Commercial PV Site Assessment Guidance Document

This Commercial PV Site Assessment template is developed for some of the unique characteristics of a commercial installation.

When conducting the actual site assessment, use a form such as the Site Visit Data Collection Form Template. This form lists information the site assessor should have on-hand during an assessment as well as information that needs to be collected during the visit. Data collection during the site visit is crucial and will determine system design possibilities and limitations.

Commercial PV installations are typically larger than residential installations, and more advanced shading analysis software tools such as SAM, Helioscope, PVSyst, etc. will help reduce time spent on shade analysis and will improve the accuracy of those results.

The PV system financial analysis will greatly impact commercial clients' decisions. Commercial PV projects commonly include more complicated energy and distributed generation rate schedules. Commercial properties may also have multiple service entrances, which can impact the financial performance of a system design. For this reason, the National Renewable Energy Laboratory's (NREL) System Advisor Model (SAM), a free but powerful tool used in analyzing financial performance of a PV system, is recommended. Using software from a highly qualified third party will also help to validate financial performance reports.

No two site assessments will unfold in the exact same way. This site assessment template provides the assessor with a 'flow' of information, which is designed to help them in their project development.

Sections 2.0 – 8.0 should be completed prior to any site visit. Conducting these steps diligently will help set parameters for the project. Understanding this information prior to a site visit will save time investigating project designs that are not feasible.

Sections 9.0 – 10.0 concern the development of one or more system designs and their associated costs and financial performance estimates.

1.0 Executive Summary

This section summarizes the site and location, the client's energy profile, the recommended system size and type, and should include a production estimate and financial summary. This section functions as a cover letter to a client and is written last after all the subsequent sections have been completed.

2.0 Client Contact Information

This is a table of contact information for stakeholders in the project.

3.0 Client Profile

The site assessor's goal upon first contact with the client is to listen and learn. Why are they interested in PV? What are their goals for this project? Have they ever investigated solar before? Does the client have a preconceived idea of an ideal PV array location?

Completing the Client Contact Information and Client Profile tables will help you gain insight into the client's understanding of PV, along with the client's goals and expectations.

If your discussions with the client have revealed specific challenges or opportunities, include them here.

4.0 Client Energy Profile

Performing this step diligently will help set parameters for the project. A comprehensive knowledge of rate schedules is critical as you learn how the client is being billed and how a PV system will impact that billing. The financial analysis will be built on this data, and any misunderstanding can lead to overestimating or underestimating a PV system's financial performance. The assessor should also be aware of thresholds between rate schedules as the installation of a grid-tied PV system may reduce the property's energy or demand requirements enough to change the client's rate schedule.

Be sure to obtain the following:
- A printed copy of the most recent electric bill for each meter on the property.
- Copies or a summary of the past 12 or 24 months energy usage for each meter.
- A copy of the current rate schedule for the property.
- A copy of the distributed generation rate schedule that may apply after interconnection.

5.0 Utility Profile

To complete the Utility Profile table, contact the utility company and/or the utility account manager. Upfront discussion about the size and scope of the project can help you gauge utility

concerns or issues. If the customer is on a demand charge, inquire about the interval-reading period and ask for one-year demand data (this may be a spreadsheet or .csv file, typically called an 8760 Report). Client permission may be needed to access this data.

At a minimum, you should:
- Ask about the distributed generation rate schedule for which the client would qualify.
- Clearly understand the utilities electrical installation requirements including any electrical interconnection requirements such as a separate solar generation meter or external AC disconnect (and the proximity to the meter). Also, if the PV array is large, you may need to inquire about the size of the transformer and the type of service.
- Discover if the utility requires any inspections. If so, identify contacts for those inspectors, what they will be inspecting, inspection costs (if applicable), and the required timing of these inspections.

6.0 Site Profile

Using a Google Earth or GIS mapping system, begin to identify potential array sites. See an example of this in Section 6 of the case studies. Indicate service entrances, buildings, available roof spaces, available ground space, on aerial images. Identify shading obstacles and indicate any future building plans that could impact an array. Google Earth and GIS allow for the assessor to take measurements which will help in preliminary array sizing and production estimates for comparison to the client's load. Note that Roof pitch may not be known until the time of the site visit.

For ground mounted arrays, soil conditions can present installation opportunities and challenges. Installer knowledge of the area will be helpful here, and in many areas, the state's Department of Natural Resources will have local well driller reports available online.

7.0 Authority Having Jurisdiction (AHJ) Profile

An authority having jurisdiction (AHJ) is an organization, office, or individual designated by local government with legal powers to administer, interpret, and enforce building codes. In this section, all AHJs should be identified and contacted to determine what types of electrical, fire safety, and construction permitting will be required throughout the project. AHJs may be at the state, county, or municipal level. In discussions which each, describe an example system to start the conversation. For example:

> *"My name is Bob, and I am working with MS&S Inc. of Stevens Point, WI on a possible solar project. MS&S Inc. is considering an installation of a grid-tied PV system (roof, ground, or both). I would like to learn what zoning requirements may impact this project and the type of permitting would be required. Will an inspection be required? If so, by whom, what will be inspected, is there a cost, and when would that take place."*

Finally request copies of any permit applications, fees, and the timing of application submission and processing.

