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Different investment models for rooftop solar projects in Cambodia

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Who is this for?

Factory owners in the textile and garment industry.

This note introduces various investment models that factory owners can choose from when implementing a solar system.

More specifically, you will find information about:

- CAPEX vs OPEX investment model
- Decision-tree for selecting the suitable investment model
- In detail: investment models available in your country
- Recommended steps to identify the right solar partner

Value proposition

Selecting the right investment model is a crucial step towards ensuring the viability of your on-site solar PV system. Knowledge of different investment models can support your decision-making when selecting the right model for your factory's budget and plan.

When you invest in a new on-site solar system, you can either self-finance your investment upfront (CAPEX) or make incremental payments to a third party over multiple years (OPEX).

The Capex Model

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

- The system is fully financed, owned and operated by the factory owner.
- The main benefit of this model is that the factory owner has full control over the installation and performance of the system.
- The factory owner is also responsible for operations and maintenance (O&M).

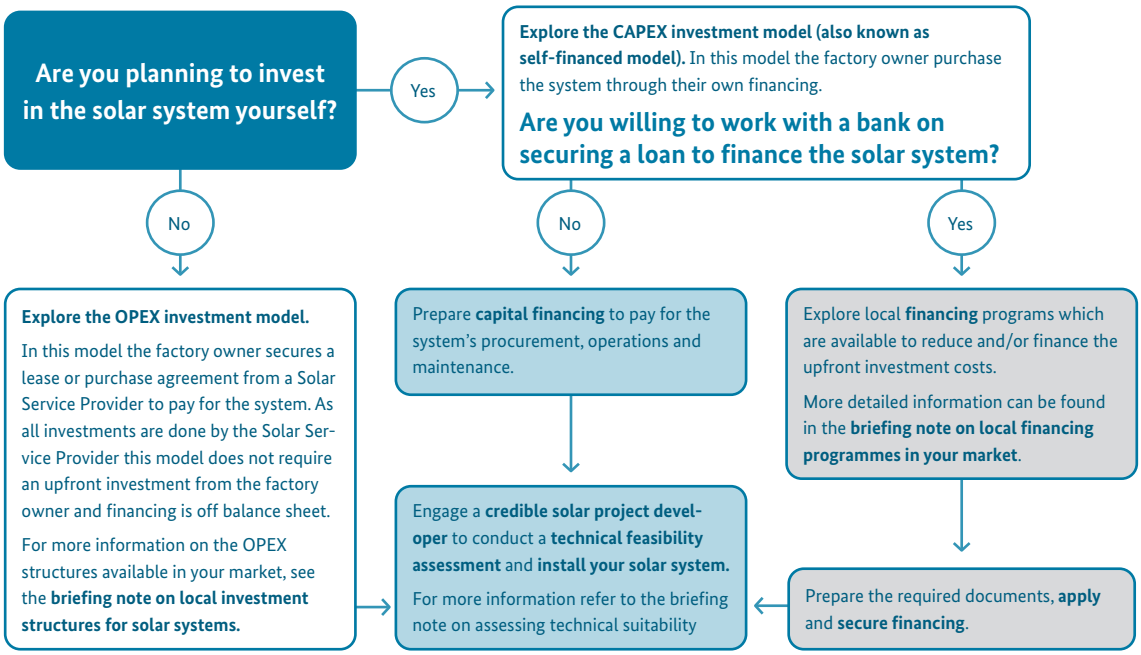
The Opex Model

Financing an on-site solar PV system under a long-term agreement with a Renewable Energy Service Company (RESCO) is known as an **"OPEX model" or a "third-party financed model"**.

- The advantage of the OPEX model is that factory owners do not have to invest in the solar PV system upfront.
- Instead, the factory owners make regular payments to the RESCO for using the solar PV system for the tenure of the contract.
- The owner also has limited to no responsibility for the O&M of the system for the duration of the contract. If it is agreed at the end of the lease contract that the system ownership be transferred to the factory, the responsibility for the O&M is also transferred.
- However, the OPEX model typically presents lower overall cost savings (since part of the revenues are shared with the RESCO) than the CAPEX model.
- Under the OPEX model, RESCOs normally conduct due-diligence on factories and would only offer service to factories with stable business and good financial health.

The OPEX model is the most common structure in Cambodia at present.

The decision-tree below provides a quick assessment of the two models indicating which could be best for you.



To help you run through the decision-tree, here are some tips on topics to explore:

The costs of each model

Contact a trusted solar developer in your area to receive an estimate of the expected cost of a solar system at your factory, for both CAPEX and OPEX models, as a comparison exercise.

Your internal business requirements

- What **internal requirements** does your company have in place for financing arrangements from third parties?
- What **internal approval process** is required for implementing and approving solar system financing and which stakeholders should be involved? Getting early buy-in among your decision-making colleagues is important.

