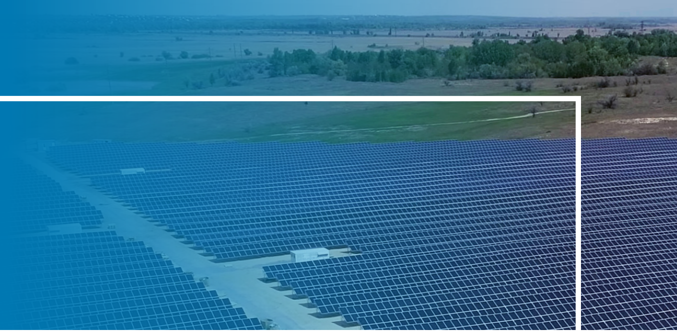
Solar

Solar as a Neighbor: Living Near a Solar Project



Key Takeaways

1. **Solar Provides Community Benefits:** Solar projects will improve air quality and provide communities with real economic benefits through land lease payments and local tax revenue.
2. **What to Expect During Construction and Operations:** Solar projects involve site preparation, manageable noise during construction, and minimal traffic, glare, and noise once operational.

Background

The cumulative operating capacity for utility-scale solar in the U.S. has grown to over 100,000 MW (as of June 2024). Millions of Americans live near utility-scale solar projects, which can be found in all 50 states, the District of Columbia, and Puerto Rico.[1]

If a new solar project is proposed in your community, it is important to understand how the project will fit into the existing landscape. This fact sheet explores what it is like to live near a solar project.

How Will a Solar Project Help My Community?

Health Benefits: Citing clean air benefits, the North Carolina State University notes "the overall impact of solar development on human health is overwhelmingly positive."[2] Health benefits from solar come from avoiding the air pollution and greenhouse gas emissions from other sources of generating electricity. Pollution and greenhouse gas emissions have immediate, long term and cumulative negative health effects.[3] Unlike other forms of electricity generation, operating solar facilities do not produce greenhouse gas emissions, odors, smoke clouds, or vapor.

Economic Benefits: Additionally, solar facilities represent a stable source of revenue for localities and impose few costs on public services.[4] The American Clean Power (ACP) Association estimates that utility-scale solar projects pay over $550 million annually in land lease payments to landowners across the U.S., and pay over $375 million in annual tax payments to state and local jurisdictions.

What Happens During Project Construction?

Solar project construction can take approximately one year or more in total for large systems.

Phase 1: Site Preparation

Open, flat spaces are generally preferable for solar projects. To prepare the site to accommodate solar panels, maintenance building and other equipment involved in building the project, most sites still require a degree of site preparation.

Equipment used during this phase can include chainsaws, chippers, dozers, scrapers, end loaders, and trucks. Topsoil is typically stripped during construction but preserved onsite before performing cut/fill operations. Cut/fill operations level out the slope of the land, help control runoff and enable panels to be spaced appropriately.

Next, the developer will place fencing and temporary job site trailers on the site. Then, they'll construct an area to temporarily store panels and prepare them for installation, along with access roads to facilitate entry and exit from the site.

Phase 2: Construction

During construction, daily activities include transporting people, panels, and equipment to the site over the course of several weeks. During installation of the solar panels, racking system, and associated project infrastructure, the typical onsite construction equipment includes backhoes, pile drivers, scrapers, bulldozers, dump trucks, watering trucks, pile drivers, forklifts, bucket or concrete trucks and compactors. Light duty trucks will also be used to transport construction workers to and from the site daily.

Maximum noise from equipment does not exceed 72 decibels from 200 feet away, according to the Federal Highway Administration Construction Handbook.[5]

- This is equivalent to the noise of a busy office or a vacuum cleaner.[6]

The panel racking system is installed by pile drivers, placing steel posts into the ground to support the system. The panel racking system can include a tracking capability to change the angle of the panels to follow the sun throughout each day, increasing energy production. Trackers can also help address stormwater management issues by allowing the panels to tilt and minimize rainwater concentration on site.

The wiring that connects panels to electrical equipment may be above ground or buried via a trench. An inverter converts power from the solar panels from direct current (DC) into alternating current (AC), and transformers change the AC voltage. Individual components can be the size of a refrigerator, or multiple inverters can be assembled together on a skid with transformers, control systems and other necessary components.

Phase 3: Revegetation & Operations

As parts of a project near completion, temporary staging, laydown areas, and other temporary disturbance areas are restored.

After construction, topsoil is reapplied to help revegetate the site and establish ground cover. Revegetation helps prevent erosion, manage stormwater, and support the surrounding ecosystem. The vegetation used will be determined by a site-specific assessment.

Once the project is operating, operations personnel maintain the vegetation, inspect the facility, make necessary repairs, and ensure efficient operations.

How Much Traffic Can I Expect After the Project is Built?

Once solar projects are built, there is little traffic in and out of the project site. Most of the vehicular traffic will be made up of light duty trucks to transport the operations personnel responsible for maintaining the vegetation around the project or cleaning panel surfaces to ensure maximum power production.

