



Federal Ministry
for Economic Affairs
and Energy



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Analysis of the Captive PV Market in Ghana

Webinar

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16.06.2021

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für Internationale
Zusammenarbeit (GIZ) GmbH

Content

- ❑ Some Definitions
- ❑ Nature and size of Captive Solar PV Market
- ❑ Market Entry
- ❑ Barriers/Challenges
- ❑ Recommendations

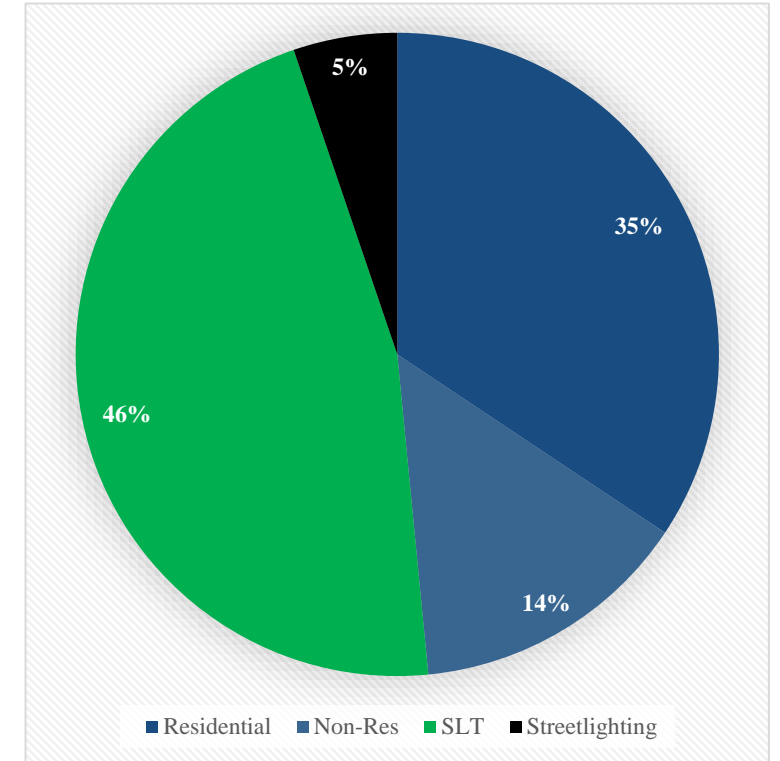
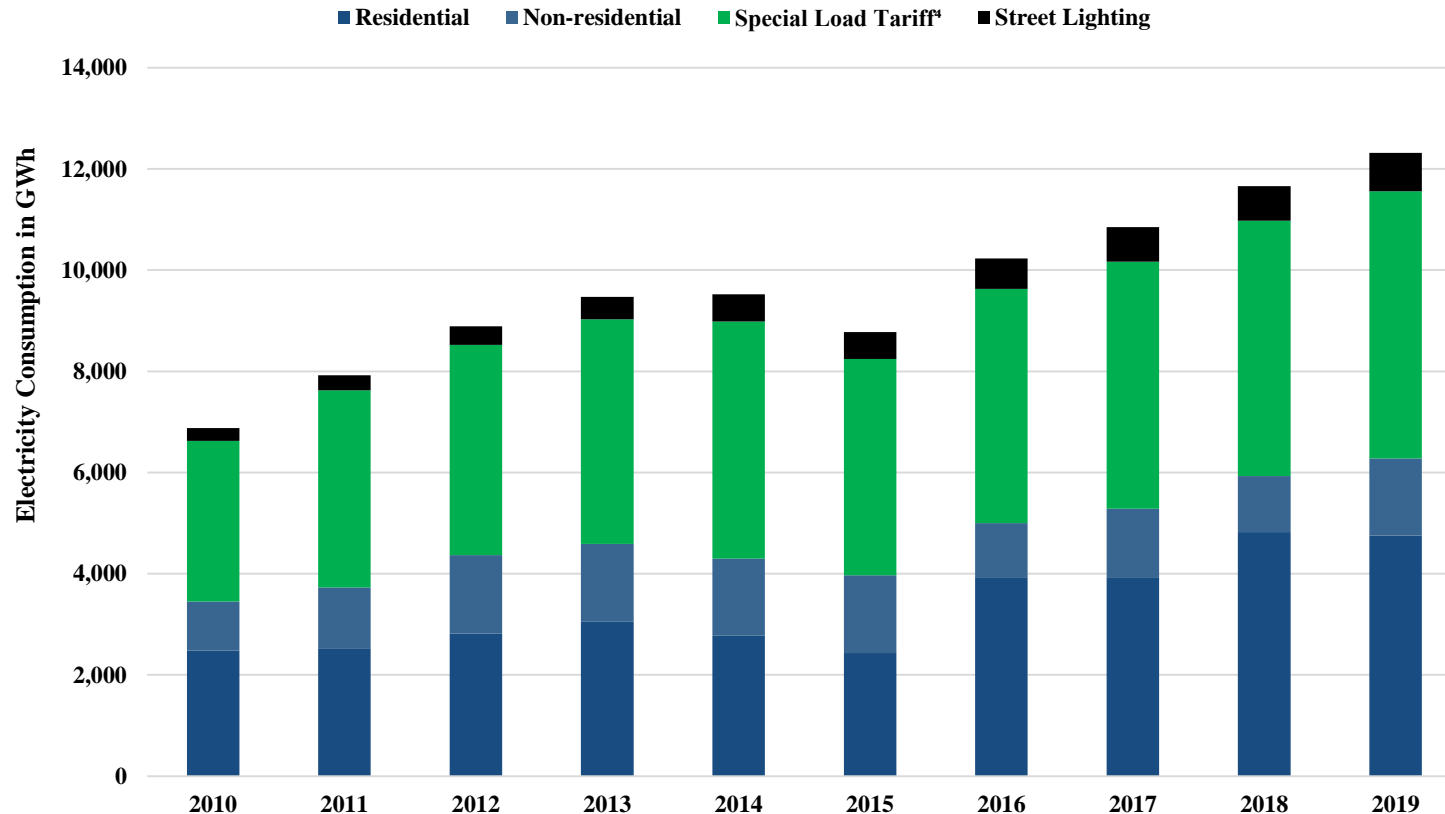
What is Captive Solar PV System?

