Solar in Pottawatomie County - Frequently Asked Questions

Responses and Materials from Orion Renewable Energy Group LLC

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Files included as attachments:

- Maps:
    - Map of Flint Hills with Prairie Areas and Evergy Land
    - Pottawatomie County Setback Example Map – 3,000 acres
    - Pottawatomie County Setback Example Map – 350 acres
- Studies:
    - Ecosystem Services at Solar Energy Facilities in the Midwest
    - Property Value Study for Solar Neighbors
    - Health and Safety Impacts of Solar
    - Study of Acoustic and EMF Levels from Solar Photovoltaic Projects
- Fact sheets:
    - Solar Panels and PFAS Contamination
    - Guide to the Federal Investment Tax Credit for Commercial Solar PV
    - Solar PV Q&A

GENERAL

What makes up a solar farm?

A photovoltaic solar farm consists of:

- Panels, which sit on metal racks and piles, usually paired with "trackers" – small motors that rotate the panels so that they face the sun throughout the day
- Electrical equipment:
    - Inverters, which convert the direct current (DC) electricity from the panels to alternating current (AC) electricity used in the grid
    - Transformers, which step up voltage
    - Underground cables, which connect sections of panels that are not contiguous
- A substation, which connects the project to the high-voltage transmission grid

Together, these elements will cover about 35% of the ground within a solar farm. Most of the ground does not have equipment on it so that panels are not shaded, either by each other or electrical equipment. As an example, if a solar farm covered 1,000 acres, equipment would cover approximately 350 of those acres. A solar farm is bounded by a fence and sometimes a screen of trees and shrubs.

Depending on the terrain, five to ten acres is needed to produce one megawatt (MW) of solar power. In flat, clear terrain, that number is closer to five to seven acres per megawatt.

How is a site for a solar farm selected?

There are many factors that determine a solar farm's location. First, a solar farm must be able to connect to the existing transmission grid, so a location near existing high-voltage transmission lines is important. Second, it is prohibitively expensive to build solar on hilly or rocky terrain; a location on flat terrain is ideal. Third, solar can only be built on property owned by receptive landowners, who voluntarily lease their land because they believe solar is a good and profitable use of their property. Additional constraints on solar siting may include wetlands, floodways, pipelines, shallow bedrock, endangered species, archeological sites, past or present mining activity, bird or wildlife sanctuaries, and suburban expansion.

Why not build a solar farm on land that Evergy owns?

Orion conducted a preliminary engineering review of the land owned by Evergy around Jeffrey Energy Center, and site preparation in this area would likely be several times more expensive than building on flatter, less rocky land. These increased engineering and construction costs would significantly increase the overall cost of energy, thus making the project uncompetitive with other solar projects in the state, and therefore unlikely to be built. Additionally, this estimate excludes any clean-up costs for Jeffrey Energy Center, which would further increase the cost of energy produced there.

Furthermore, the land owned by Evergy is designated as remaining native tall grass prairie, which we do not want to disturb. (See attached "Map of Flint Hills with Prairie Areas and Evergy Land".)

How will a solar project be screened?

The draft zoning ordinance currently requires that a project use existing natural screens (e.g., trees, berms, etc.) to screen a project whenever possible. Industry practice is to plant trees and shrubs to provide additional screening from neighboring occupied properties throughout all four seasons. To this end, as part of site design, Orion will consult neighbors and the community to understand screening needs in the project area. After construction, the project owner (not landowners) will be responsible for maintaining this vegetative screen.

What do 200-foot setbacks for residences within a project look like?

Please see attached maps "Pottawatomie County Setback Example Map – 3,000 acres" and "Pottawatomie County Setback Example Map – 350 acres," which show setbacks for example areas within the county. *(A note on setback methodology: in these example maps, we used setbacks of 250 feet from the central point of a building, which is similar to a 200-foot setback from the edge of a building. In actual project site design, building edges would be used.)*

What are the potential drawbacks of solar?

The largest impact of solar is the change in land use during a project's life. In limited cases, a portion of the land leased for solar can serve agricultural purposes, through sheep grazing or agrivoltaics (crops grown around solar panels), but more often solar land is not farmed or grazed. Agricultural production can continue after a project is decommissioned, often with improved soil health due to the use of regenerative ground cover within the solar project.

Solar farms also visually change the landscape, though if properly designed, natural screens (e.g., evergreen trees) can shield neighbors' views of panels.

Noise is sometimes cited as a concern on solar farms. While some of the electrical equipment within a project can create a low hum during the day, when the site is producing electricity, this noise is typically very quiet or inaudible outside the project fence. It is reasonable to expect a solar site to produce fewer than 40 Decibels (dBA) at the project fence – i.e., quieter than a library, refrigerator, or existing typical road noise. A project must abide by state or local noise codes, and noise modeling as part of site design can help identify and reduce any potential noise levels above code requirements. (See attached "Study of Acoustic and EMF Levels from Solar Photovoltaic Projects".)

ECONOMIC IMPACT

What is the economic impact of a solar project?

A large utility-scale project in Pottawatomie County would generate significant revenue for the county, through a PILOT (Payment In Lieu of Taxes) agreement and property taxes. This revenue would total tens of millions of dollars over a project's life. As an example, a 500 MW project in Pottawatomie County would be expected to generate over $40 million in property tax revenue during a 35-year project life, in addition to any PILOT agreement payments negotiated with the county.

Landowners receive payment on a solar project on a per-acre basis. To continue with the previous example, a 500 MW project would pay landowners in the county around $3 million per year. This income is stable, predictable, and typically more than these landowners would make through agriculture on that land.

