

Renewable Electricity Options for Industrial Facilities in Vietnam: Solar PV

Climate Action Training for Textile Suppliers

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The Clean Energy Investment Accelerator

(CEIA) is an innovative public-private partnership focusing on improving the pathways for corporate RE procurement in emerging markets

The CEIA is co-led by:

- **World Resources Institute (WRI)**
- **Allotrope Partners**
- **National Renewable Energy Laboratory (NREL)**

CEIA is currently working across emerging markets, including **Vietnam**, the Philippines, Indonesia, Mexico, and Colombia.



Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

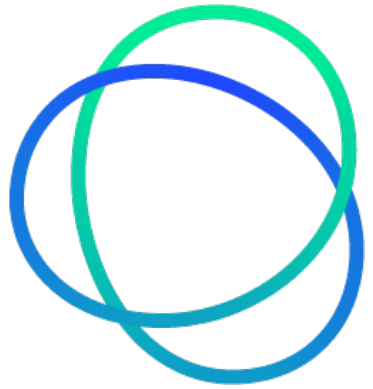


Our Approach and Activities

- **Ongoing dialogue and engagement** with market participants, i.e. REBA Vietnam
- **Policy and regulatory design**, i.e. DPPA and rooftop solar PV
- **Direct technical and transaction support to corporate buyers** through RE project feasibility assessments and procurement/RFP assistance
- **Technical assistance** to other market stakeholders, i.e. banks, government

Mission: improve and increase opportunities for corporate procurement and usage of clean energy in Vietnam.

Renewable Energy Buyers Alliance Vietnam Working Group



REBA

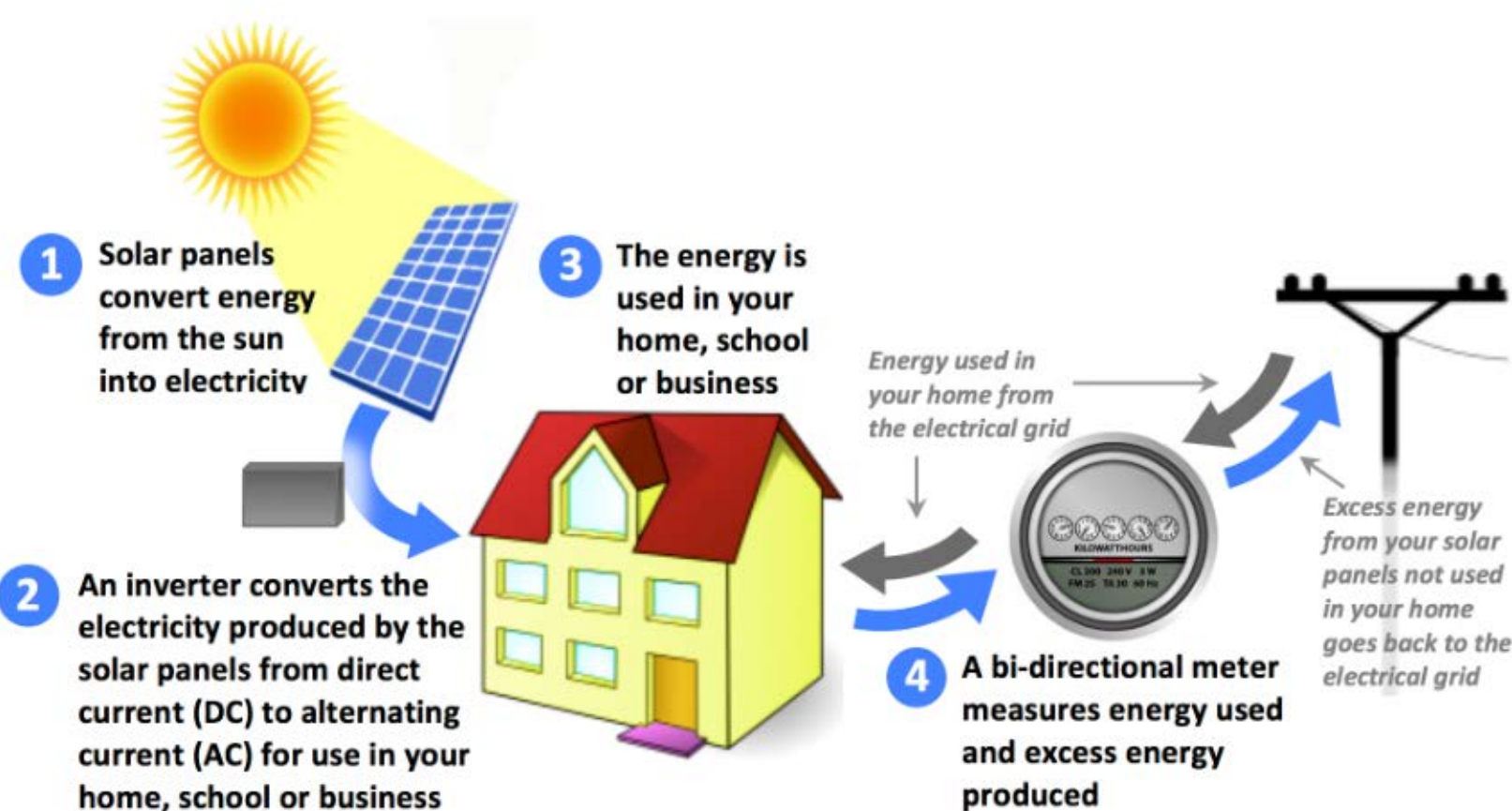
- Reoccurring meeting in HCMC
- Focus on corporate RE buyers
- Engage with RE solutions providers and gov't