8.0 Available Incentives/Grants/Tax Credits

In this section, determine the client's ability to qualify for federal, state, or local tax credits or if state or local sales taxes are applied. Determine if there are utility, state, or local incentives or grants available, and learn about the client's ability to apply for and secure these funds.

Remember, the Federal Investment Tax Credit is applicable only to entities that have tax liability.

Use the Database of State Incentives for Renewables & Efficiency (DSIRE) at www.dsireusa.org as a resource.

9.0 PV Array Options

In this section, assemble the main components of your PV system. Whether sketching by hand or through computer software, size the modules, arrays, conduit runs, inverters, etc. Then, begin entering the information as inputs in System Advisor Model (SAM).

NREL SAM USER INPUTS	
Location and Resource	User can choose airport data, which will be used as the basis for energy generation estimates, or user can download their own information.
Module	Select the photovoltaic module that will be used in this design.
Inverter	Select the inverter that will be used in this design.
System Design	By clicking the radio buttons under System Sizing, the user can either default to SAM to create an array or specify the number of modules and inverters.
Shading and Snow	This can be achieved a couple different ways; with SAM's 3D shading calculator, or through a variety of other commercial shading analysis tools.
Losses	User can select default losses or specify their own data for losses.
Lifetime	Enter the system's degradation rate.
Battery Storage	Not used for grid-tied systems.
System Costs	User can be as detailed or general as desired. User can zero out all categories and enter one

	value to achieve the entire project cost.
Financial Parameters	Enter data for financing, tax rates, etc.
Incentives	Enter data for qualifying tax credits and incentives.
Electricity Rates	User can enter data or have SAM "search for rates", which will automatically populate the grids for time-of-use or demand charges.
Electric Load	User can enter data for the properties monthly energy use, or download .csv or Excel data (particularly useful for demand charge data).

Example data points for the two case studies are provided below:

MS&S Inc. Option 1	
Category	**Input**
	Keep default settings with these exceptions
Location and Resource	USA, WI, Eau Claire TMY2
Module	SolarWorld SW325XL Mono
Inverter	SMA America STP20000TL-US-10
System Design	Select "Specify Modules and Inverters" Modules in string: 16 Strings in parallel: 22 Number of inverters: 5 In DC Sub array, change tilt to; 15
Shading and Snow	No Changes
Losses	No Changes
Lifetime	No Changes
Battery Storage	No Changes
System Costs	Zero everything except change one $/watt dc to $2.45. This should change the system cost to $282,073.81
Financial Parameters	Zero the following; Debt %, Loan Term, Loan Rate, Property Tax, Assessed %, Property Tax Rate, Sales Tax Rate
Incentives	Change IBI State to $2,400
Electric Rates	Search Zip Code 54482. Select Wisconsin Public Service Corporation, Select Commercial, Select CG-20. Select Download and Apply. Change Energy Cost Escalation to 3.5%
Electric Load	Need .csv file.

Town of Rome	
Category	**Input**
	Keep default settings with these exceptions
Location and Resource	USA, WI, Eau Claire TMY2
Module	SolarWorld SW325XL Mono
Inverter	SMA America STP20000TL-US-10

System Design	Select "Specify Modules and Inverters" Modules in string: 12 Strings in parallel: 18 Number of inverters: In DC Sub array, change tilt to; 15
Shading and Snow	No Changes
Losses	No Changes
Lifetime	No Changes
Battery Storage	No Changes
System Costs	Zero everything except change one $/watt dc to $2.50. This should change the system cost to $176,623
Financial Parameters	Debt 100%, Loan Term 10, Loan Rate 3%, Property Tax 0, Assessed 0%, Property Tax Rate 0, Sales Tax Rate 0
Incentives	Change IBI State to $2,400
Electric Rates	Search Zip Code 54457. Select Adams-Columbia Electric Cooperative, Schedule GS. Select Download and Apply. Change Energy Cost Escalation to 3.5%
Electric Load	13,222kWh per month

10.0   PV Project Summary and Recommendations

In this final section, verbalize thoughts and recommendations for the project. Some of this content should also be summarized within the Executive Summary.

Attachments

At the end of this report, attach any additional documentation that is informative to the client including, but not limited to:

A. System Advisory Model (SAM) report
B. Copies of client's recent utility bills
C. Summary of past 12-24 month energy usage at each meter on site
D. Current rate schedule for property
E. Future rate schedule after PV is interconnected at the site
F. Utility distributed generation application
G. Permit applications