A solar project also creates construction and operations jobs. The construction of a large project would employ hundreds of workers, while ongoing operations would create a modest number of direct and indirect jobs.

What subsidies are available for a utility-scale solar project?

The federal government offers an Investment Tax Credit (ITC) for a portion of the cost of an operating photovoltaic solar project. This credit steps down in value over the next several years. A project in Pottawatomie County will likely not begin construction for several years, at which point the ITC is expected to be 10% of the cost of the project.

The state of Kansas exempts renewable energy projects from property taxes for the first ten years of a project's life. Because of this abatement, renewable energy projects usually enter into a PILOT agreement with counties for those initial ten years.

Does solar negatively affect property values?

Studies of installed large-scale solar energy projects throughout the U.S. show that operating solar farms have no material impact on neighboring property values. (See attached "Property Value Study for Solar Neighbors".)

ENVIRONMENTAL IMPACT

How does a solar farm impact local agriculture and the environment?

Solar power does not pollute local air, water, or land. As the land lies dormant, soil can replenish nutrients such as potassium and phosphorus, improve moisture holding capacity and increase the presence of microorganisms.

The Pottawatomie County draft ordinance requires projects to incorporate native and pollinator-friendly vegetation. This ground cover can reduce storm water runoff and provide habitat for native pollinators, which in turn can support crop yield for pollinator-dependent crops. For example, a recent study of solar farms in the Midwest found that "compared to presolar agricultural land uses, solar-native grassland habitat produced a 3-fold increase in pollinator supply and a 65% increase in carbon storage potential. We also observed increases in sediment and water retention of over 95% and 19%, respectively." (See attached "Ecosystem Services at Solar Energy Facilities in the Midwest".)

Can a solar farm be built in a floodplain?

A solar farm can be built in a floodplain with the proper engineering. The main requirement to build solar in a floodplain is to elevate all sensitive electric equipment to at least one foot above expected flooding depth. As an example, there has been flooding at some solar farms in eastern North Carolina during recent hurricanes, and projects that properly elevated sensitive equipment did not suffer damage.

In any solar development Orion pursues in a floodplain, Orion extensively models flooding and incorporates projected worst-case flooding into site engineering.

While solar can be built in a floodplain, a project would not be built in a floodway, which is the portion of a floodplain where water flow is deeper and swifter. Some state and federal regulations may prohibit development in such areas.

How will a solar project affect water runoff?

A solar project should not increase water runoff. In fact, proper ground cover on a solar site (e.g., deep-rooted grasses) significantly decreases runoff and increases infiltration compared to conventional agriculture. Appropriate seed mixtures will increase water percolation, soil stabilization, and carbon sequestration, and improve soil health (i.e., build organic matter, decrease soil temperatures, and fix nitrogen).

Can solar panels leach toxic materials?

The two most common types of solar panels – silicon-based and thin film – are required to pass the Environmental Protection Agency's Toxic Leaching Characteristic Procedure (TCLP) test, which means that these panels are nonhazardous. The chemical components of solar panels are enclosed in tempered glass (similar to a car's windshield) and cannot mix with water or vaporize into the air, and the panels are designed to stay intact even under extreme weather conditions. In addition, PV panels are made of

mostly recyclable materials, including glass and aluminum, which can be recovered and reused at the end of a panel's useful life.

Will solar panels produce glare?

Solar panels are made of materials that absorb sunlight and include an anti-glare coating. Accordingly, solar panels only reflect a small amount of the sunlight. Potential projects should conduct a glare study using the Federal Aviation Administration's glint and glare standards to ensure that no residences, flight paths, or roads near a project will experience glare.

Should a solar project include wildlife corridors?

Wildlife corridors are generally considered for two primary purposes: to connect fragmented habitat and/or to provide safe travel or access between habitat areas. Neither of those purposes are likely necessary in this portion of Pottawatomie County, as a project would likely be surrounded by agricultural land. However, environmental studies should be conducted to better understand any potential impacts to wildlife and to identify any needed mitigation.

Can animals graze within a solar farm?

Sheep are sometimes grazed within solar farms and can be an effective alternative to mowing, depending on the specific ground cover, site layout, and availability of local herds. Cattle and goats are not allowed within solar farms.

DECOMMISSIONING

What happens at the end of the solar project's life?

When a solar project has reached the end of its operational life, the project facilities will be fully decommissioned. A solar reclamation firm will collect the panels for recycling, the inverters for refurbishing, and the hardware for salvage. The land will be returned to its original condition before the project was constructed, in accordance with county regulations and project agreements with landowners. As an example, any holes or voids created by poles will be filled in with soil to the surrounding grade and restored to condition consistent with the preconstruction land use. Financial security will be in place during project operations to ensure the cost of decommissioning is covered.

How are decommissioning costs determined?

Typically, a qualified, independent construction and engineering firm is hired by a project to estimate decommissioning costs. Because salvage value can offset a significant portion of decommissioning costs, we recommend allowing 50% of the estimated salvage value to be considered in determining the amount of decommissioning security. Salvage value and the costs of decommissioning fluctuate, so we recommend requiring a project to update this estimate every five years and adjust the amount of security required.

Should underground collection lines on private ground be removed at the end of a project?

Collection lines should be buried at least three feet deep to allow for plowing, and pulling up collection lines at end of project may be more disruptive to landowners than leaving those lines in place. We recommend leaving the decision to remove underground lines to landowners and project owners.