

OFF-GRID SOLAR MARKET RESEARCH FOR TOGO

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Objectives of this study

The Togo Electrification Strategy developed and launched by the Togolese government in June 2018 prioritizes off-grid solutions to achieve **universal access to energy by 2030**.

The **Government of Togo has also launched the CIZO Programme**, which provides **favorable incentives** for private solar home systems companies.

To complement the effort of the Government of Togo in the definition of a new electrification strategy, IFC commissioned this market research to assess the Togolese off-grid energy market.

The main objective of this study is to provide private and public sector actors with an up-to-date overview of trends in the off-grid solar energy sector in Togo

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Off-grid energy uses

Current solution

- ▶ **Battery torches are the current preferred lighting solution in rural areas** (estimated to be used in 78% of all homes). This represents a rapid switch from kerosene lamps (12%), which were the dominant solution in 2011.

Solar products

- ▶ **Penetration of solar products is limited** with an estimated 3.5% of households using solar as a primary lighting source (approximately 35,000 households).
- ▶ However, there has been **rapid growth in the use of off-grid solar products**. In 2011, only 0.1% of the population were using solar as their primary lighting source.
- ▶ **86%** of the products are from the **informal market** and are mostly **component based-systems**. Stakeholders in Togo expressed concerns regarding the low quality of these systems.
- ▶ **Lighting Global quality verified products represent an estimated 14% of the market** (~4,800 units)

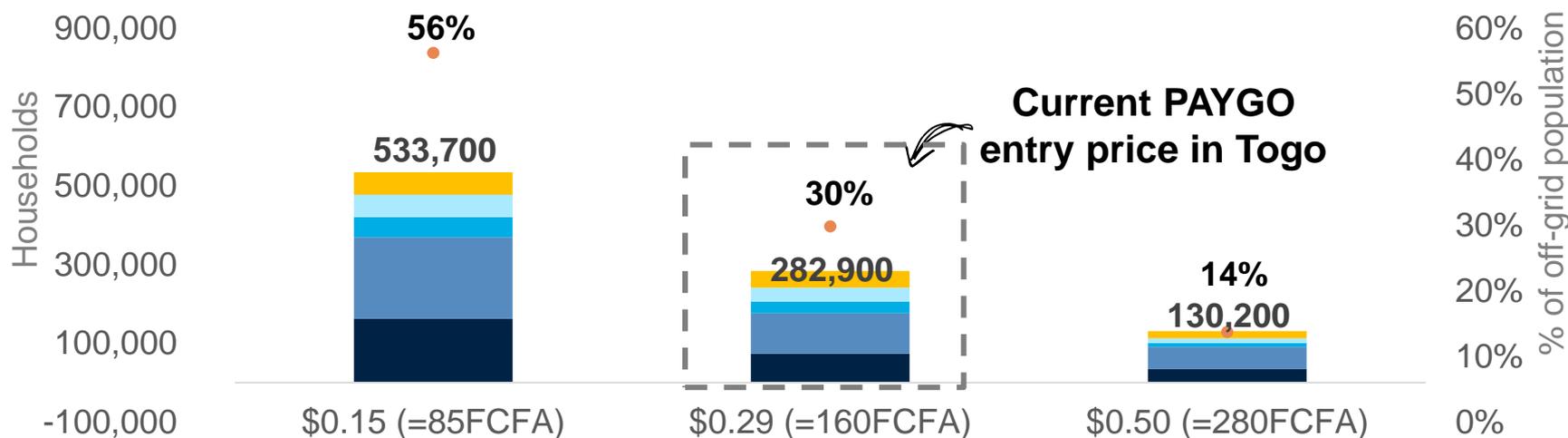
PAYGO solar

- ▶ The Government of Togo (GoT) granted licenses to two companies under the CIZO programme: **BBOXX** and **Soleva**. Each of them have a **sales target of 300,000 solar home systems (SHS) by 2022**. BBOXX has **experienced fast growth** since beginning operations in November 2017.

Potential market

- ▶ An affordability analysis shows that at **160 FCFA/day** (the entry price of BBOXX's solar home product in Togo), the **current potential market is ~280,000 units**. Over **30% of off-grid households** can afford a solar system on instalment at this price.
- ▶ **Reducing** the price to **85 FCFA per day** may increase demand for off-grid solar products, leading to a **potential market of over 500,000 units** (56% of off-grid households).