- ❑ Captive installations refer to the energy generating technologies, which are usually installed by commercial or industrial establishment on their sites.
- ❑ They are deemed “captive” because the electricity produced is generated for the facility’s own use (and sometimes for neighbouring communities’), not sent to a third-party or to the national grid.
- ❑ Captive Generation: means generation of capacity exceeding 1MW and for own use only without a connection to the national grid (Energy Commission, 2018)
- ❑ Captive PV plants, refer to solar energy solutions, that produce energy on site or near-site for owners’ own consumption

Size of Captive PV Market

- ❑ Main market players are electricity consumers in the commercial (non-residential) and industry sectors
- ❑ Non Residential customers characterized by their commercial use of electricity and their request of capacity lower than 100 kVA
- ❑ Industry customers are classified as Special Load Tariff (SLT) customers who use energy mainly for industrial and commercial purposes, with capacities $\geq 100\text{kVA}$. SLT customers are further subdivided into three groups according to their supply voltage:
 - ❑ SLT-LV: supply voltage is 400 Volts
 - ❑ SLT-MV: supply voltage is 11,000 Volts;
 - ❑ SLT-HV: supply voltage is 33,000 Volts.

Electricity Consumption per Customer Category (2010-2019)



SLT Customers have accounted for 46% of electricity consumed over the past 10 years. Total # SLT customers in 2020 was 1,805: NRES=733,550

Average Annual Electricity Consumption by SLT Customers

Customer Category	Total Number of Customers	Monthly Electricity Consumption (kWh)	Annual Electricity Consumption (kWh)	Average Annual Consumption (kWh)	Maximum Demand (kVA)
SLT-LV	1,053	43,390,991	520,691,892	494,484	1,246
SLT-MV	512	122,577,286	1,470,927,432	2,872,905	8,448
SLT-HV	122	61,536,700	738,440,400	6,052,790	47,320.00
TOTAL	1,687	227,504,977	2,730,059,724		

Source: PURC, 2020

AVERAGE LOAD OF INDUSTRIAL AND COMMERCIAL CUSTOMERS ESTIMATED AT 690 MW

Current Installed Captive PV Capacity

No.	NAME OF ESCO/EPC/DEVELOPER	SECTOR			
		Manufacturing (kWp)	Commercial (kWp)	Total (kWp)	Share of Installation (%)
1.	AB Solar Africa/DSE Group	2,181	284.6	2,465.6	17.18
2.	CrossBoundary Energy Ghana	2,494	-	2,494	17.38
3.	Ecoligo	23	441	464	3.23
4.	REDAVIA Solar Power	1,112	406	1,518	10.58
5.	SunPower Innovations	1,000	4,998	5,998	41.79
6.	Berkeley	-	200	200	1.39
7.	Dutch and Co	-	515.2	515.2	3.59
8.	Wilkins Engineering	-	167.99	167.99	1.17
9.	TINO Solutions	470	61	531	3.69
TOTALS		7,280	7,073.79	14,353.79	100.00

Installed Capacity = 14.35 MW compared to potential demand of 690 MW

...Huge Potential Exist

- Many of commercial and industrial consumers ready switched to captive PV motivated/driven by the following:
 - Rapidly/steeply declining cost of PV technology;
 - High electricity tariffs paid by commercial and industrial customers
 - Incentive mechanisms (net-metering) introduced but put on hold due to excess/idle capacity;

Market Entry

- ❑ Any person or entity intending to undertake any commercial activity in the renewable energy industry **MUST** obtain a license from the Energy Commission [Section 6 of the Renewable Energy Act, 2011 (Act 832)]
- ❑ Three different licenses required depending on the activity envisaged
 - ❑ Wholesale Supply and Generation License (WSGL) – WSGL authorises the license holder to produce electricity from renewable energy sources for supply to distribution utilities and bulk customers
 - ❑ Installation and Maintenance License – empowers the licence holder to install and maintain renewable energy systems
 - ❑ Importation License – allows the license holder to import renewable energy products for sale
- ❑ Depending on the nature of the business, one may have to obtain all 3 licenses.

Market Entry: Requirement for WSGL

STAGE 1: ACQUISITION OF PROVISIONAL LICENCE

Required Submissions

- Exhibit WS1 - Scope of Operation
- Exhibit WS2 - Company Registration
- Exhibit WS3 - Principal Officers, Director and Partners
- Exhibit WS4 - Ownership and Corporate Structure
- Exhibit WS5 - Cross-ownership and Ring Fencing
- Exhibit WS6 - Disclosure Liabilities and Investigations
- Exhibit WS7 - Financial Capability and Proposed Financial Plan
- Exhibit WS8 - Statement of Assets
- Exhibit WS9 - Feasibility Report
- Exhibit WS 10 - Business plan
- Exhibit WS 11 - Company History and Existing Activities
- Exhibit WS 12 - Industry Participation
- Exhibit WS 13 - Operational Experience and Expertise
- Exhibit WS 14 - Specific Licence Conditions and Exemptions
- Exhibit WS 15 - Indicative Implementation Plan
- Exhibit WS 16 - Commercially Sensitive Information
- Exhibit WS 17 - Generating Plant Technology and Type of Renewable Energy Resource

