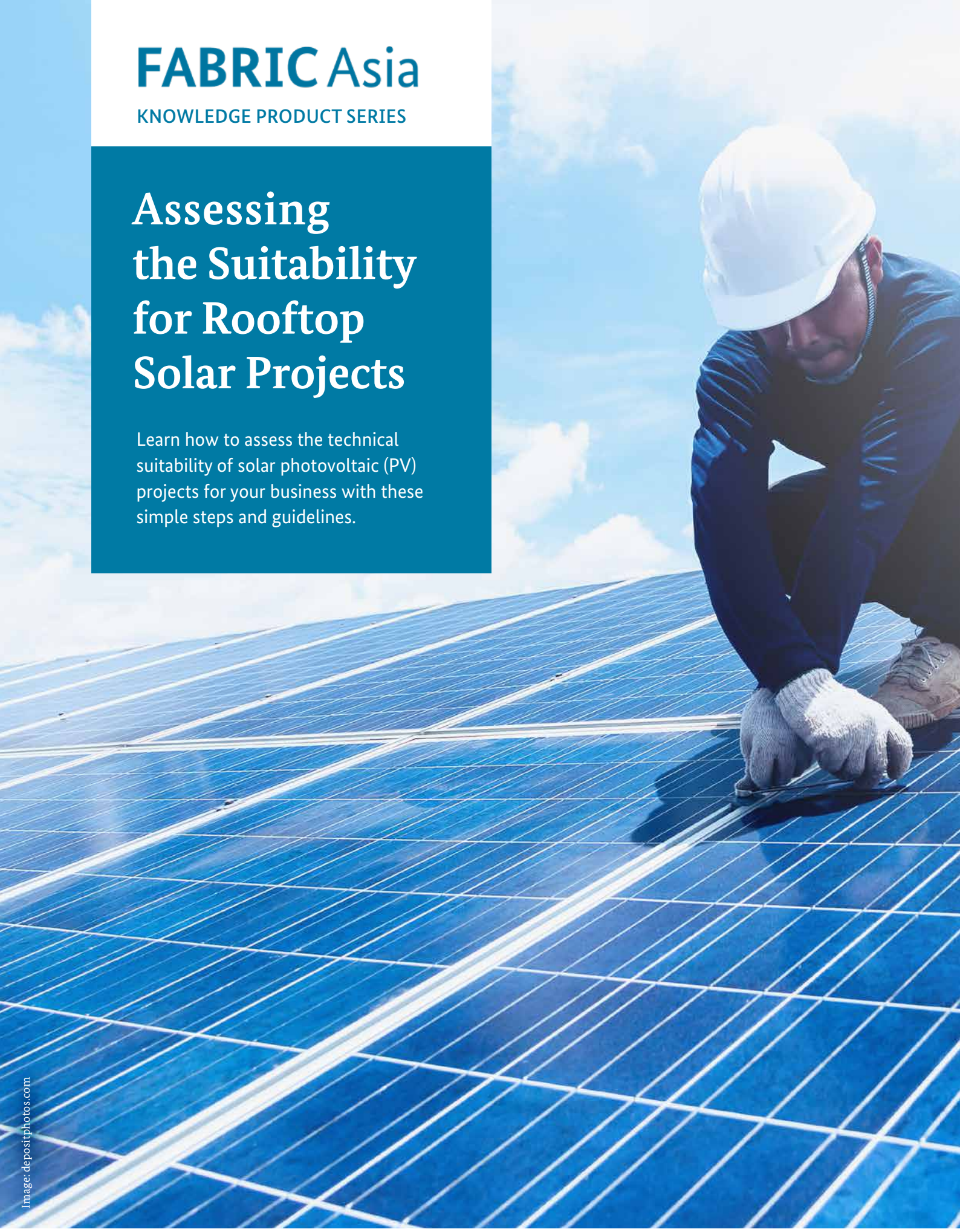
FABRIC Asia

KNOWLEDGE PRODUCT SERIES

Assessing the Suitability for Rooftop Solar Projects

Learn how to assess the technical suitability of solar photovoltaic (PV) projects for your business with these simple steps and guidelines.



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Implemented by
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Assessing the Suitability for Rooftop Solar Projects

Who this is for

Factory owners in the textile and garment industry

In brief

Assessing the technical feasibility of solar photovoltaic (PV) systems for your business will help you make better investment decisions.

Where to start?

If you are interested in installing an on-site PV system, a detailed technical and financial assessment should be performed. This document focuses on the technical self-assessment necessary before installing an on-site PV system and the data you need to collect before reaching out to a PV provider.