Potential market for off-grid solar products by per-day price



■ Rural Maritime ■ Plateaux ■ Centrale ■ Kara ■ Savanes ● Off-grid population

- ▶ For the cash sales market, 90% of rural households may be able to afford a small study lantern, whilst 42% can afford a lantern with phone charging capability. See *Market Potential* section of this presentation for the methodology.

Opportunities

- ▶ **Mobile phone ownership is increasing steadily**, standing at **46% of the adult population** in 2018.
- ▶ **Mobile money use is growing fast**, with **21% of adults holding an account** in 2017, compared to only 1% in 2014. Mobile money providers are moving into rural areas, though many villages do not yet have a mobile money agent.
- ▶ **Microfinance institutions (MFIs) have a deep reach into rural areas (43% coverage)** and can support the off-grid solar sector with consumer finance and distribution.
- ▶ **Local banks have started to support PAYGO firms.** Togolese banks are expected to further benefit from initiatives by some development partners including concessional credit lines to off-grid solar firms.
- ▶ **Distribution and delivery logistics of off-grid energy products are relatively easy compared to neighboring countries**, given high population density, road network and small size of the country.
- ▶ **Agricultural cooperatives are a promising channel for solar products** as employees/members are likely to have higher disposable incomes due to revenues from export crops such as cotton and coffee. These cooperatives could also provide access for solar distributors to organized groups.
- ▶ **Several government and development-partner initiatives** are in place to support the off-grid sector.

Challenges

- ▶ **Low ability-to-pay remains a major challenge to the medium-term growth of the solar industry in Togo**, with only 1.9% of rural households able to save for purchases. As demonstrated in the potential market model, 70% of off-grid households cannot afford quality solar products at current prices.
- ▶ **Cheap, low-quality solar products are negatively affecting the Togolese market** by distorting price expectations and increasing consumer mistrust of solar.
- ▶ Most off-grid households are aware of solar, but **there is a lack of understanding on how to use solar products**. For example, people may have the wrong expectations regarding what appliances can be powered by a solar home system.
- ▶ **Lack of working capital** makes it difficult for companies to maintain inventory and supply off-grid solar products in rural areas. Importers and large distributors do not provide payment terms to retailers. Retailers in turn do not provide credit to final customers. However, several development partners (e.g. AfDB, World Bank) are launching new facilities to provide solar home systems distributors with access to capital through local finance institutions. Those facilities are expected to be operational in 2019.

Summary of recommendations

Main public sector recommendations

Affordability – GoT can consider extending VAT and import duty exemptions to high-quality products below 20W, including products sold by existing distributors in Togo. The GoT can also develop a “bottom-of-the-pyramid” access strategy to address the part of the population that cannot afford SHS.

Product quality – GoT can increase enforcement of quality standards through on-the-spot checks at solar distributors, and through consideration of a Pre-Export Verification of Conformity (PVoC) scheme.

Awareness campaign – GoT can launch a national campaign to inform consumers of the benefits of high-quality, verified, solar products. The campaign can also explain how clients should use solar products.

Microfinance and agricultural cooperative engagement – GoT can organise a national forum, inviting MFIs and agricultural cooperatives, to discuss how to leverage their rural networks to increase solar access. The forum can include a ‘matchmaking’ event between solar distributors and MFIs/cooperatives.

Main private sector recommendations

Affordability – Distributors should ensure their product offering is tailored to lower income customers by providing smaller sized, more affordable, systems and longer repayment periods.

Working capital finance – Solar companies can work with Togolese banks to benefit from the forthcoming World Bank (ROGEP) and AFDB programmes that will supply local banks with green credit lines.

Priority markets – Distributors should prioritise the Plateaux and Maritime regions, which contain 62% of the potential market. Savanes has the 3rd largest market for off-grid solar, as electrification levels are low.

MFI and agricultural cooperative engagement – Distributors can establish partnerships with MFIs and cooperatives, who have strong rural reach. Details on these firms can be found later in this presentation.

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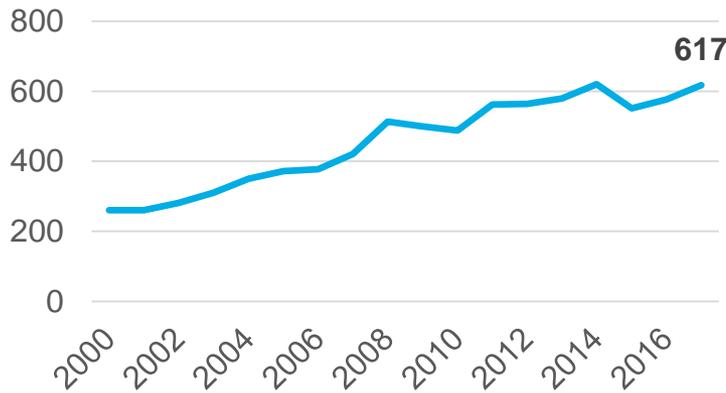
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Despite economic growth in the last 15 years, Togo has one of the world's lowest amount of income per capita