Your budget

Check the **budget availability/allocation** (with the relevant department) for the procurement of the equipment needed for the on-site PV system.

- Does your company's budget allow for equipment to be purchased with capital budgets (money for the acquisition and maintenance of fixed assets such as land, buildings and equipment)?
- If yes, are there any requirements around the "payback period"[1] ?

Check whether the company allows the **use of operational budgets** to implement an on-site system via an equipment lease or power purchase agreement (PPA). A PPA is a contractual agreement between a power producer and a power consumer for the sale and purchase of electricity.

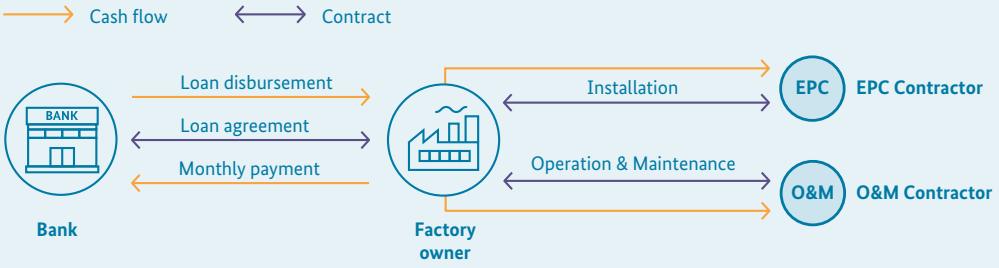
- Would it be able to sign a 10–25-year contract?
- Would a capital loan for self-financing the system be preferable to implementing third-party financing?

1. 'Payback period' refers to the time required until the savings from the solar energy system are higher than the initial system's cost and maintenance expenditure.

CAPEX model in Cambodia explained

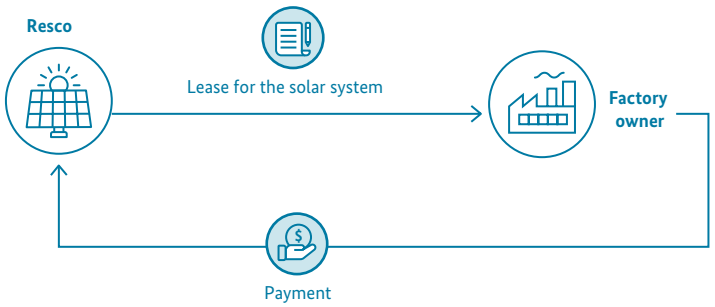
Under the CAPEX model, the entire investment for the rooftop solar system comes from the power-user/ factory owner. The factory owner generally hires a solar EPC company to provide turnkey installation of the entire solar power system and hand assets over to the user.

Figure 1



Structure	1. The factory owner owns the solar PV system. 2. The factory owner can apply for financing via a loan from a bank. 3. The installation of the solar system is completed by a trusted EPC contractor, selected through a tender process. 4. The factory owner is responsible for O&M; however, an O&M contractor should be engaged for a fee (typically annual) to ensure high quality.
How do you pay for it?	• You pay for the **(a) capital expenditure** (the solar system parts) and **(b)** for **O&M support.** **a. The PV system (CAPEX costs) will be paid for on a balance-sheet basis and can be financed through a bank.** Loans to cover CAPEX are available, the most common being a mix of commercial loans and equity. **b.** Factory owners can manage the **O&M of the solar system** (if there are qualified staff available) but companies will typically hire an O&M contractor to manage the O&M, usually for **an annual fee.**
Incentives	The factory owner is responsible for taking advantage of the available tax incentives for rooftop solar PV in Cambodia, i.e. a tax exemption on solar panels imported from China. Exporting excess power to the grid via net-metering or a feed-in-tariff is currently **not permitted** in Cambodia. Only in exceptional cases may electricity be injected or sold back to the grid, which requires a PPA with the state utility, Electricité du Cambodge (EDC) and approval from the Electricity Authority of Cambodia (EAC).
Operations and maintenance	**Factory management (or the system owner) is responsible for O&M.** Typically, the EPC contractor offers one and sometimes two years of O&M service free of charge due to the performance guarantee and warranty. After this period, O&M service is charged if requested by the factories. The facility owner must be aware of the scope of O&M that the EPC contractor should deliver and ensure that the EPC contractor fulfils this responsibility. If the facility owner wants to use internal staff to oversee O&M activities, proper capacity-building (i.e. training) must be carried out.