Image: depositphotos.com

Part 1: Initial assessment checklist – is a solar PV system suitable for your factory?

The below checklist is not a comprehensive technical assessment but rather an introduction to key factors that should be considered in determining whether your factory has the right conditions and potential for installing a solar PV system. Further information on each category can be found below.

Question	Yes / No
Factory conditions	
Does your factory own or have a long-term lease of more than 15 years on the building in which the solar PV system is intended for installation/available space in the building for system installation?	
Do you have space available on your roof for solar panels and/or land available close to your factory for a ground-mounted system?	
Is the roof structurally sound and will it be so for the duration of the economic lifetime of the solar PV system (typically more than 25 years)?	
Location suitability	
Is there a high exposure to solar irradiation where your factory is located?	
You can check your local solar Irradiation here: https://globalsolaratlas.info/	
There are no trees, walls, buildings or other structures that shade or obstruct light to the area in which the solar panels would be located.	
There is no serious air pollution in the area or from the production itself, resulting in high amounts of dust or chemicals accumulating on the panels.	

If you answered "yes" to all of these questions: your business is in a good position to consider installing a solar PV system. The next step would be to assess the concrete business case in your country. Please refer to the other chapters of our series for further Information.

If you answered "no" to any of the above or are unsure about an answer: seeking expert advice and gathering more information is recommended.

Part 2: Technical assessment with a certified and experienced solar PV solution provider

After completing the initial technical assessment checklist, the next step is to conduct a proper technical assessment of the on-site system requirements and suitability through an experienced solar PV solution provider. It is highly recommended to engage solar PV solution providers with a strong track record of projects to ensure a high-quality assessment and following recommendations:

Factory conditions

A solar PV system can be installed on the roof of a property (roof-mounted) or on a space you own or lease near to your factory (ground-mounted).

To get the best return on investment, the solar PV system should be used for as long as possible. The business should therefore **own the factory or have a lease contract for more than 15 years** from the date of system installation. Meeting with chief operations officers to discuss the operational horizons is therefore a priority. It is also critical to make sure that, if the property is leased, the lease agreement conditions allow for the installation of a solar PV system.

Practical context
Installing a solar PV system without properly evaluating your leasing contract may lead to negative consequences. For example, you may face lawsuits for making an illegal installation or, if having to move out of the building, lose ownership of the system or incur extra costs to move it.

Prior to installing, you need to determine whether there is enough space for panels available and whether that space is structurally capable of supporting the entire solar PV system.

- Expected roof lifetime should be greater than 15 years after the installation.
- If a roof needs repairs or replacement, a solar PV system should be installed after they are completed.
- Ground-mounted systems also require assessments to ensure that the area is suitable.

Practical context for factory conditions – Please avoid this set-up
Unsuitable roofs may suffer material damages at the location and endanger factory workers.

Image: © Buntrabe (Wikimedia Commons)

An improper mounting structure on a structurally unsuitable roof

Image: © GIZ / Gerbang Multindo Nusantara (GMN Energy)

A roof lacking space for required capacity

Location suitability

- The location of the solar PV panels should provide high solar irradiation and be free from shading (especially between peak solar hours, i.e. 10.00 am and 3.00 pm).
- Solar PV panels must be properly oriented to capture the most solar radiation.
- Air pollution in the area, dust and chemicals can reduce the system performance and durability and increase operating and maintenance costs.

Practical context

- Even a small amount of shade may disproportionately affect the performance of the entire solar PV system (causing overall electricity production to drop by up to 90%).
- Shading can be caused by walls, vents, skylights, air-conditioning equipment, walkways or even two solar panels placed too close together.

Image: © reijotelaranta (Pixabay), AS_PHOTOGRAPHICS (Pixabay) r.

Shadows cast on the solar panels by objects such as ventilation pipes, chimneys, plants, etc. reduce the efficiency of the PV system.

Image: depositphotos.com

Practical context

What are some of the major reasons for the failure of solar projects, and some tips on how you can avoid them?

Reason:

1. Low-quality materials

Description

Using low-quality materials for installation or maintenance can result in sub-optimal solar PV system performance and other infrastructure failures.

Practical Example

The image below shows a low-quality mounting arrangement with improper sealing.

Image: © GIZ / Gerbang Multindo Nusantara (GMN Energy)

Reason:

2. Low-quality components

Description

Installing low-quality components (such as solar panels, and inverters) can result in sub-optimal solar PV system performance and other infrastructure failures

Practical Example

Electric arc failures or arc discharges can occur if low-quality components or materials are installed

Image: © GIZ / Gerbang Multindo Nusantara (GMN Energy)

Cracked PV panels due to low-quality material can be seen below

Image: © GIZ / Gerbang Multindo Nusantara (GMN Energy)

Reason:

3. Improper mounting structures

Description

The mounting construction keeps the solar modules in place. Unreliable mounting structures can be damaged by wind and other influences. This can reduce the efficiency of your installation and even become a dangerous hazard for your workers.