GDP per capita (current USD) [2]

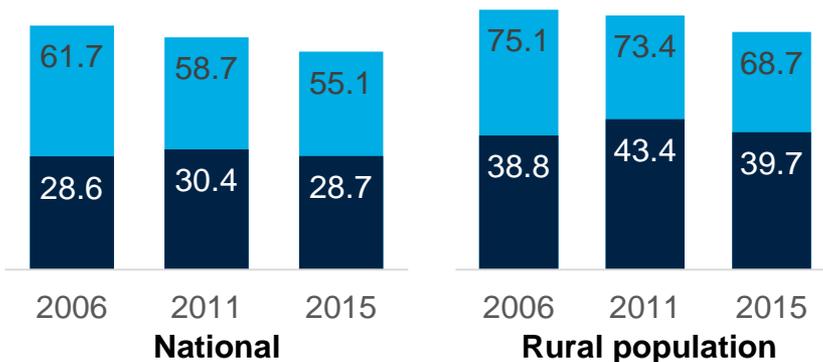


Togo macroeconomic overview

- ▶ Population: 8 million (est. July 2017) [1]
- ▶ The country is divided into 5 regions, of which Maritime is the most populous (over 40% of the population) [1]
- ▶ GDP: \$4.8 billion (149th/188 countries) and per-capita GDP of \$617 (171st/184 countries) [2]
- ▶ Doing business ranking: 156th/190 countries (2018) [3]

Incidence of poverty and extreme poverty (%) [4]

■ Poverty ■ Extreme poverty

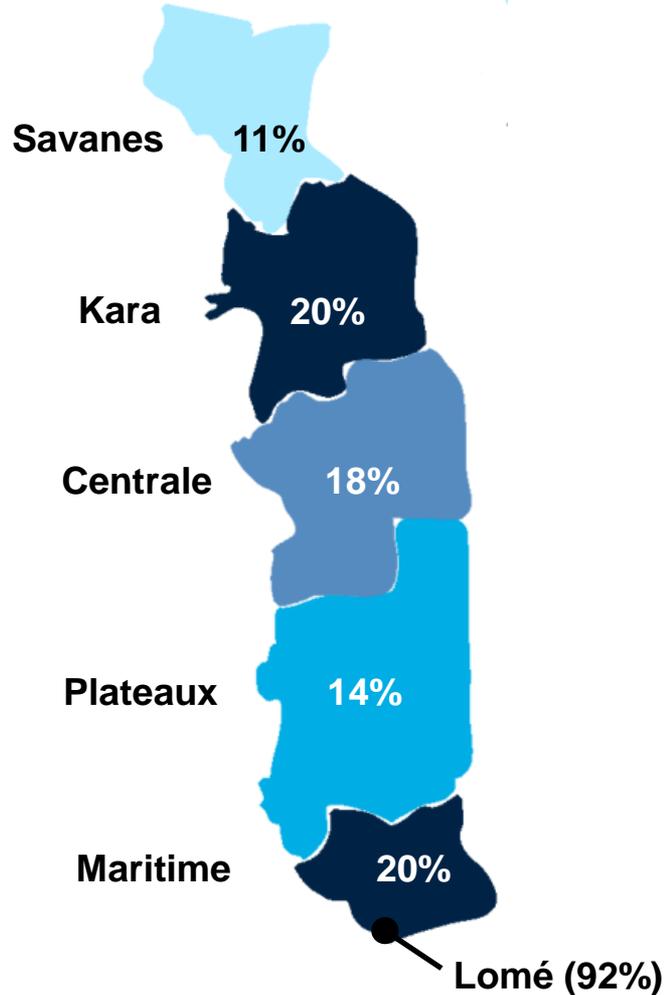


- Main areas identified for improvement include: removing red tape for construction permits and registering property and simplifying the payment of taxes. Electricity access and political stability are also included among investors' concerns.

