# Solar Market Brief: Cambodia

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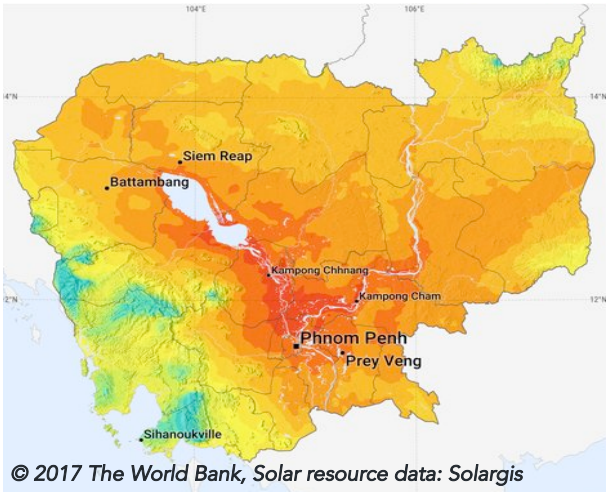


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|---|---|
| **Population (2017)** | 16.0 million |
| **GDP (2016)** | US$ 18 billion |
| **GDP per capita (2016)** | US$ 1,078 |
| **GDP growth rate (2007 - 2016)** | 6.8 % |
| **Inflation rate (2007 – 2016)** | 5.5 % |
| **Sovereign Rating (Moody´s, 2017)** | B2 (Stable) |
| **FDI inflow (2016)** | US$ 2.3 billion |
| **Ease of Doing Business Rank (2017)** | 135 of 190 |

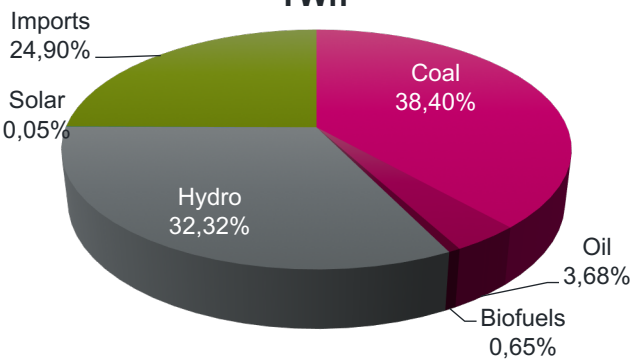
## Electricity Market Profile

| | |
|---|---|
| **Gross Generation (2015)** | 6.19 TWh |
| **Installed Capacity (2014)** | 1.85 GW |
| **Installed Capacity of Renewable Sources (2014)** | Hydro: 929 MW<br>Biomass: 23 MW |
| **Officially planned installed capacity of Solar PV** | 30-50 MW by 2020; 325 MW planned in total |

## Country Facts

- Constitutional monarchy in Southeast Asia
- Agricultural society, 85 % of population living in rural areas
- One of the world‘s fastest growing economies

## Electricity Generation 2015: 6.19 TWh




## Key Electricity Market Facts

- Coal and hydro based energy generation
- Dependency on electricity imports mainly from Vietnam and Thailand
- Challenges regarding power supply during dry season due to low water storage levels
- Rapidly growing power sector, electricity demand has experienced annual growth rates of 18% (2011-2015)
- National Power Development Plan: Investments mainly in coal and hydro power, but also solar power (100 MW planned by government)

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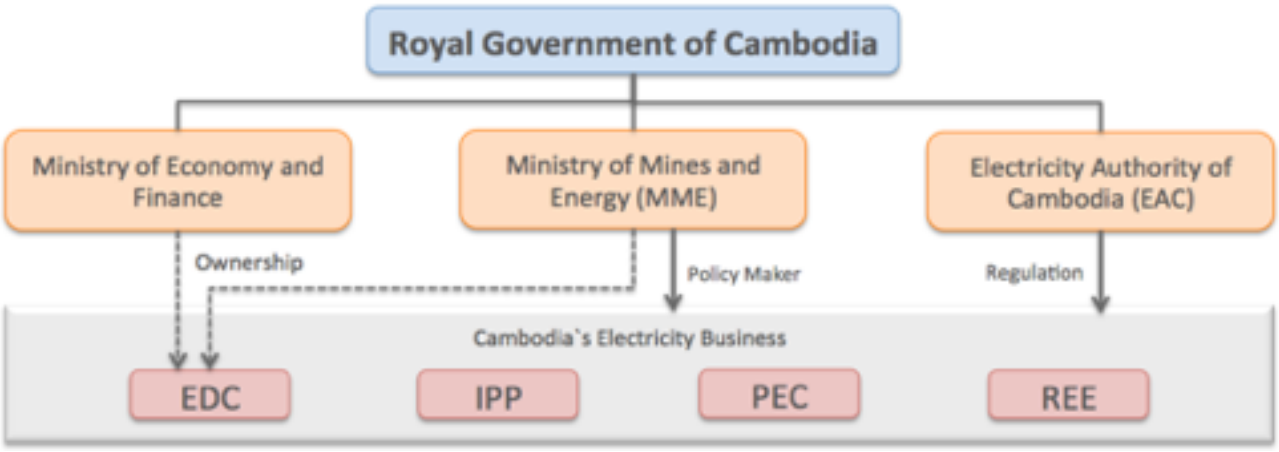
## Regulatory framework