Practical Example

An improper mounting structure can be seen below.

Image: © GIZ / Gerbang Multindo Nusantara (GMN)

Reason:

4. Improper installation

Description

Improper wiring and installation of components can be a cause of system failure. Engaging an experienced and certified provider will ensure that components are properly installed and protected against environmental forces.

Reason:

5. Electric surges coming from the utility grid or natural events (such as lightning).

Description

Solar panels are especially prone to lightning strikes due to their large surface area and placement in exposed locations, such as on rooftops and open spaces. Proper installation by an experienced and certified provider can minimize such risk.

Practical Example

Lightning is responsible for more than 30 % of damage to PV systems.

Image: © GIZ / South Pole

Reason:

6. Lack of proper maintenance throughout the solar PV system's operational lifetime.

Description

A lack of proper maintenance (including a lack of continuous cleaning of the PV panels) can severely affect your systems efficiency and lifetime. Improper cleaning may lead to hotspots on the PV panels.

Practical Example

Below you can see an improperly cleaned solar panel.

Image: © GIZ / Gerbang Multindo Nusantara (GMN Energy)

Recommendation:

- To avoid early and preventable failures in your PV system, make sure to conduct a proper tendering process in order to select a qualified and experienced solar PV solutions provider that uses high-quality components and materials.
- Seeking advice from independent consultants can help to ensure the quality of your system.
- When evaluating and choosing a solar PV system provider, try to avoid basing your decision only on the lowest price. Instead, base your decision on the system's overall costs, considering quality and lifetime. This also includes costs for operation and maintenance with regular check-ups.

Next steps

The following information should be prepared and shared with the solar PV solutions provider to optimise the design and configuration of the PV system to your specific needs:

Electricity demand information

1. Energy demand and costs/bills: current electricity supply sources, prices, consumption patterns based on load profiles (daily, seasonal, annual), any use of diesel generator and its specifications, etc.

2. Operational schedule: operational and off days per week, work shifts and hours per day, any seasonal fluctuations of operational activities, regular shut down periods, etc.

Site-specific information

1. Any future plans in terms of changing location, expected increase or decrease of energy demand, change of operations schedule and anything that may affect the facility's energy consumption.

2. Facility conditions at the intended on-site solar PV system location: engineering designs, drawings and photographs that document the current condition and age of the infrastructure, allowable additional load and any potential obstructions (walkways, skylights, vents, A/C units, etc.).

Additional points to start thinking about

- **Financing structure:** Which financing model you could consider for the project (CAPEX or OPEX structure, return expectations, etc.). Please refer to the factsheet on "Different investment models for solar PV" for more information.
- **Regulation considerations:** Which regulations, policies, financial incentives and business models are available in your country. Please refer to the factsheet on "On-site solar regulation and policy framework" for more information.
- **Power market insight:** Prepare the business case assessment for a solar PV system. Some aspects to consider here are future power price development, inflation, etc. These aspects can be assessed by independent advisors or the solar PV solutions provider itself.

Abbreviation/Acronym	Description	Abbreviation/Acronym	Description
C&I	Commercial and industrial	**RE**	Renewable energy
kWp	Kilowatt peak	**Wp**	Watt peak
PV	Photovoltaic		

To explore more topics related to solar PV, please review the full set of briefing notes. Topics include:

- ☐ Introduction to C&I RE sourcing
- ☐ How a solar PV system works
- ☐ Assessing the business case for on-site solar (financial perspective)
- ☐ National solar regulations and policy framework
- ☐ Different investment models for rooftop solar projects
- ☐ Local financing programmes for rooftop solar projects

Image: © GIZ / Sabrina Asche, 2017

ABOUT FABRIC

The project FABRIC (Fostering and Advancing Sustainable Business and Responsible Industrial Practices in the Clothing Industry in Asia) is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, which works on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ). To successfully shape the desired economic growth in Asia's textile and garment production in a sustainable way, many parties need to be involved. GIZ's FABRIC project brings together people from the Asian industry, public sectors, NGOs and from international buyers, promoting knowledge transfer and cooperation. FABRIC is working in Bangladesh, Cambodia, Myanmar, Pakistan, Viet Nam and together with China to strengthen an industry that offers quality jobs, protects the environment and contributes to economic growth.

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