- ▶ Incidence of poverty has decreased from 62% in 2006 to 55% in 2015. Incidence of extreme poverty has decreased in comparison with 2011 figures [4]

Togo energy sector indicators

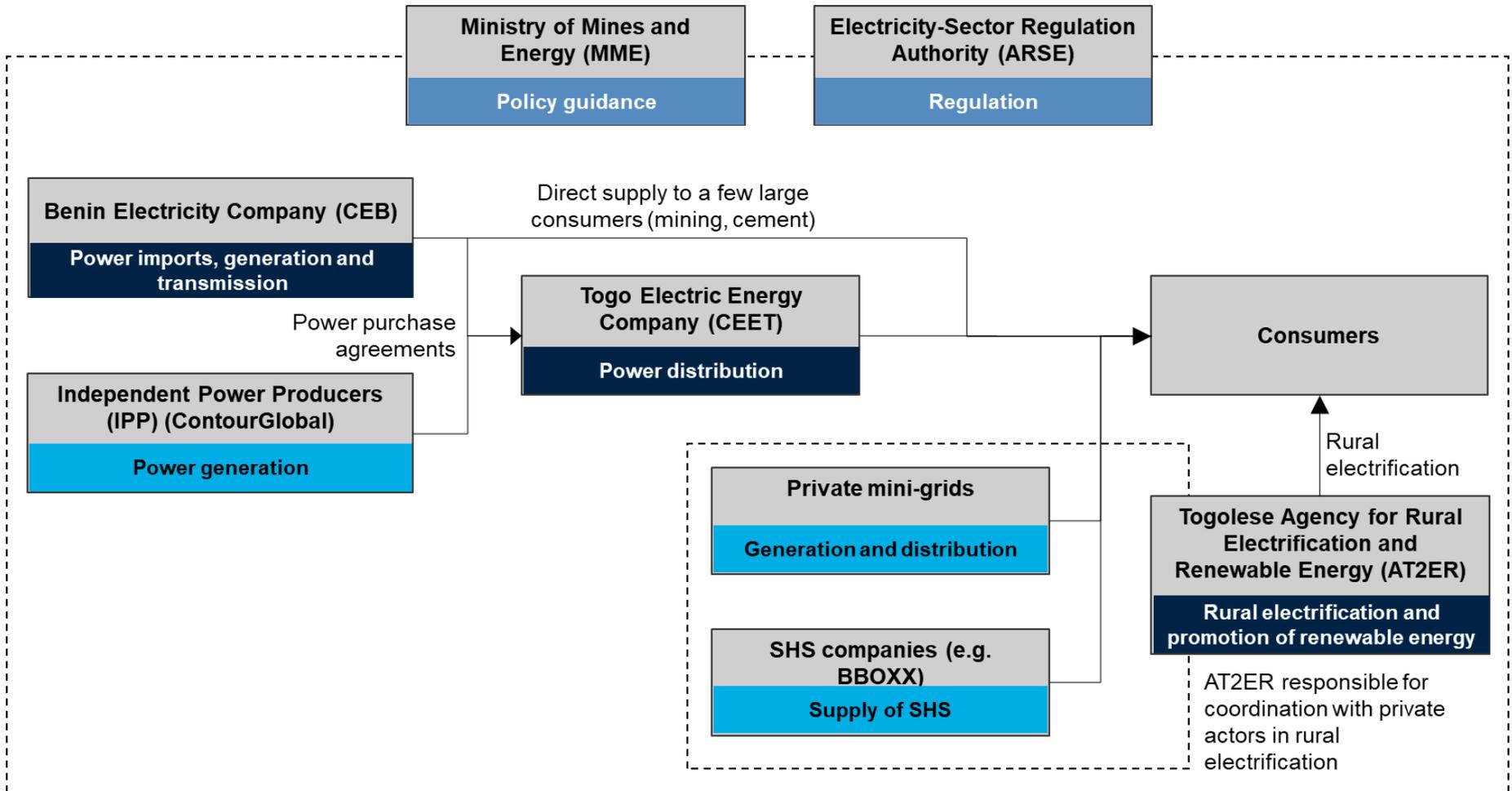
Electricity access rates per region [1]



Key energy sector indicators [2]