STAGE 2: PRIOR TO CONSTRUCTION

A. ACQUISITION OF SITING CLEARANCE (SITING PERMIT)

Required Submissions

- Exhibit WS 18 - Site Analysis
- Exhibit WS 19 - Land Conveyance Agreement
- Exhibit WS 20 - Geological Survey
- Exhibit WS 21 - Health, Safety and Environment Plan
- Exhibit WS 22 - Environmental Disclosure
- Exhibit WS 23 - Site Layout and Right of Way
- Exhibit WS 24 - Water Use Permit (applicable to ONLY hydro power generation)

B. ACQUISITION OF CONSTRUCTION WORK PERMIT (AUTHORISATION TO CONSTRUCT)

Required Submissions

- Exhibit WS 25 - Implementation Agreements
- Exhibit WS 26 - Detailed Implementation Schedule
- Exhibit WS 27 - Plant and Machinery Specifications
- Exhibit WS 28 - Construction Contract
- Exhibit WS 29 - Feed-In-Tariff Approved by the Public Utilities Regulatory Commission
- Exhibit WS 30 - Power Purchase Agreement

STAGE 3: ACQUISITION OF OPERATIONAL LICENCE (AUTHORISATION TO OPERATE)

Required Submissions

- Exhibit WS 31 - Supply Agreement (equipment, parts, etc.)
- Exhibit WS 32 - Operations and Maintenance Plan
- Exhibit WS 33 - Safety and Technical Management Plan
- Exhibit WS 34 - Commissioning Report
- Exhibit WS 35 - Plant Drawing
- Exhibit WS 36 - Receipt of Initial Licence Fee

Market Entry: IML

Box 1: Acquisition of Installation and Maintenance Licence

Required Submissions

Exhibit IM 1 - Company Registration and locational address.

Exhibit IM 2 - Principal Officers, Directors and Partners, their qualifications.

Exhibit IM 3 - Type of renewable energy technology whether solar, wind, minihydro, biogas, etc.

Exhibit IM 4 - Business Plan stating:

- ✓ Scope and nature of operation.
- ✓ Technical and financial feasibility.
- ✓ Environmental and social management plan.

Exhibit IM 5 - Receipt of Initial Licence Fee

Source: Energy Commission, 2012

Market Entry: IL

Box 2: Acquisition of Importation Licence

Required Submissions

Exhibit IL 1 - Company Registration and locational Address.

Exhibit IL 2 - Principal Officers, Directors and Partners, their qualifications.

Exhibit IL 3 - Type of renewable energy technology being imported (solar, wind, mini-hydro, biogas, etc.)

Exhibit IL 4 - Certification of Ghana Standards Board or any other agency approved by the Commission in respect of the proposed product specification.

Exhibit IL 5 - Business Plan stating:

- i. Scope and nature of operation.
- ii. Technical and financial feasibility.
- iii. Environmental and social management plan.

Exhibit IL 6 - Annual returns on the number of the renewable energy systems imported.

Exhibit IL 7 - Receipt of Initial Licence Fee

Source: Energy Commission, 2012

Key Barriers/Challenges

- ❑ Temporary freeze on issuance of WSGL (supply side) and permits for Bulk Customers (demand exceed 500 kVA and monthly consumption exceeds 1 GW for three consecutive months) (demand-side)
- ❑ Suspension of the implementation of the pilot net-metering programme and failure to implement renewable energy purchase obligations
- ❑ Tough local content and participation requirement (e.g. new companies to be registered in Ghana for the purposes of entering the renewable energy market are required to have a minimum of 15% local ownership, increasing to 51% in 10 years' time).
- ❑ Currency risks due to the volatility of the local currency (Cedi) against major currencies.

Recommendations

- ❑ Prospective entrants should explore partnerships/joint ventures with current license holders or bulk customers of electricity
- ❑ New financial instruments that seek to maximize or at least maintain the cost saving potentials of the captive projects should be developed
- ❑ Equipment and components manufacturers can explore the current gap in the supply chain causing delays in projects implementation by developing warehousing and supporting infrastructure to ensure ready availability of modules and balance of systems in Ghana. Also electronic component suppliers should offer strong after-sale support for their equipment to reduce downtime, etc.