What is Solar Photovoltaic (PV) Power?

Why is it Interesting to Commercial & Industrial Facilities?

Solar Photovoltaic (PV) Electricity



- Solar electricity is produced during daylight hours – with most output between 10:00am and 3:00pm
- Electricity is still generated on cloudy and rainy days – just not as much as a clear, sunny day.
- Solar electricity is a supplement to your EVN supply, not a full replacement (covers approximately 10-70%)
- Solar electricity is used for all electricity consuming “loads” in a building or factory; you don’t need to choose where it is directed.

Strong Momentum in Southeast Asia



Coca-Cola Beverages to tap into solar energy

THE NATION

Sharp to build 27MW of rooftop solar systems on Big C stores



Facebook signs 20-year deal to supply Singapore operations with clean energy



Microsoft is buying solar energy from Singapore rooftops

And also in Vietnam ...



Royal Spirit Group, Long Hau, 165 kWp (2016)



**Sao Mai Group, Dong Thap
1,0160 kWp (2017)**



**ABB Bac Ninh Factory
75 kWp (2018)**



**Emergent Cold Storage,
Bac Ninh, 308 kWp (2016)**



**Big C Supermarket, Binh Duong
212 kWp (2012)**



**Tan Cảng Sóng Than Logistics
500 kWp (2017)**

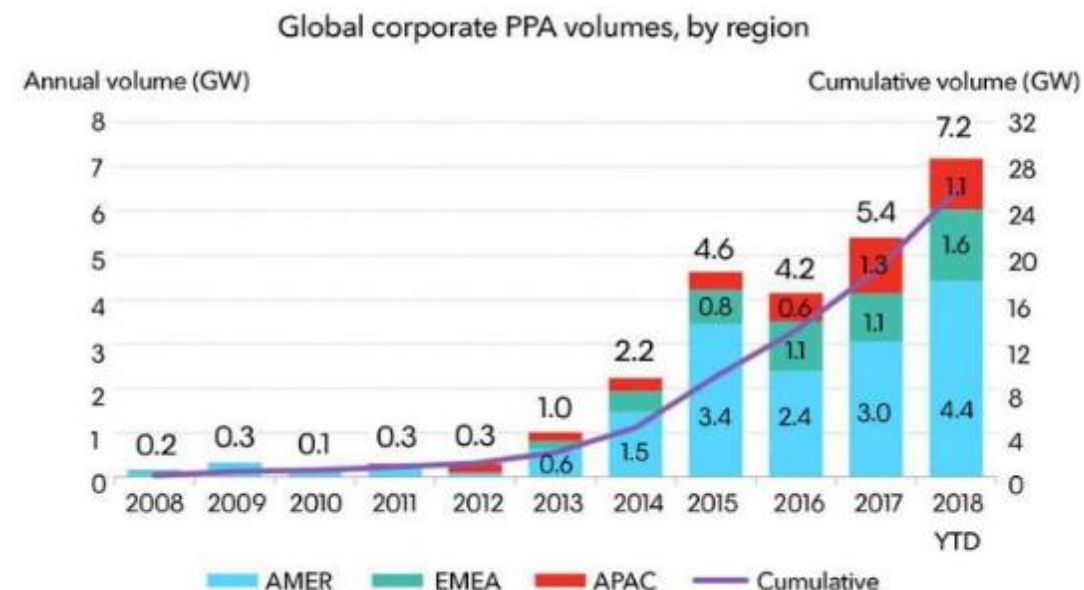
Why Are Companies Turning to RE?