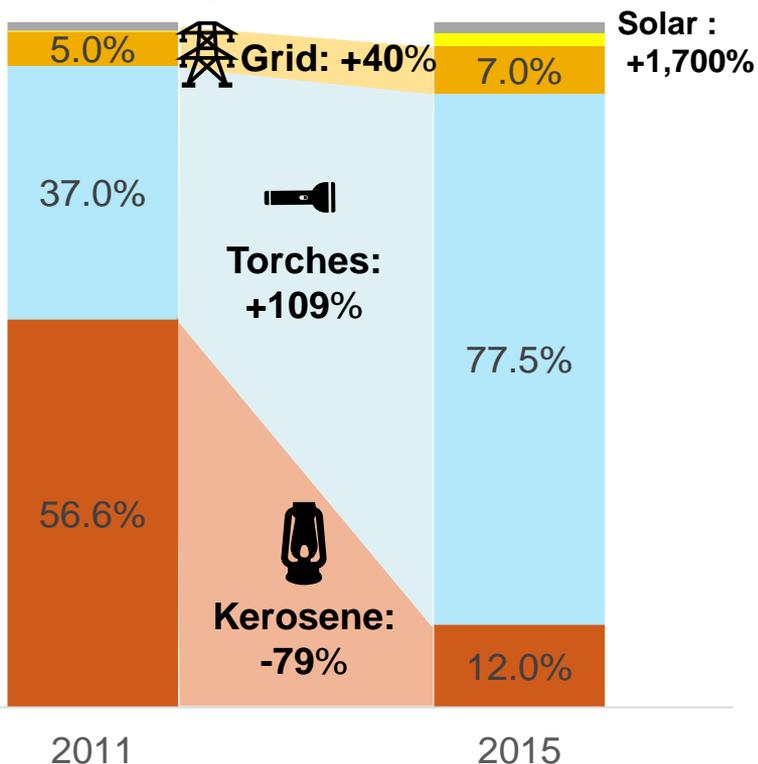
Electricity Access Rates	National: 36% • Urban: 80% • Rural: 7%
Number of grid customers	290,000
Installed capacity (2016)	205 MW of domestic power generation, out of which: • 100 MW Contour Global HFO • 50 MW Diesel • 30 MW Hydro • 25 MW OCGT (CEB) 95 MW imports (Nigeria, Ghana, Cote d'Ivoire)
Average cost of service (2011-2015)	US\$ 0.29 per kWh
Average tariff (2016)	US\$ 0.19 per kWh
CEET Electricity bill collection rate (2016)	90% residential and industrial customers 36% Public sector customers
Level of debt of national utility (2016)	US\$ 29 million (25% of annual revenues)

Togo electricity sector institutional map



Battery torches are the main lighting solution in rural Togo

Evolution of lighting sources in rural Togo (2011-2015) [1]



■ Kerosene lamps ■ Battery torches
■ Grid ■ Solar
■ Others

Market drivers

Price per day (FCFA) [2]



12%

- ▼ Emits fumes
- ▼ Source of accidents
- ▼ Poor lighting quality

205



77.5%

- ▲ Widely available
- ▲ Safe to use
- ▲ Portable
- ▼ Short lifespan
- ▼ Produces e-waste

113



7%

- ▲ Ambitious strategy
- ▼ High connection fee

128



0.5%

- ▲ Potential to provide productive power
- ▼ High operating cost

673



▲ Market driver
▼ Growth inhibitor

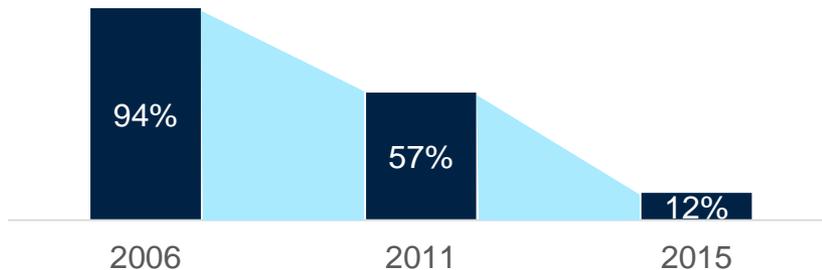
Sources: [1] ENEA QUIBB 2011 and 2015; Stratégie d'électrification du Togo 2018 [2] CEET, field survey. Figures are for basic lighting service. Cost of grid power connection is amortized over 10 years.

Kerosene lamps are no longer the predominant lighting solution because of their cost and negative health impacts



- ▶ Kerosene lamps were **historically the main lighting solution** in Togo, but their use declined from 94% of households in 2006 to an estimated 12% in 2015.

% of households using kerosene as principal lighting source (2006-2015) [2]



- ▶ Kerosene lamps negatively affects people's health.

