Cook County
Community
Solar Project

Solar Pre-Development for Site Owners

The Cook County Community Solar Project

November 2017

For many properties, installing solar can represent opportunities to lower energy and operating costs or create new revenue from the use of your property. Whether investing in solar (photovoltaics or PV) to reduce your energy use, leasing your property or simply buying energy from a developer-owned system, your property can be an asset as solar grows in our region. To determine whether or not your property is right for solar or what business model is right for your organization, steps should be taken to asses your property and your goals. This short guide provides an overview of the key considerations for site owners during the pre-development stages.

Stage 1: Pre-Screening for Solar

Initial site pre-screening is an important part of the solar pre-development process. Understanding whether site-specific barriers are significant may save time and expense. It will also help understand how best to be prepared for a thorough assessment of your site's suitability for solar.

I Adequate Space for Solar

Sizing the potential solar system is an important first step in understanding the opportunity of solar for your site. Economies of scale mean larger systems lower costs and shorten payback.

- **Square Footage:** Each square foot of unobstructed roof space can host about 8W. A 10,000 sq. ft. roof, therefore, can host an 80kW system.
- **Acreage:** Each acre of land can host about 250 kW. A 1MW system, for example, requires at least 4 acres of uncluttered land.

II Connecting to the Grid

Whether installing onsite generation behind your meter or community directly to the grid, the distance to the interconnect point can make a significant difference in installation requirements and costs.

- **Urban**: Siting in urban areas is commonly easier because the distance to the utility's substation or feeder is usually shorter.
- **Suburban or Rural**: At sites with greater acreage, the distance to the nearest, adequate connection point may be significantly further, creating extra costs for connecting the system via conduit and wires.

III Land Topography and Roofs

Not all land parcels or roofs are optimal for solar. The layout, landscape or roof design can help or hinder panel placement, installation cost and the long term power generation of the system.

- **Land Topography**: Sites that are sloped or hilly, wooded, with streams, wetlands or floodplains, with rocky or clay soil, may introduce barriers for solar installation. Clear, flat land is ideal.
- **Rooftop**: It is recommended that roofs be new or have at least 20 years of life remaining. But, even perfect roofs may have problems. Roofs with many levels, with rooftop equipment or steeply pitched and barreled roofs, may mean solar is not feasible or economical.

IV

Land Use

The intended or potential use of the land or property needs to be considered before investing in solar. Solar is a 25 year investment and the value and intended use of the property can change over that time.

- **Square Footage:** Each square foot of unobstructed roof space can host about 8W. A 10,000 sq. ft. roof, therefore, can host an 80kW system.
- **Acreage:** Each acre of land can host about 250 kW. A 1MW system, for example, requires at least 4 acres of uncluttered land.

V

Zoning & Permitting

Zoning, permitting and other local requirements can make solar installations more difficult or impossible in some instances. Understanding how these requirements impact your solar design is important.

- **Historical or Landmark Properties**: These properties may have strict requirements, like facade and setback requirements, or not allowing solar at all.
- **Other Requirements**: Does you site cross a public-way? Do you need an easement? What is the timeline and the requirements for zoning and permitting of solar in your municipality?

Stage 2: Site Assessment

Conducting a site assessment provides valuable information to more comprehensively assess the site's potential and inform preliminary design. These tasks are usually performed by a solar developer or a consultant. But, savvy site owners can take advantage of publically available tools and resources to help you perform these assessments.

VI

Energy Usage

Review one or two years of electric use to determine your annual energy load for the property. This will help you understand how much of your energy can be covered through solar. This is not necessary for land sites.

- **Electricity Charges:** Depending on the type of solar business model and your state solar laws, some or all of the charges you see on your electric bill will be offset by solar. "Behind the Meter" solar will reduce your energy costs, demand charges and other fees, while community solar will only offset your energy costs. Both can produce good returns.
- **Energy Efficiency:** Utilities often offer free energy assessments and incentives to help pay for energy efficiency measures on your property. The cost of energy efficiency is significantly lower than the cost of solar. If your building is not energy efficient, consider this before solar.

VII Placement & Shading

The larger the site, the more solar energy will be produced. But, size becomes less important if the site is obstructed or doesn't allow for enough direct sunlight.