OPEX model in Cambodia explained[2]

Third-party ownership of the generating asset (lease model)	
Under the OPEX model, a RESCO invests, builds and maintains an on-site solar plant. The customer pays for the power generated under a long-term agreement. This choice is best for factory owners who do not have the capital available to install an on-site solar plant, or do not have access to long-term low-cost capital.	
Structure	**Under current regulation[3] (as of May 2020), EDC is the only entity authorised to purchase energy from any electricity generators. Therefore, a solar lease is the only type of OPEX agreement permitted in Cambodia. On-site PPAs with solar service providers are currently prohibited.** The RESCO installs a solar PV system on the roof of the factory. The RESCO is the owner of the system and **leases** it on an operational basis to the factory owner, who then pays regular (typically monthly) fees to the RESCO.
Ownership of system	Under the lease agreement, the factory owner leases the solar PV system from RESCO and employs it to generate electricity while the RESCO still holds the ownership. The lease agreement is structured as an equipment rent fee instead of sales of power. At the end of the agreed lease period, the factory owner may purchase the solar PV system (at fair nominal value), renew the lease contract, or get the system taken back by the RESCO, depending on the agreement. Currently, in Cambodia, RESCOs offers contracts with tenures between 10 and 25 years. **Note:** it is important that the agreement not be structured as sales of power (per unit of electricity consumed) by the RESCO to the factory owner, which would be considered as a PPA type of contract, which is currently not permitted in Cambodia.
Investment	Typically, zero upfront investment cost is required from the factory owner.
Incentives	Under current regulations, an import tax exemption is available for solar panels imported from China.
How to pay for it?	The price is fixed per kWh of expected production. While not banned under current regulation, this contractual agreement is not explicitly permitted, either. The PPA price would be negotiated with the RESCO, but for example could also be related to a % discount from utility price. **There is little price transparency in the current market but in practice, the longer the tenure, the lower the fixed tariff – for instance, USD 0.07/kWh for a 20-year tenure.**
Operations and maintenance	The RESCO is responsible for O&M for the contract's duration thus all project costs should be included in the lease price.

2. As of June 2021 there is no existing regulation on the OPEX model. However, this model is implemented in practice.
3. General Conditions for Connecting Solar Generation Sources to the Electricity Supply System of National Grid or to the Electrical System of a Consumer Connected to the Electricity Supply System of National Grid. Typically referred to as the **Solar Prakas,** this document was issued by the EAC on 26 January 2018.

Finding the right EPC or project developer is crucial

Although the pricing results of the tender are important, factory owners should also consider other qualitative aspects, such as those listed in the table below.

Table: Sample checklist for solar developer/EPC company due diligence

Parameter	Details	Check box
Technical offer	• Check that all system elements are included • Check that all necessary infrastructure works are included • Check that all relevant quality standards have been addressed More information on key system elements and set-ups is available in the "101 Crash Course: How a solar system works".	
Financial offer	**Ensure sound financial offers:** Offers with unusually low prices might indicate an inexperienced provider; ensure proper due diligence on this type of offer. Undertaking a tender process will ensure that different technical and financial offers are received and compared to find the best option.	
Track record/ credibility of the EPC contractor	**Review the company's past experience** • Research **previously developed projects** (number of years of experience and number of projects). The more similar the projects an EPC contractor has carried out in the past, the better the chances are that they can deliver well on this project. • **Check references** from recent clients (call respective facility owners or visit the sites). • **Check the current and historical financials** of the EPC contractor. • If applicable, check **accreditation** from the national/regional/global certification body for solar system equipment. • Due diligence – assess EPC contractor's own due diligence process. Overall, it is important to have a long-standing and good relationship with the proposed contractors.	
O&M services (if included in the scope)	**Ensure that O&M services are agreed and delivered.** The scope of O&M services should typically include online monitoring of the solar system, together with periodic site inspections to check for faults, clean the system and carry out repairs/replacements in case of any breakdown or malfunction of the solar system. To read more about best practices for O&M refer to: National Renewable Energy Laboratory's report, "Best Practices for Operation and Maintenance of Photovoltaics," linked here.	
Insurance policy and warranties	Check **insurance/warranties coverage and duration.**	

Note: This table is not exhaustive and should be used for information purposes only

List of abbreviations and acronyms

Abbreviation/Acronym	Description	Abbreviation/Acronym	Description
CAPEX	Capital expenditure	**OPEX**	Operating expenditure
EAC	Electricity Authority of Cambodia	**RESCO**	Renewable Energy Service Company
EPC	Engineering, procurement and construction	**PPA**	Power purchase agreement
EDC	Electricité du Cambodge	**PV**	Photovoltaic
kWh	Kilowatt hour	**USD**	US dollar
O&M	Operation and maintenance	**Wp**	Watt peak

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

Topics include:

- ☐ 101 Crash Course: How a solar system works
- ☐ Assessing suitability for rooftop solar projects (technical perspective)
- ☐ Assessing the business case for on-site solar (financial perspective)
- ☐ Solar regulations and policy framework
- ☐ 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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