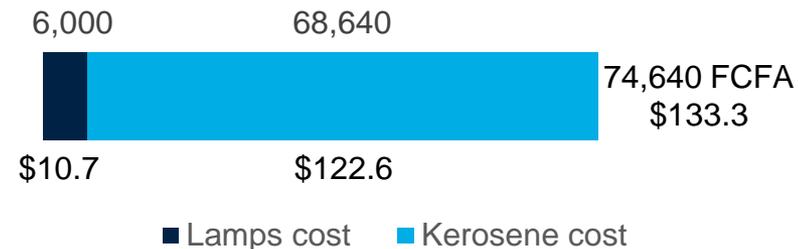
- According to a survey conducted by Acumen on BBOXX customers, 36% of kerosene users reported experiencing health issues related to kerosene use [3]
- The World Health Organization estimates that 3.8 million people die prematurely each year from indoor air pollution as a result of kerosene lamps (and other fossil fuels). [2]

- ▶ Kerosene lamps are the **source of frequent accidents**: 67% of kerosene lamp users reported having accidents from using them (burns, fires or, in the worst cases, explosions).

"We don't use kerosene anymore in this village, you can't even buy it. Everyone uses battery torches"

villager, Gbowle village, June 2018

Estimated annual cost of using kerosene



- ▶ Assuming that households use 2.4 kerosene lamps on average, the cost of using kerosene as the main source of lighting has been estimated at \$133 per year.

- ▶ The cost-competitiveness of battery-powered torches was stated as one of the main reasons explaining the shift away from kerosene.

Battery-powered torches are now the preferred lighting solution for households

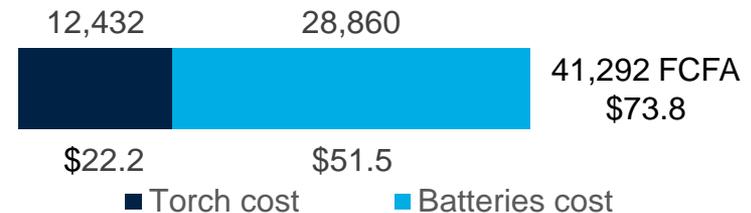


- ▶ Distribution channels include market stalls, street vendors, and small village shops
- ▶ Torches offer **poor lighting quality**. They are however easy to use and to carry compared to kerosene lamps.
- ▶ Battery torches have **negative environmental impacts**, stemming from the improper disposal of used batteries and plastic.
 - There are **no large-scale battery recycling facilities in rural Togo**.
 - Batteries contain **highly polluting heavy-metals** such as lead, mercury and nickel, which are not biodegradable.
 - Based on data collected during the field survey, it is estimated that as many as 200 million batteries and 4 million single-use plastic torches are potentially disposed of per year in Togo.



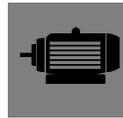
Torches for sale, June 2018

Est. annual cost of using battery torches [2]



- ▶ Battery-powered torches are considerably cheaper than kerosene. Torches can cost as little as 600 FCFA (\$1.10). Taking into account the cost of batteries and the eventual replacement of broken torches, families spend around 41,300 FCFA (\$73.80) per year on torches.

Petrol and diesel generators are mostly used for special occasions and agricultural transformation

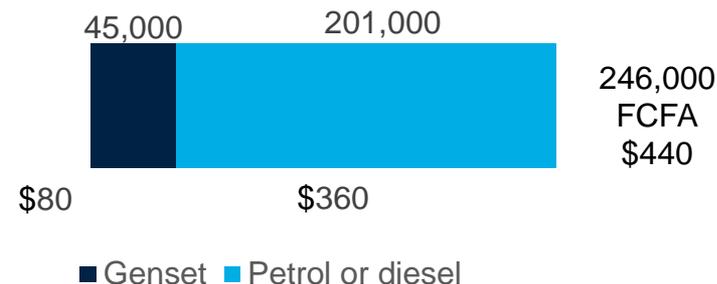


- ▶ According to all data sources available, diesel genset use is relatively limited, at 0.5% of the rural households.
 - Generators are predominantly used by the **wealthiest families**, or when **village events require large amounts of power**.
 - For **basic services** such as phone charging, cold drinks, hairdressing and shop keeping during evening hours, businesses are increasingly using **solar power**.
- ▶ Small diesel/petrol engines are however common for agricultural transformation (see section on Productive Uses)

“We only bring the diesel generators out for big events, like funerals. Many houses have solar panels now”

 *Ako, teacher, Kame village, June 2018*

Est. annual cost of using diesel generation



- ▶ Basic gensets can be found for as low 45,000 FCFA (\$80), which corresponds to the observed entry price for a 10-20W SHS in the informal market. Small generators (<1kW) running on petrol or diesel are cheap to buy, but have high operational costs.