1. Environmental and sustainability commitments
2. Social responsibility and corporate reputation
3. Vietnam's RE targets, i.e. 7% by 2020; 10%+ by 2030
 - o Estimated: 60GW total capacity by 2020; 129.5GW by 2030
4. Attractive project economics and financial implications

Why Are Companies Turning to RE?

I. Sustainability agendas and commitments

- 154 global companies committed to 100% renewable electricity (RE100)
- 497 companies taking science-based climate action (Science-Based Targets)

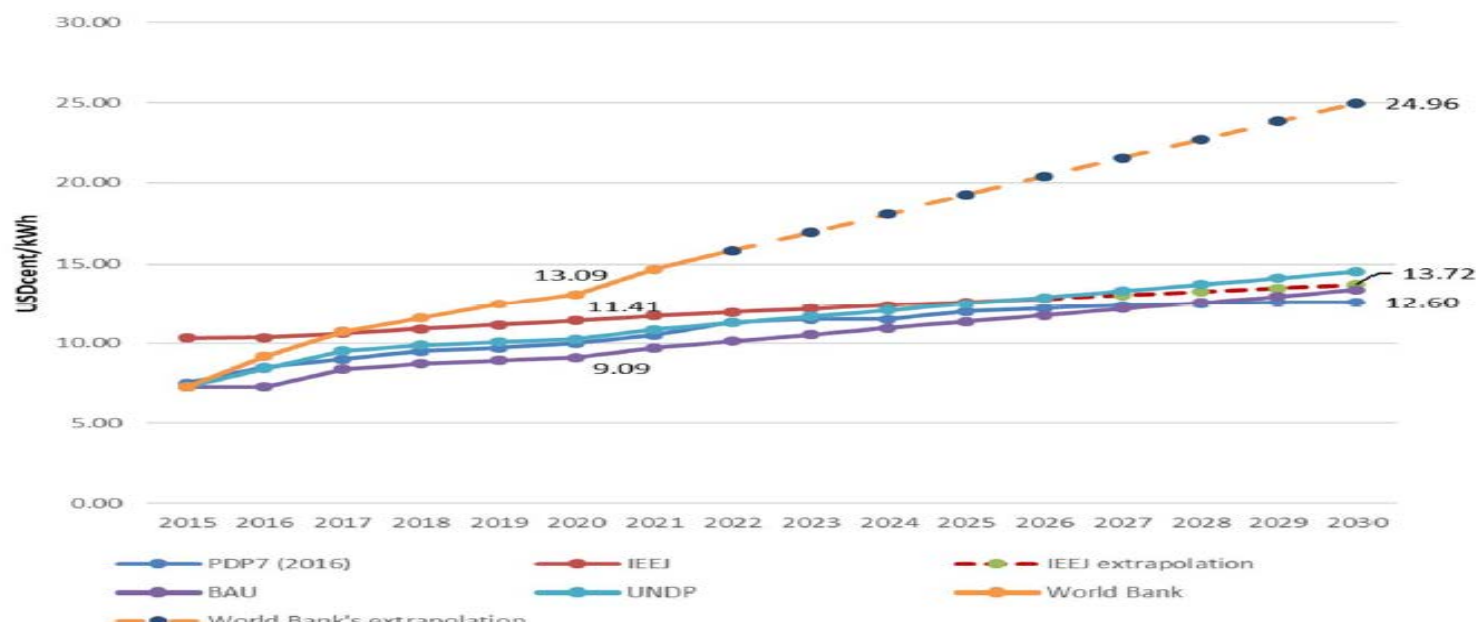


Source: Bloomberg NEF. Note: Data is through July 2018. Onsite PPAs not included. APAC number is an estimate. Pre-market reform Mexico PPAs are not included. These figures are subject to change and may be updated as more information is made available.

Why Are Companies Turning to RE?

