



Key Questions When Considering On-Site Solar PV: An Introductory Guide for Commercial & Industrial Facilities in Vietnam

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Solar photovoltaic (PV) costs are falling dramatically. As utility electricity tariffs increase in Vietnam, commercial and industrial (C&I) facilities will, increasingly, have opportunities to save money by using a portion of electricity from on-site solar PV power generation. The following guide provides key questions for C&I facility operators to consider when exploring solar PV options which include, but are not limited to: site ownership, physical characteristics of the site, operational practices, and access to financing. This guide is not intended as a comprehensive resource but as a high-level introduction to the key factors that can impact whether or not C&I businesses and facilities have the right conditions to make a cost-effective procurement of an on-site solar PV system.

If you decide that on-site PV is of interest to you, based on this checklist, the next step would be to perform a more detailed technical and engineering feasibility assessment.

Checklist to Determine if Your Factory Should Explore Solar PV

Key questions to ask about your facility are listed below. More detail for each can be found in the sections that follow.

- ✓ Does your factory own the building or have a long-term lease (20+ years)?
- ✓ Do you have space available on your roof for solar panels and/or sufficient land for a ground-mounted system?
- ✓ Is the roof structurally sound and will it be in place for the duration of the economic life of the solar PV system (typically, 20-25 years)?
- ✓ Are there any trees, walls, buildings or other structures that shade the area where the solar panels would be located?
- ✓ Does the factory's operational schedule and electricity consumption align with solar production?
- ✓ Does your company allow the use of operational budgets to lease equipment? Or does your company's budget allow for equipment to be purchased with capital budgets?
- ✓ If your company is interested in a solar lease, would it be able to sign at least a 10-year contract?
- ✓ Would your solar PV system qualify for incentives, such as net metering and tax breaks?

If you answer YES to all these questions, your factory is well positioned to consider solar.

If you answered *NO* to some of these questions, there may still be other options for renewable energy procurement. The following sections provide a deeper look at these considerations and offer a more detailed explanation of the primary and current financing options for on-site solar PV electricity in Vietnam.

Ownership

✓ Direct Ownership or Facility Lease

Whether the facility operator owns or leases the building and land will influence solar PV investment decisions. Landlords sometimes are not incentivized to invest in solar PV on behalf of their tenants if they there is not a profitable investment angle or cost-saving opportunity for the owner. However, some industrial parks in Vietnam are exploring new models of providing tenants with solar energy. Generally, a company's ownership or long-term lease of land and buildings allows for easier decision-making when committing to an on-site solar PV investment or contract.

→ Action Items:

- *If leasing the factory building, determine land and building leasing agreement conditions to see if the contract term is sufficiently long to enable a payback on the solar PV system (e.g., a facility lease of at least 10 years).*
- *Explore whether the commercial landlord or industrial park would be interested in providing solar energy as a service to tenants.*

Physical Characteristics

✓ Availability of Roof or Land Space for Solar Panels

Solar PV systems require approximately 8-10 square meters of space for each kilowatt (kW) installed. Whether roof-mounted or ground-mounted, a solar PV system needs a flat or angled surface (ideally oriented in a south-facing direction for maximum sun exposure) that is free from barriers and impediments such as walls, vents, skylights, air-conditioner equipment, walkways, etc.

✓ Structural Soundness and Remaining Lifetime of Roof

Prior to installing a rooftop solar system, you need to determine if the building's roof is structurally capable of holding approximately 10-15 kg/sqm, which is the general range of weight bearing load for solar panels and the mounting structure. Additionally, because solar PV systems are designed for a lifetime of 20-25 years, the building owner needs to determine the remaining lifetime of the current roof. If your building currently has an old roof in need of repairs or replacement, a solar system should not be installed until repairs or replacement is completed. A ground-mounted solar PV system could be a good alternative if there is sufficient space on your property.

✓ Shading Barriers

To collect maximum sunlight during daylight hours, a solar PV system in Vietnam should face South as much as possible. The area where the solar PV system will be placed (rooftop or ground area) must be checked for shadows created by trees, walls, or nearby buildings. Minimal shadows throughout the entire daytime - particularly between 10:00 and 15:00 - is an ideal case for solar PV installations. In cases where shadows do exist in the area of the proposed solar PV system, a detailed analysis of time and

direction of sunlight needs to be performed by a solar expert to accurately estimate the reduction in solar energy output.

→ **Action Items:**

- *If your factory is considering a rooftop installation, conduct an structural engineering assessment of roof space to check the quality, strength and integrity of the roof.*
- *For both rooftop and ground-mounted systems, engineers should check for shading from trees or other structures that might impact solar energy production.*

Building's Operations

✓ Operational Schedule and Electricity Consumption Patterns

Solar PV systems generate electricity every day of the year - however, production is variable based on weather and other conditions and tends to be greatest in the afternoon when the sun exposure is most direct. Unless your solar system has the capability to use MOIT's net metering regulation, your solar system should be designed so that as much solar electricity as possible is consumed by the building. Does your business operate on a year-round basis? Does your operation's electricity demand remain stable from day-to-day, or does it fluctuate often? Businesses and buildings that don't operate year-round, or have long periods of very low electricity consumption, might not be suitable for an on-site solar PV system. Net metering is further discussed below.

✓ Company's Operational Future

Solar PV systems are designed to generate electricity for 25 years or more. If your company is going to invest into solar assets or is considering a contract for solar service, it is necessary that the solar system will be used for as long as possible. As a rule of thumb: if you think your business will move locations in less than 10 years, pursuing an on-site solar PV system may not be a suitable choice.