Solar use is increasing with an estimated 3.5% market penetration rate

- ▶ Based on trends observed in national household surveys, it is estimated that solar home systems are now **used by 3.5% of off-grid households*** as their principal lighting source.



Solar panels at rural house, Gbowle, Haho, Togo, June 2018

Solar penetration: **3.5%**  **35,000 households**

- ▶ Stakeholders pointed out the recent increase in use of solar.

“For the last 1-2 years, we witness many more solar distributors, selling products in the markets or even on the side of the road. This is a recent phenomenon”

 Solar distribution managing director
June 2018

“There is not one village, from the North to the South, which does not have a household with solar”

 Solar distribution company CEO,
June 2018

“Most people bought their solar systems in the last 1-2 years”

 Teacher, Gbowle, Haho, Plateaux,
June 2018

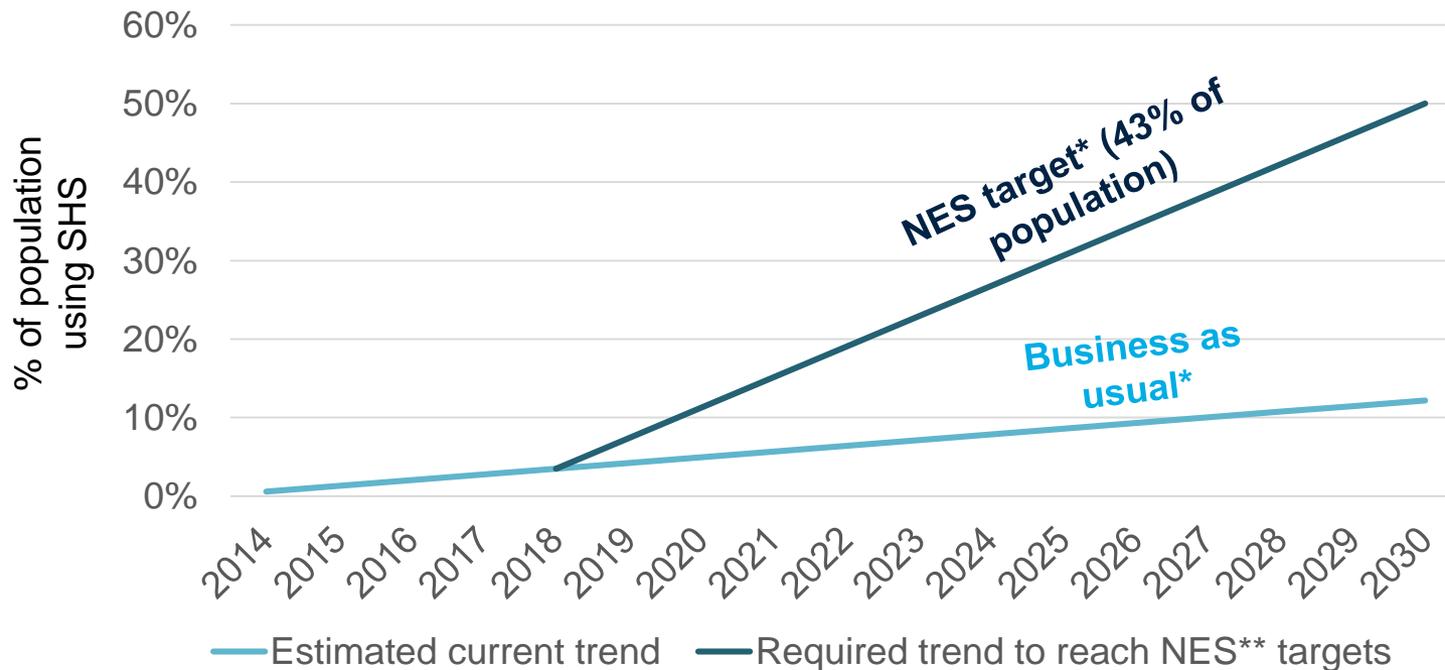
Sources: QUIBB 2011, 2015, Interviews and survey

* This figure is based on a linear growth extrapolation from the growth between the 2011 and 2015 national household surveys. This continuing growth trend has been further confirmed through stakeholder interviews

The penetration of SHS products will need to grow at a faster pace to reach the target of the National Electrification Strategy

- ▶ To reach the target of 550,000 units under the national electrification strategy, SHS penetration will need to increase at a faster pace.
- ▶ To reach this target an additional 35,000 households will need to adopt SHS every year.