2. RE-based electricity saves you money

- “Meets or beats” current EVN electricity prices
- Long-term price predictability and OPEX budgeting
- Hedge against widely-predicted power price increases for Vietnam

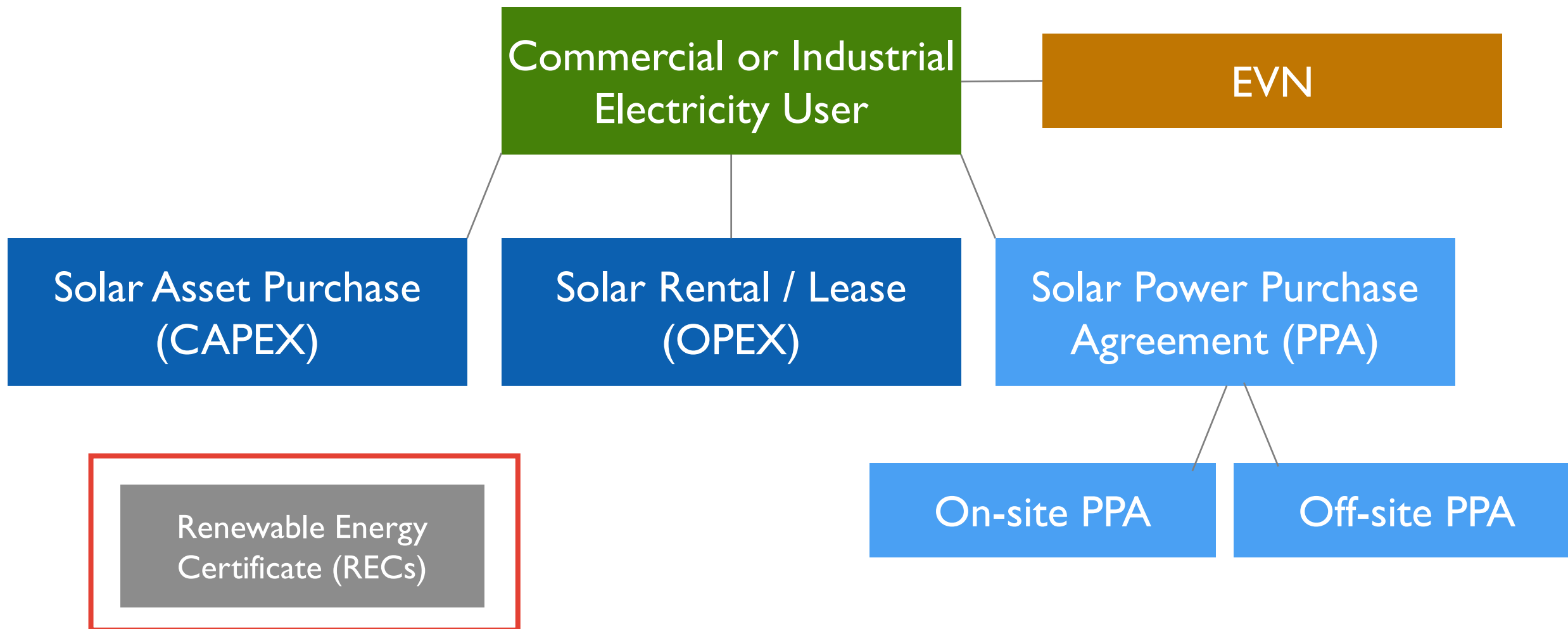


Corporate Options for Sourcing RE-Based Electricity in Vietnam

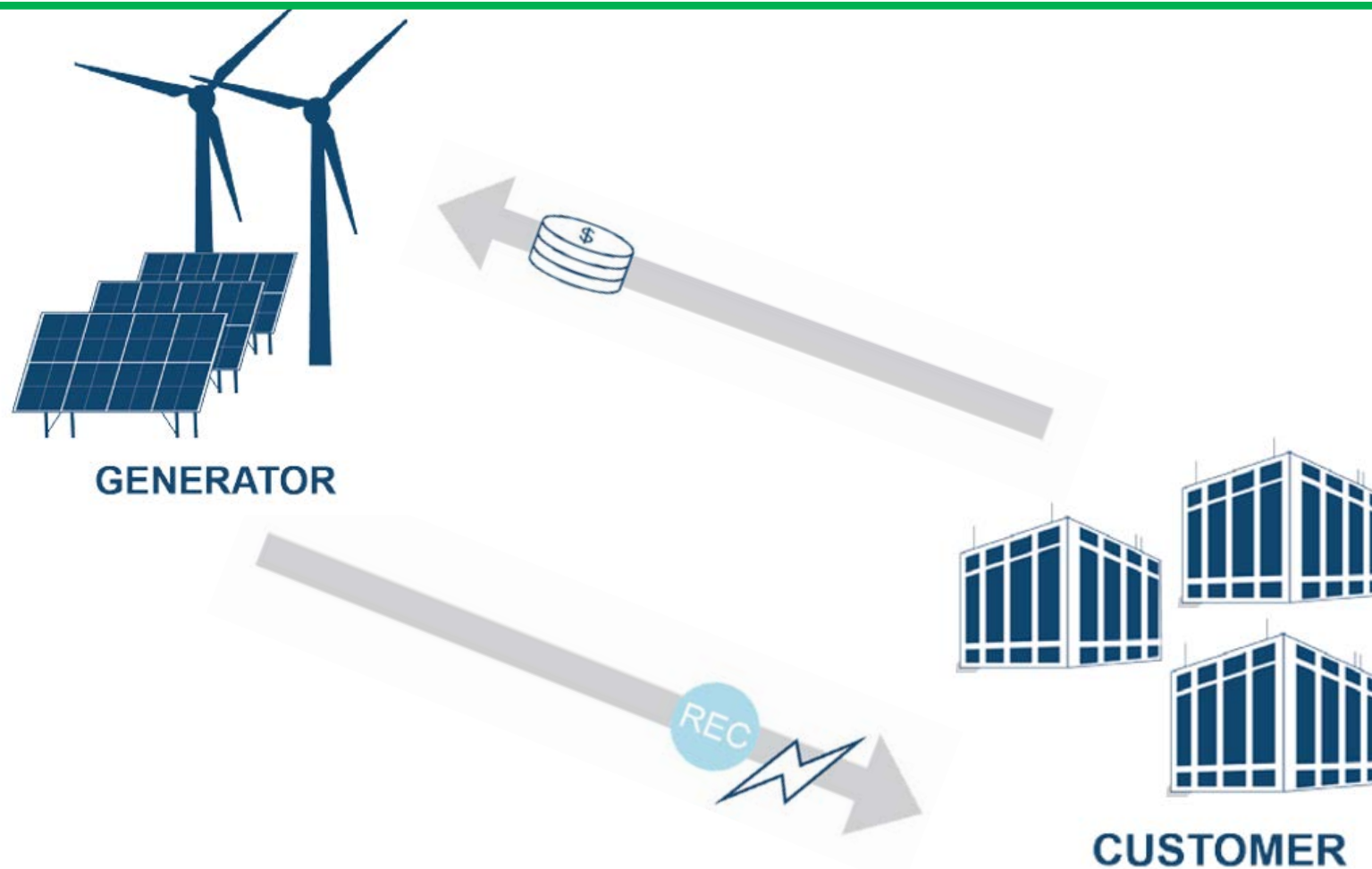
As a commercial or industrial electricity user in Vietnam, are you aware that RE-based electricity:

- Can be procured with **little or no down-payment or capital investment?**
- Can, in many cases, “**meet or beat**” your **EVN rates?**
- In the near future, can be supplied to your facility from a **wind or solar PV plant in a different location?**

Solar PV Options for Vietnam Companies



On-Site Solar PV (Purchase, Lease, PPA)



Source: O'Shaughnessy et al. 2017 (NREL)