- **Orientation**: How panels are placed can significantly affect solar production and the cost of the system over time. Systems with panels that are directed due south are ideal. However, systems can be productive with other orientations (between 900 and 2700 azimuth).
- **Obstructions**: Trees, tall buildings and rooftop equipment can all cause shading, thus reducing the output of a system. The system design must take into account these obstructions and factor into the economics.

VIII Interconnection

The larger the site, the more solar energy will be produced. But, size becomes less important if the site is obstructed or doesn't allow for enough direct sunlight.

- **Orientation**: How panels are placed can significantly affect solar production and the cost of the system over time. Systems with panels that are directed due south are ideal. However, systems can be productive with other orientations (between 900 and 2700 azimuth).
- **Obstructions**: Trees, tall buildings and rooftop equipment can all cause shading, thus reducing the output of a system. The system design must take into account these obstructions and factor into the economics.

IX Roof Condition

For rooftop systems, early understanding roof condition and structural integrity is important. Significant repairs or roof replacement should not be anticipated during the life of the solar system (25 years).

- **Condition**: Ideally, PV installation is done concurrently with a new roof installation. If that is not possible, it is generally not recommended to install PV on roofs over 12 years old.
- **Structural**: Do existing construction or warranty drawings indicate the structural ability of the roof to handle the weight of solar panels or does an engineering assessment need to be done.
- Warranty: Work your solar developer and roofing contractor to make sure the solar installation is done in a way that does not impact or void your warranty.

X Land Condition

The condition of the land, including debris, structures or natural obstructions, needs to be considered. Many issues can impact the site preparation and installation costs of the proposed system.

- **Condition**: Existing structures will hinder the design and may need to be remove. Debris or backfill can create significant issues and may need to be removed. Trees, shrubs and other vegetation may also need to be trimmed or removed to ensure an efficient design.
- **Environmental Issues**: Preparing the land for solar installation may create drainage issues requiring grading or retention ponds. Floodplains and wetlands may reduce useable areas for panel placement. Some sites may require review of endangered specifies or soil contamination.

Stage 3: Financial Assessment

Assessing your property for the financial viability of solar starts with a conceptual design for the solar array. This provides some indication of the components needed and the required costs. Assumptions will be made about the ownership structure of the system, the incentives and how the energy generated gets used. The result should be a fair assessment of the costs and benefits of installing solar over time for all those involved; i.e. the host site, the system owner, the solar developer, etc.

X

Solar Design

A preliminary solar design in the pre-development stage will help site owners understand the solar potential of the site, as well as the costs and revenues from the power generated.

- **Assessment**: The solar assessment provides information on the feasibility of hosting a solar system. A solar assessment can be done at a high level remotely or by conducting a site visit and incorporating more detailed site information
- **Design**: The solar design identifies the size, placement and orientation of the system, which determines the annual output based on publically available solar resource data.
- **Components**: The design will produce a list of system components (modules, inverter, mounting hardware, meters and monitoring equipment), as well as costs and projected power generated.

XI

System Costs

Outputs from the site assessment and solar design are used to create system costs that include components, installation, maintenance and developer costs. Revenues are also calculated from power generation.

- **Installation Costs**: These include the components (modules, inverter, mounting hardware, meters and monitoring equipment), as well as installation labor, permitting and interconnection costs.
- **Operations & Maintenance Costs**: These include the costs for maintenance and all the necessary costs for the lifetime of the system.

XI

Financial Modeling

Financial modeling for solar captures all of the site, costs, fees and power generation assumptions and measures the value of the proposed system based on various potential ownership structures and business models.

- **Ownership Structure**: Who owns the system and how the site owner fits into the ownership structure determines where the value of the solar system flows. Usually, whomever invests the capital to build the system will see the greatest incentives and returns.
- **Incentives**: Incentives vary based on location. These include Solar Renewable Energy Certificates (SRECs), rebates, as well as tax benefits, like the Investment Tax Credit (ITC) and Modified Accelerated Cost Recovery System (MACRS).
- **Financial Returns**: Financial modeling provides insight to key elements of the project's financial performance. Simple payback, Return on Investment, Internal Rate of Return and Net Present Value are metrics that a financial model can demonstrate through cash flow modeling and life cycle cost analysis.