How Much Noise Do Solar Projects Make?

Solar panels do not emit sound when they convert sunlight into electricity. Rather sources of sound at solar facilities are associated with converting solar panels electrical output from DC to AC and adjusting the voltage such that it can be transmitted to the electrical grid. This is done via inverters and transformers. The inverters and transformers may have fans and cooling systems to ensure proper operation when operating at full load during the heat of the day. Sound emitted from inverters can be calculated using software during project design and can be minimized with proper planning and siting. Generally, when permitting solar facilities, the expected sound levels fall within the accepted limits established by land use or zoning ordinances.

Can I Expect Glare from the Panels?

Solar panels are designed to capture light rather than reflect it. Nonetheless, the glass from solar panels can produce glare. Studies indicate that the potential glare from solar arrays is comparable to glare from a body of smooth water.[7] Modern PV panels reflect as little as two percent of incoming sunlight, which is about the same as water and less than soil or even wood shingles.[8]

To further reduce visual impacts from solar facilities, developers may plant vegetation along the perimeter of the project to provide visual barriers in accordance with local ordinance requirements.

Do Solar Projects Make the Surrounding Area Warmer?

The Ohio Department of Public Health has found "Information to date **does not indicate a public health burden from heat generated by PV panels** or from the heat island effect."[9]

Solar photovoltaic (PV) "heat island effect" refers to a limited warming effect in and around solar facilities at certain times of the day and/or year—depending on other conditions such as wind speed and cloud cover. This phenomenon is conceptually like the "urban heat island effect," that has been observed in which heat-absorbing elements of cities—such as concrete—increase the temperature when compared to surrounding areas. [10,11]

Existing studies on the "heat island effect" at solar facilities have found varied results with respect to daytime and nighttime temperature effects.[12,13]

- Note: current research has been conducted on sites that do not have planted vegetation underneath panels, which is not representative of solar PV facilities in many parts of the country.[14]
- Vegetation can help cool an area.

1 American Clean Power Association, Clean Power Annual Market Report, 2023. https://cleanpower.org/resources/clean-power-annual-market-report-2023/?token_refresh=cf1950c0-7aad-44d5-b872-78baf8363ef8&mrcid=1713385403

2 NC State University, Health and Safety Impacts of Solar Photovoltaics, https://content.ces.ncsu.edu/health-and-safety-impacts-of-solar-photovoltaics (2017)

3 CDC. Climate Change Decreases the Quality of the Air We Breathe. https://www.cdc.gov/climateandhealth/pubs/AIR-QUALITY-Final_508.pdf

4 Mangum Economics. The Economic Development Contribution of Utility-Scale Solar to Virginia. May 2020. Available: https://mdvseia.org/wp-content/uploads/2020/06/MDVSEIA-Report-.pdf

5 U.S. Department of Transportation. FHWA Highway Construction Handbook. 2006. https://rosap.ntl.bts.gov/view/dot/8837/dot_8837_DS1.pdf

6 Yale Environmental Health and Safety, Decibel Level Comparison Chart. https://ehs.yale.edu/sites/default/files/files/decibel-level-chart.pdf

7 National Renewable Energy Laboratory (NREL). Research and Analysis Demonstrate the Lack of Impacts of Glare from Photovoltaic Modules. July 2018. https://www.nrel.gov/state-local-tribal/blog/posts/research-and-analysis-demonstrate-the-lack-of-impacts-of-glare-from-photovoltaic-modules.html

8 NREL, *Ibid*.

9 Ohio Department of Public Health, "Solar Farm and Photovoltaics Summary and Assessment," Updated April 2022, available at: https://odh.ohio.gov/know-our-programs/health-assessment-section/media/summary-solarfarms

10 V. Fthenakis and Y. Yu, "Analysis of the potential for a heat island effect in large solar farms," 2013 IEEE 39th Photovoltaic Specialists Conference (PVSC), 2013, pp. 3362-3366, doi: 10.1109/PVSC.2013.6745171.

11 Barron-Gafford, G., Minor, R., Allen, N. et al. The Photovoltaic Heat Island Effect: Larger solar power plants increase local temperatures. Sci Rep 6, 35070 (2016). https://doi.org/10.1038/srep35070.

12 Broadbent, A. M., E. S. Krayenhoff, M. Georgescu, and D. J. Sailor, 2019: The Observed Effects of Utility-Scale Photovoltaics on Near-Surface Air Temperature and Energy Balance. J. Appl. Meteor. Climatol., 58, 989–1006, https://doi.org/10.1175/JAMC-D-18-0271.1.

13 Devitt, Dale A., Lorenzo Apodaca, Brian Bird, John P. Dawyot, Jr., Lynn Fenstermaker, and Matthew D. Petrie. 2022. "Assessing the Impact of a Utility Scale Solar Photovoltaic Facility on a Down Gradient Mojave Desert Ecosystem" Land 11, no. 8: 1315. https://doi.org/10.3390/land11081315

14 *Ibid*