- As the primary policy-making and planning entity for the electric industry, the Ministry of Mines and Energy (MME) is responsible for creating and operating the electrical power infrastructure.
- Electricity distribution and sales in urban areas are dominated by the state-owned utility Electricité du Cambodge (EDC), which is owned by MME and the Ministry of Economy and Finance.
- Rural distribution is mainly provided by Provincial Electricity Companies (PEC) and Rural Electricity Enterprises (REE)
- Electricity generation is dominated by independent power producers (IPP) in the hydro and coal sector with long-term power purchase agreements (PPA) with EDC
- The Electricity Authority of Cambodia (EAC) is responsible for managing and administering the provision of electric power. On January 26, 2018, the EAC issued a set of regulations to clarify the general conditions for installing and operating solar photovoltaic (PV) systems:
- Medium voltage consumers (380 V – 22,000 V) and high voltage consumers (> 22,000 V) may consume electricity generated from their installed solar PV and also be synchronised with the national grid.
- EDC must first evaluate whether the proposed solar project can be connected to the national grid. If EDC permits, the permission so granted is valid for one year.
- All electricity generated from the solar PV systems injected into the national grid must be sold to EDC under a power purchase agreement (PPA) approved by the EAC.
- All solar PV projects must be developed in accordance with the National Plan. A project which has not been included in the National Plan must first be approved by the Ministry of Mines and Energy and EDC before electricity generated by these projects may be connected to the national grid.



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**Case Study on a 10 MW pilot solar project in Bavet**

- Located near Bavet, Svay Rieng Province, close to Vietnamese border
- 21 hectares, total investment cost 12.5 Mio. US$, in operation since October 2017
- Cambodias first utility-scale PV power plant and first competitively tendered renewable energy IPP project
- Debt Funding of 9.55 Mio. US$ by Asian Development Bank
  - ADB Libor-based loan: 3.6 Mio. US$
  - Concessional loan from Canadian Climate Fund for the Private Sector in Asia (CFPS) under the Clean Energy Financing Partnership Facility (CEFPF): 3.25 Mio. US$
  - B-Loan from commercial banks: 2.7 Mio. US$
- Equity funding by Sunseap Asset Cambodia Co. Ltd (majority owned subsidiary by Singapore based construction firm Sunseap Group, one of the largest sustainable energy providers in Southeast Asia), followed with a 20-year PPA with EDC under a public-private partnership (PPP) arrangement.
- Tariff offer by Sunseap: 0.091 US$/kWh (below EDC's average cost of supply, which was 0.095 US$/kWh in 2015)
- Clean Energy production for ¼ of Bavet City's energy demand

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## Planned solar park projects in Cambodia

### 225 MW solar power program by GPP

- 3 solar parks to be installed in Kampong Speu, Takeo and Kampong Chhnang provinces
- 225 MW total planned capacity (investment cost 400 Mio. US$), first phase 15 MW (10 Mio. USD) at industrial park in Kampong Speu province
- developer Global Purify Power, Phnom Penh-based joint venture by southeast Asian investors (Cambodia, Laos, Thailand)
- Electricity supply directly to industrial and commercial customers based in Kampong Speu, Takeo and Kampong Chhnang provinces (each at least 75 MW) without PPA with EDC (As of now GPP can not sell to EDC because of EDC‘s contracts with hydro and coal power)
- Status April 2018: Construction of first phase (since September 2017)

### 100 MW National Solar Park Program by ADB and EDC

- 100 MW capacity (first phase 30 MW, followed by 70 MW)
- Collaboration of EDC and ADB (after joint solar park project in Bavet)
- ADB’s involvement: provision of concessional funds to help EDC develop solar park infrastructure, conduction of feasibility studies for the project, and organisation of a competitive tender process in order to attract and select the most viable private sector sponsor to serve as IPP with a PPA.
- development of a bankable PPP (Public-Private Partnership) structure for the program, which will act as a template for further PPPs in Cambodia
- Status April 2018: Pre-Feasibility Study (2017) proved project viability in principle
- Suntrace was mandated to conduct detailed feasibility studies, energy yield analysis, technical and financial specifications, resulting in elaborating recommendations for PPP structures.
- Status: ongoing

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## Our view on the market

- Cambodia has approximately 5.8 peak sunlight hours a day and an average solar irradiation of 5.0 kWh/m$^2$ per day, ranking among the world's top solar resources. The largely hydro-based power supply calls for natural hedge with solar PV capacities.
- Together with high electricity rates, unreliable sources of power, and skyrocketing demand for electricity, Cambodia in principle could provide attractive business cases for solar energy.
- The successful completion of Cambodia's first utility-scale solar power project in Bavet City, which was backed by the Asian Development Bank (ADB), and the new regulations forwarded by the EAC in January 2018, provide next level investment opportunities.
- **Investment opportunities and requirements:**

  **On-Grid**: Project development of solar parks PPP schemes with EDC: *a 100 MW solar park funded by ADB is already planned.* → Regulatory framework
  - IPPs are standard practice in the Cambodian power sector (licensing by the EAC necessary), PPP template by ADB may improve further opportunities.
  - Proposed solar projects can be connected to the national grid in accordance with the National Plan (approval by the Ministry of Mines and Energy and EDC necessary).
  - Generated electricity must then be sold to EDC under a PPA approved by the EAC (exemption: GPP solar park, see page 4).

  **Direct Industrial Supply:** (Rooftop) solar park PPAs with industrial consumers who are seeking to reduce high electricity costs: *numerous solar plants are already in use, e.g. Coca-Cola factory in Phnom Penh)* → Regulatory framework
  - Licensing by the EAC necessary

  **Off-Grid:** Electricity supply/panel distribution in rural areas, where customers use solar panels to charge household batteries → Regulatory framework
  - consumers can install solar PV systems for their own consumption, as long as these systems do not require connection and synchronisation with the national grid.
- Room for improvement in the regulatory framework: Establishment of feed-in tariffs, net metering systems, electricity price subventions and VAT and import tax benefits for solar energy equipment.

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**Do you have questions?**
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