Considerations for On-Site Solar PV

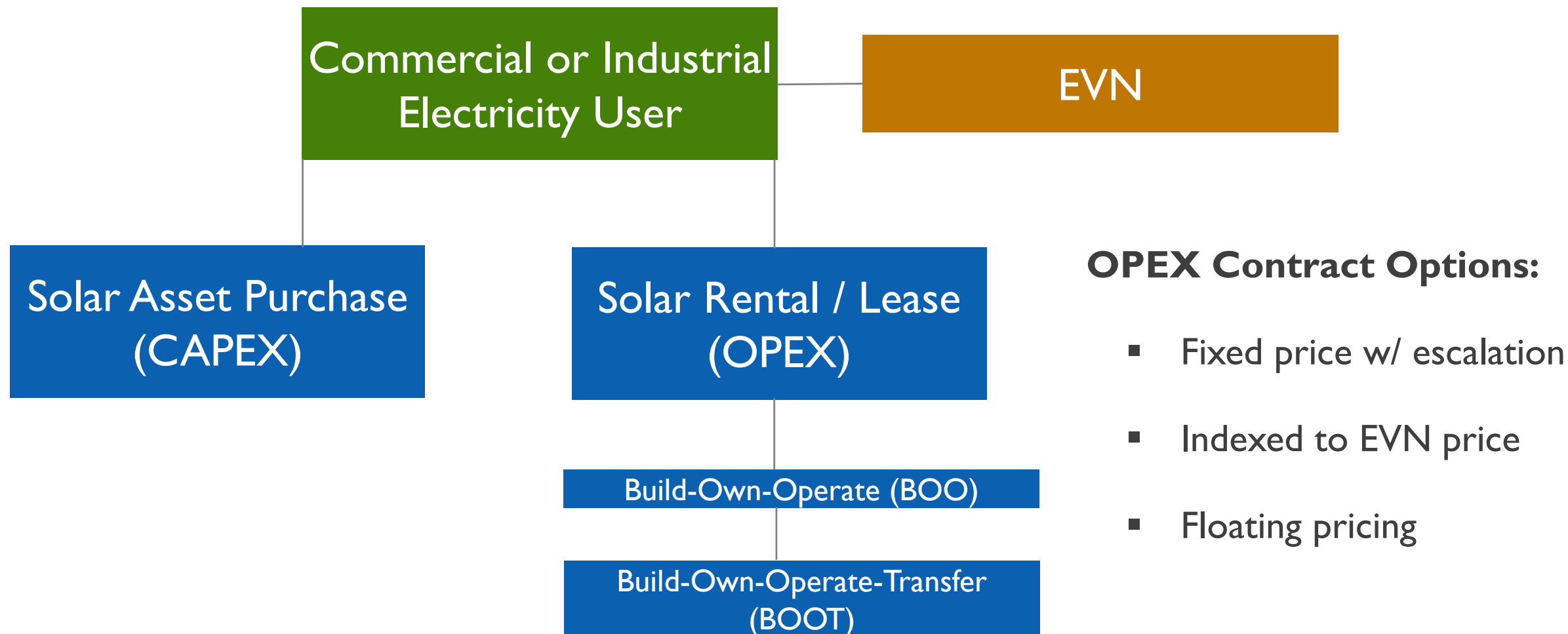
Facility owners and managers have their own preferences:

- Preference for onsite vs. offsite
- Leased versus owned facilities
- Financing considerations
- Project size
- Contract length
- Investment and business plan horizons
- Energy demand and supply requirements

Requirements for all cases:

- Long-term view for building/property i.e. 10+ years
- Electricity consumption on a regular basis
- Structurally sound roof, i.e. weight load of 10-15 kg per sqm

Considering CAPEX vs. OPEX models



Considering CAPEX vs. OPEX models

Solar Contract Aspect	CAPEX Purchase	Rental, Lease or PPA	Notes
Financing from solar company		✓	
On factory's balance sheet	✓		Corporate bank loan primary option in Vietnam (currently)
Operation & Maintenance	✓	✓	
Equipment Warranties	✓	✓	
Performance Guarantees	✓	✓	Negotiated with solar company
Insurance Included		✓	
Potential for Year 1 cash-flow positive		✓	If no down-payment, immediate saving generated

Solar Net-Metering: Overview

A legal mechanism to promote investment into rooftop solar PV

- 9.35 US cents/kWh remunerated for excess solar electricity produced
- Excess solar power transferred from one billing period to the next (“payment cycle”). Remuneration overall surplus can be annually or at end of PPA lifetime.
- Bi-directional metering supplied by EVN / provincial power company
- Power company is responsible for meter readings, calculation excess solar electricity and revenues of solar asset owner
- Must be operating before June 30, 2019

Solar Net-Metering: Guidelines

For rooftop solar systems smaller than 1 MW:

