FABRIC Asia

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Assessing the business case for on-site solar (financial perspective)

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DEUTSCHE ZUSAMMENARBEIT

Implemented by
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Assessing the business case for on-site solar (financial perspective)

In this knowledge product, you will learn about the steps to take to calculate an on-site solar business case

Who is this for?

Factory owners in the textile and garment industry

In brief

Using solar energy to power your manufacturing operations is an effective and profitable option.

Value proposition

Assessing the business case for on-site solar and determining the criteria for a viable solar project will help you make better investment decisions.

Key solar PV business case trends in the region

- **Significant reductions in renewable technology costs, as well as policy environments,** have made renewables more cost-competitive and attractive than conventional forms of energy generation.
  - The cost of solar-PV, for example, declined by 82% from 2010 to 2019. This also means that the cost of generating renewable energy is now on a par with or significantly lower than fossil fuels.
  - In Viet Nam and Cambodia for example, the cost of rooftop solar per kWh is now cheaper than the utility tariff rate.
- Power prices can be volatile and are generally expected to increase across the Asia-Pacific region.
  - The on-site renewable installations provide **long-term price predictability** for the factory's operational costs and can provide potential energy cost-savings.

1 Start by ensuring that solar energy is a fit for your organisation and business priorities

☑ Check if electric utility costs are a significant contributor to your operating costs. If yes, procuring on-site solar power could potentially offer considerable cost-saving potential.

☑ Will “going green” raise your organisation’s environmental profile among customers, regulators, and your community?

2 Determine site suitability for on-site solar power procurement

☑ Check how long you plan to keep your operations at the site. For the best return on your investment, the PV system should be used for as long as possible.

☑ Check location availability and suitability. Please refer to the “assessing suitability for rooftop solar projects (technical perspective)” document as part of this series

3 Setting criteria fpr "gp/no-go" decision and achieve internal alignment

☑ In the process of identifying your company’s criteria, be sure to think about everyone who will take part in the decision-making. Achieve internal buy-in for exploring solar across departments. This includes:

- management;
- site managers;
- electrical and operations staff
- finance department

4 Gather the facts of your recent energy usage

☑ At least six months of electrical bills are essential for this process. In addition, financials related to business losses resulting from previous power outages, and projections of future business expansion, will help quantify the monetary advantages of on-site solar energy.

☑ Check alignment between:

- factory’s/site’s electricity consumption profile with solar hours. Ideally, peak electricity consumption during the day will match best with the solar power generation profile
- retail tariff rate changes (in case peak/off-peak rates apply) with solar power production hours to maximise cost-savings. Ideally, peak rates during the day will provide the best cost-saving potential for solar power generation

☑ What is the consumption profile and the site’s tenancy outlook in the next five to 10 years? If the site is due to close in less than 10 years, on-site system viability may be significantly reduced

5 Evaluate the budgeting viability

☑ Check (with relevant department) the budget availability/allocation for procurement of on-site system equipment

☑ What is the payback period requirement (in case of self-financed/CAPEX model)

☑ In case of the OPEX model:

☑ operational budget allocation to lease equipment or services

☑ possibility/commitment to sign a long-term (10- to 25-year) contract

6 Partner up with a credible solar energy specialist and service providers with proven system quality

☑ Too many solar projects end in failure because customers skip this crucial step. Get references and check prior project portfolios to make sure you do business with a proven, reliable partner.

☑ Choose a partner with strong financial backing who assures you of long-term support, and with demonstrable experience in building and supporting solar infrastructures of the size and complexity your business demands.

Sample business case calculations

To calculate your business case you can either (1) invest directly in your own rooftop solar plant (this is called "the capex model") or (2) choose to pay a third party to own and operate a rooftop solar plant on your behalf (this is called "the opex model"). The costs and calculation methodology differ for the two models. See the calculations below.

The CAPEX investment model

Directly investing in a rooftop solar plant by commissioning a renewable energy developer or an engineering procurement construction (EPC) company. This is known either as a **"CAPEX model" or "self-financed model".**

Sample parameters to evaluate an on-site rooftop solar system

No	Parameter	Example value
1	**Solar system equipment costs (including PV panels, inverters and replacement, balance of system, support structure)**	USD 800/kWp installed
2	**Installation costs**	USD 150/kWp installed
3	**Solar PV system production**	1,400 kWh/kWp installed/year
4	**Average tariff during solar hours**	USD 0.09/kWh
5	**Rooftop feed-in-tariff (FiT) rate**	USD 0.0838/kWh
6	**Operation and maintenance expenses**	USD 5/kWp installed/year
7	**System lifetime**	20 years
8	**Installed capacity**	1,000 kWp
9	**On-site system operation profile**	Seven days/week, assumed 90% power used on-site while the rest fed to the grid at FiT rate

Note: These values are for illustrative purposes only and do not represent market data.

