials such as dry sand at 45%, needle-leaf coniferous trees at 20%, grass-type vegetation at 25% and broadleaf deciduous trees at 10%. The solar panels therefore do not noticeably alter the site's current amount of reflected, indirect sunlight.

Is there a time of day or year that the panels could reflect directly into the surrounding area?

Due to the path of the sun over West Linn and Oregon City, sunlight would reach the solar panels at varying angles before it is absorbed or reflected over the course of a day. Based on the position of the south-facing system and the sun path diagram,[1] the summertime at high noon would present the highest potential for impact to the surrounding area, namely for Oregon City residents. There is no potential impact of glare or reflection for I-205 drivers or for West Linn residents.

Will Oregon City residents experience direct reflection from the solar panels?

No. In the summertime noon scenario of highest potential for impact, rays of sunlight reach the panels at a maximum angle of 80 degrees; 30% of those rays are reflected in the direction of Oregon City at a minimum angle of 40 degrees. Performing a few calculations determines that Oregon City residents who are one mile away would need to be at an elevation of over 4,400 feet higher than the panels in order to experience direct reflection from the solar panels. Concerned Oregon City residents are at an elevation of 400 feet and will not experience direct reflection from the solar panels.

[1] GAISMA sun path diagram for West Linn (the location of the panels) is available at http://www.gaisma.com/en/location/west-linn-oregon.html