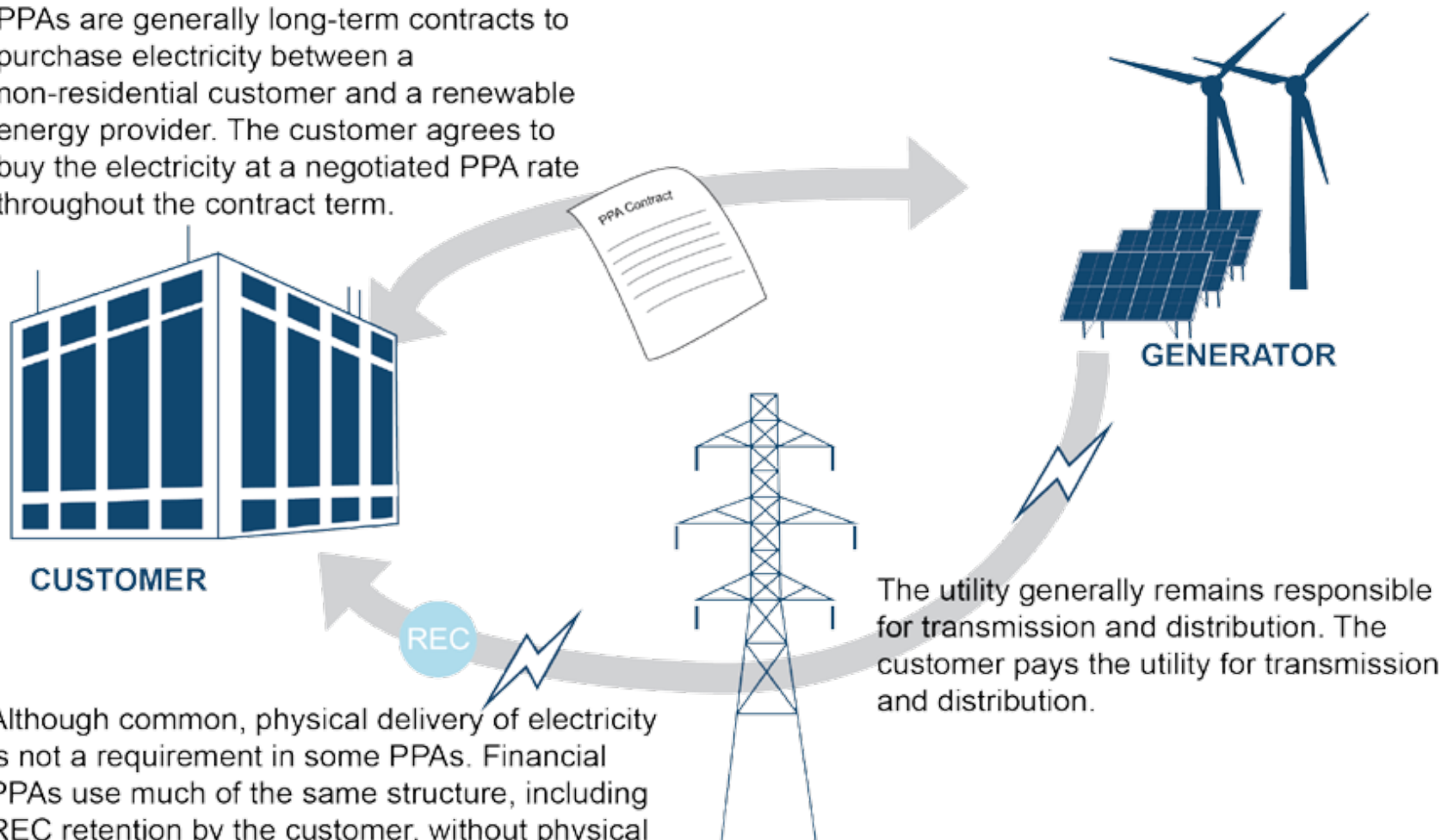
- Registration with provincial / municipal power company
(planned capacity, technical specifications of PV modules and inverters)

For rooftop solar systems larger than 1 MW:

- Projects must be included in Solar Power Development Plan and PDP
- Projects must obtain Electricity Operation License
(regulated in MOIT Circular 12/2017/TT-BCT as of July 31st, 2017)

Direct Power Purchase Agreement (DPPA) (Off-site)

PPAs are generally long-term contracts to purchase electricity between a non-residential customer and a renewable energy provider. The customer agrees to buy the electricity at a negotiated PPA rate throughout the contract term.



Although common, physical delivery of electricity is not a requirement in some PPAs. Financial PPAs use much of the same structure, including REC retention by the customer, without physical electricity delivery.