✓ PV System Component Location and Housing

Solar panels will need to be connected your facility's electrical Main Distribution Board (MDB). It is imperative to ensure cabling from the solar panels have access to the facility's MDB. Secondly, it will be necessary to have a protected indoor or outdoor area where inverters can be placed.

→ **Action Items:**

- *Work with energy managers to analyze utility bills, ideally looking at average use over the past two years to understand daily, seasonal, and annual electricity consumption patterns. The tariff structure should also be examined (e.g., time of use, special utility offerings, capacity charges).*
- *Meet with chief operations officers to discuss operational horizons and whether the factory intends to stay in its current facility for at least 10 years.*

Business and Financing

✓ Company's Investment Policy

As of 2018, solar PV systems for commercial and industrial energy users in Vietnam normally have a capital investment payback period of more than 5 years. If your company has guidelines that mandate new capital investments must have a *shorter* payback period than 5 years, it is advisable to consider solar service contracts (known as: OPEX model, leasing/rental, ESCO) in which your company is not required to commit a capital outlay to the solar assets.

✓ Company's Ability to Engage in Vendor Contracts for 10+ Years

If your company prefers not to invest its own capital into solar assets, solar vendors in Vietnam are able to provide "OPEX" or "ESCO" solar service contracts, usually in the form of a lease or rental contract. As the electricity user, your company pays a monthly fee to use the solar system and the generated electricity. Typically, solar vendors require the electricity user to sign a contract for multiple years -- oftentimes a minimum of 10 years, sometimes up to 20 years. If your company is not able to sign a long-term contract, it may be difficult to find a solar vendor that will provide the OPEX solar service.

→ Action Items:

- *Consult with company's chief financial officer to determine whether the factory has payback period requirements that would limit a turnkey capital investment.*
- *Alternatively, explore with the factory's legal department whether the factory can sign lease or rental contracts with a minimum suggested length of 10 years.*

Access to Incentives

✓ Tax Incentives

Commercial and industrial facility managers and owners should consult with tax advisors to determine what types of tax incentives or holidays a solar PV system might qualify for. Potential tax incentives could include exemptions on import duties on fixed assets as well as corporate tax incentives.¹

✓ Net Metering

Vietnam passed a net metering regulation in 2017 that provides remuneration to the owners of on-site solar PV systems for all excess solar electricity generated over the course of a billing period (i.e. the payment cycle) which can be calculated either annually or at the end of lease lifetime. Net metering requires installation of a bi-directional meter by EVN that measures both energy consumption and production. The current remuneration rate is 9.35 US cents/kWh for qualifying rooftop solar PV systems in operation prior to June 30, 2019. As of November 2018, there appears to be very minimal uptake of the net-metering incentive by commercial and industrial energy users. However, it is important for C&I facility owners and managers to stay abreast of any changes in the implementation of the net metering regulation as it could have significant implications on the size of the rooftop solar project that would be economic for you to install.

✓ Renewable Energy Certificates

¹ <http://www.mondaq.com/x/601922/Renewables/Vietnam+New+Solar+Power+Policy>

Renewable Energy Certificates, or RECs, represent the non-power attributes of renewable energy generation. Typically, one REC equates to the “green” attributes of 1 megawatt-hour (MWh) of power generated from the renewable energy system. RECs can be sold “bundled” together with the power in the form of a lease or power purchase agreement. Although Vietnam does not yet have a nationally-sanctioned REC market and there have been limited private REC deals to-date, it is important for corporate energy users, especially those considering entering into a solar lease, to ensure they will retain ownership to the RECs if they want to make verifiable claims about their utilization of renewable energy.

→ **Action Items:**

- *For any turnkey investments, seek advice from legal counsel as to whether a solar energy system would be eligible for any tax breaks.*
- *For solar leases, engage legal staff to ensure that any net metering benefits or renewable energy certificates are credited to the factory. This is especially important for RECs if the factory intends to make a verifiable renewable energy claim.*

Comparison of Financing Structures

There are two general models of solar financing **currently** offered in Vietnam by solar vendors:

1. Turnkey solar asset purchase

- Also known as: “CAPEX purchase”, “balance sheet financing”.
- Your company invests into and owns the solar system assets.
- Obtaining a corporate loan from a Vietnam bank may be an option if your company has an existing credit line.

2. Solar lease or rental

- Also known as: “OPEX contract”, “solar-as-a-service”, “ESCO” or “Build-Own-Operate”.
- Your company does not own the solar assets. Instead, the solar vendor provides the financing and owns and operates the assets for the lifetime of the contract.
- Leasing contracts with solar vendors vary in length; they are typically 7-25 years.
- In some cases, your company can have a “lease-to-own” option at the end of the contract, i.e. a “Build-Own-Operate-Transfer” contract.

The following table compares the key characteristics of the two existing financing structures:

Characteristics	1. Turnkey Asset Purchase	2. Solar Lease/Rental/ESCO
Financing	On company’s balance sheet	Financing from solar company
Operations and Maintenance	Requires separate contract with solar company or third-party O&M provider	Cost included in lease
Equipment warranties	Yes, possible	Yes, possible
Performance Guarantees	Yes, possible with additional cost	Cost included in lease
Permitting & interconnection licenses	Responsibility of building owner	Responsibility of solar company

Insurance included	No	Yes
Lowest cost per kWh over solar system lifetime	Yes	No
Potential for Year 1 cash-flow positive	No	Yes

For additional information or to learn more about the Clean Energy Investment Accelerator (CEIA), visit www.cleanenergyinvest.org or contact us at info@cleanenergyinvest.org.