Business case calculation example for CAPEX model

Annual cost-savings from on-site consumption:

- = 90% x 1,000 kWp x 1,400 kWh/kWp/year x USD 0.09/kWh
- = USD 113,400/year

The figure above represents savings from the avoided utility costs you would otherwise have paid. It is assumed that you will use 90% of the electricity output (see point 8 in the table above) from your solar PV system at 1,400 KWh per kWp for the 1,000 KWp installed per year. With a utility tariff at USD 0.09/kWh, your annual cost savings from on-site consumption are USD 113,400 per year.

Annual sales from FiT export to the grid:

- = 10% x 1,000 kWp x 1,400 kWh/kWp x USD 0.0838/kWh
- = USD 11,732/year

It is assumed that you will not use the remaining 10% of your electricity output and thus the excess electricity will be exported to the grid. With the prevailing feed-in tariff at USD 0.0838/kWh, you will get paid USD 11,732/year from the imported electricity.

Total cost-savings from the on-site system throughout its lifetime:

- = (annual savings from own consumption + annual sales from FiT) x lifetime
- = (USD 113,400/year + USD 11,732/year) x 20 years
- = USD 2,502,640

By installing on-site solar PV, you would achieve savings from the avoided utility cost/savings from own consumption and from electricity sales to the grid. Assuming the lifetime of your solar PV is 20 years, you would save USD 2,502,640 throughout its lifetime.

Total costs:

- = Equipment costs + installation costs + operation and maintenance costs throughout its lifetime
- = (USD 800/kWp x 1000 kWp) + (USD 150 /kWp x 1000 kWp) + (USD 5/kWp/year x 1,000 kWp x 20 year)
- = USD 1,050,000

The total costs of installing the solar PV system comprise the equipment costs and the operation and maintenance costs throughout the system's lifetime. Assuming the lifetime of your system is 20 years, the total costs of your solar PV system throughout its lifetime are USD 900,000.

Net cost-savings throughout its lifetime:

- = Total cost savings - total costs
- = USD 2,502,640 - USD 1,050,000
- = USD 1,452,640
- or, equal to USD 72,632/year with 20-year lifetime.

Simple payback period:

- = Total costs : annual savings
- = 14.5 years

It should be noted that the above example is a simple business case estimation. The actual net present value of the business case would need to take into consideration the following parameters as well:

- Annual utility rate growth/changes
- Inflation rate
- PV output degradation (typically at 0.5% annually)
- Interest rate and loan tenure in case of debt-financed

The OPEX investment model

Buying solar power under a long-term agreement with a Renewable Energy Service Company (RESCO) is known as an "OPEX model" or a "third-party financed model".

Sample parameters for evaluating an on-site rooftop solar system

No	Parameter	Example value
1	**On-site solar lease discount to utility rate**	5%
2	**Solar PV system production**	1,400 kWh/kWp installed/year
3	**Average tariff during solar hours**	USD 0.09/kWh
4	**Installation costs**	included
5	**Operation and maintenance expenses**	included
6	**Lease contract**	20 years
7	**Installed capacity**	1,000 kWp
8	**On-site system operation profile**	Seven days/week, assuming 90% power used on-site while the rest is fed to the grid with FiT payment received by the solar vendor

Note: These values are for illustrative purposes only and do not represent market data.

Sample business case calculation example for OPEX model

Annual cost-savings from on-site consumption:

- = annual system generation x utility rate discount
- = 90% x 1,000 kWp x 1,400 kWh/kWp x 5% x USD 0.09/kWh
- = USD 5,670/year

The figure above represents savings from the avoided utility costs you would otherwise have paid. It is assumed that you will use 90% of the electricity output (see point 8 in the table above) from your solar PV system at 1,400 KWh per 1,000 KWp installed per year. With an on-site solar lease discount to utility rate of 5% and utility tariff at USD 0.09/kWh, your annual cost-savings from on-site consumption would be USD 5,670 per year.

Total cost-savings from the on-site system throughout its lifetime:

- = annual savings x lifetime
- = USD 5,670/year x 20 years
- = USD 113,400

Assuming the lifetime of your solar PV is 20 years, you could achieve savings of USD 113,000 from your OPEX investment model throughout its lifetime.

It should be noted that the above example is a simple business case estimation.

Useful online tool: Rooftop Solar Financial Model Tool

Clean Energy Investment Accelerator (CEIA) and USAID Clean Pow- Asia's jointly developed Southeast Asia Rooftop Solar Financial Mod- Tool for commercial and industrial energy us-

This resource can be accessed at: https://www.cleanenergyinvest.org/southeastasiafinancialresources

List of abbreviations and acronyms

Abbreviation/Acronym	Description	Abbreviation/Acronym	Description
CAPEX	capital expenditure	**PV**	photovoltaic
kWh	kilowatt-hour	**RE**	renewable energy
kWp	kilowatt-peak	**RESCO**	Renewable Energy Service Company
FiT	feed-in tariff	**USD**	United States dollar
OPEX	operational expenditure		

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

- ☐ Introduction to C&I RE sourcing
- ☐ 101 crash course: how a solar PV system works
- ☐ Assessing suitability for rooftop solar projects (technical 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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