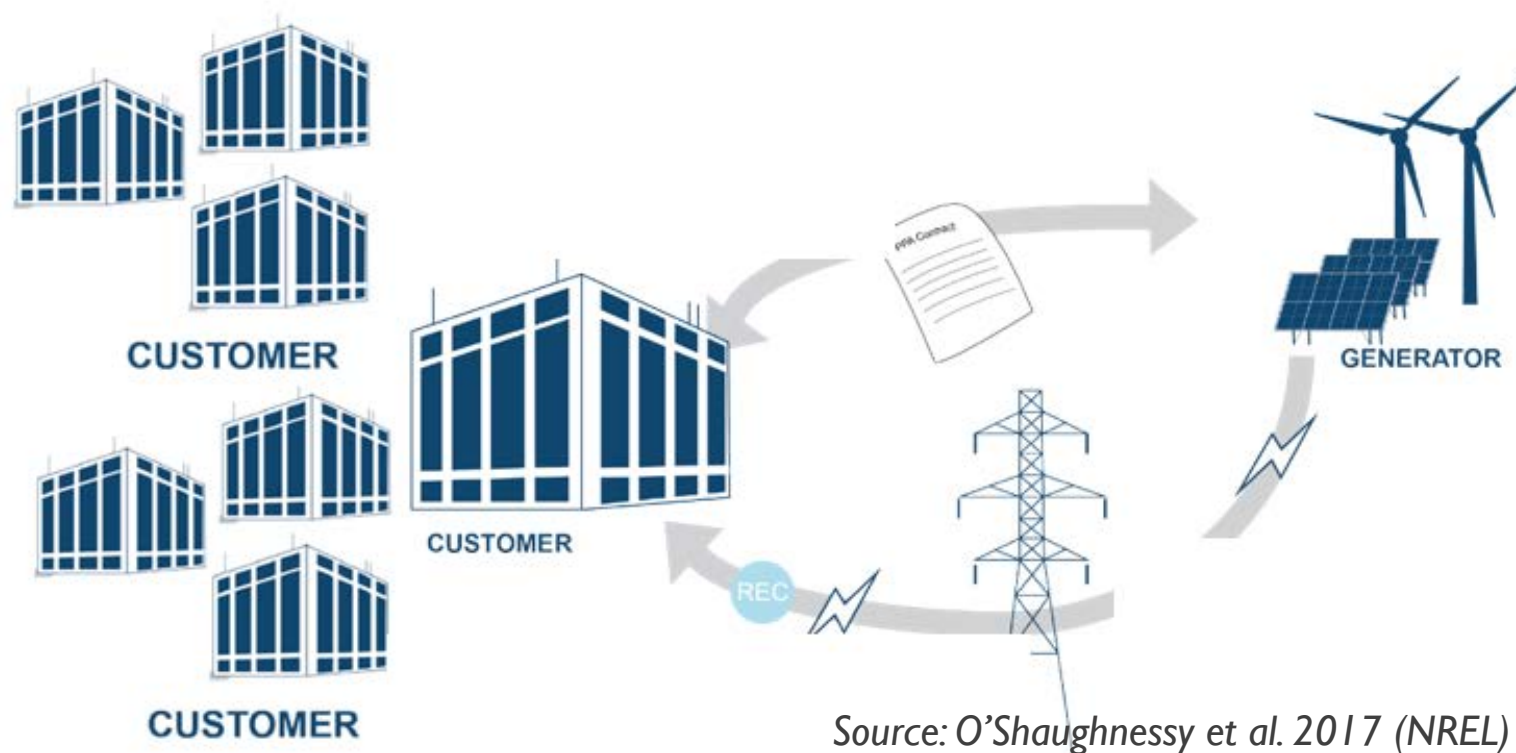
Source: O'Shaughnessy et al. 2017 (NREL)

Commercial & Industrial Buyer Aggregation

Advantages of aggregation:

- Larger projects = lower equipment prices
- Diversified risk = cheaper financing
- More contractual flexibility for buyers and sellers

Result: lower price of electricity



Source: O'Shaughnessy et al. 2017 (NREL)

Challenges for Corporate Use of Solar PV

- Payback of turnkey CAPEX purchase doesn't align with company's investment horizons— i.e. payback longer than 5 years
- Operational plans of company doesn't align with rooftop solar needs (10+ years in same building)
- Loan options from local banks for solar assets remains limited
- Current version of Solar Net-Metering regulation needs improvement; currently limited to “self-consumption” applications
 - Easier permitting for 1MW+ projects; aiming for Net-Metering applicable up to 3MW
 - Assurance of effective tax and accounting implementation by EVN and MOF
- Lack of access to up-to-date and accurate information about prices and procurement models

Next Steps: Points to Consider

- First steps: trainings, awareness-building and information gathering
- Pre-feasibility study at your facility to understand technical and economic opportunities
- Consider the array of support programs to facilitate your decision-making
 - ✓ Renewable Energy Buyers Alliance Working Group (REBA Vietnam)
 - ✓ Clean Energy Investment Accelerator pilot project assistance
 - ✓ Direct Power Purchase Agreement (DPPA) Program – USAID and ERAV
 - ✓ GIZ's PDP program

Questions for You

- As a building/factory manager or owner, what is your biggest concern about rooftop solar PV?
- Do you think rooftop solar PV is a good option for your factory? Why? Or Why not?
- What information or tools would help you better understand and evaluate your options for rooftop solar PV?

THANK YOU

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