Increase in solar growth required to reach the government's SHS target [1]



Low quality component-based products are widely available in rural areas

- ▶ **Component-based solar** accounts for an estimated **86%** of the solar market. [1] [2]



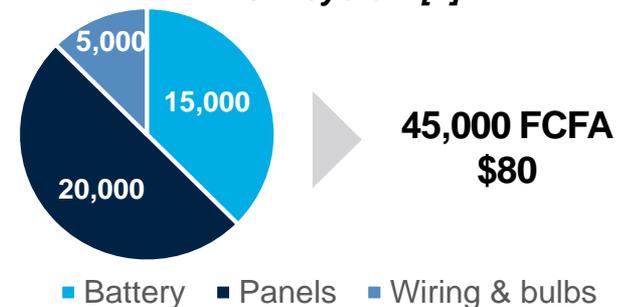
- ▶ **Distribution** is mostly done by **small-scale local vendors** in markets or small shops.
- ▶ Observed panel size ranged from **10W to 240W** and prices were observed at **45,000FCFA** (US\$ 80) for a 20W system.
- ▶ Products are typically **sold for cash** (no consumer finance offer), with **no formal after-sales service**.
- ▶ Despite the government adopting IEC (International Electrotechnical Commission) quality standards for solar products, there is still a **significant inflow of low-quality, non-compliant products**.

Component-based solar refers to consumers (or local installers) buying components (panel, battery, bulbs, wiring and appliances) separately from local markets



Solar panels in a small electronics shop, Notse, June 2018

Price breakdown of an observed 20W system [2]



Lighting Global products account for ~14% of the overall solar market

▶ LIGHTING GLOBAL certified products sold from H1 2017 to H1 2018 [1]:



Active distributors of Lighting Global Certified products [2]*



Example of LG certified products available in Togo [2]



S2



S300



Sun King Pro



Sun King Home 60



Barefoot Connect

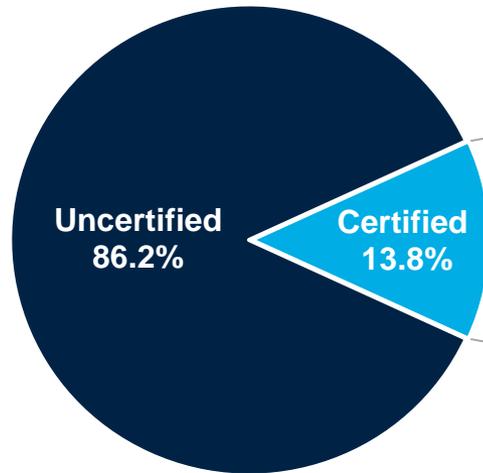
Sources: [1] Lighting Global data, [2] Interviews

* New entrants BBOXX and Soleva presented in subsequent slides

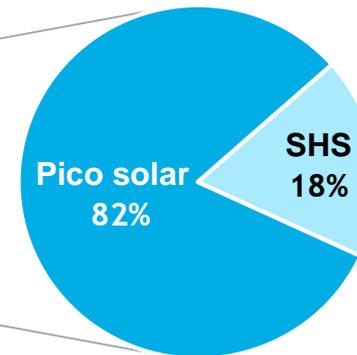
**Mivo sells both Barefoot and SunKing Products

Non-certified solar products are prevalent in Togo

Share of Lighting Global certified products sold in Togo (2018) [1]



Share of lantern/pico-SHS and SHS among Lighting Global certified products [1]



- ▶ **LIGHTING GLOBAL** is the World Bank Group's platform to **support sustainable growth of the global off-grid lighting market**. Lighting Global maintains industry approved **quality standards** that set a baseline level of quality, durability, and truth in advertising to protect consumers. Meeting the standards is a requirement for participation in Lighting Global support programs.
- ▶ **The market for certified Lighting Global products is small in Togo, with approximately 4,800 units sold in the last 1.5 years. [1]**

The CIZO initiative expects to further expand the market for quality SHS

PAYGO is an innovative **payment scheme** which allows customers to pay over time for a SHS or other products, making these systems available to those who do not have the ability to pay upfront.

The Government of Togo (GoT) recently launched the **CIZO initiative**, with PAYGO as a **key pillar** of its **National Electrification Strategy**. The GoT has granted licenses* to two companies: BBOXX and Soleva.

- ▶ **BBOXX** was the first **large-scale** provider of PAYGO SHS products in the country:



2018



10,000
Targeted
total sales



2022



300,000
Targeted
total sales



- ▶ **Soleva** will start distributing **Greenlight Planet** SHS Products Q4 2018



2022

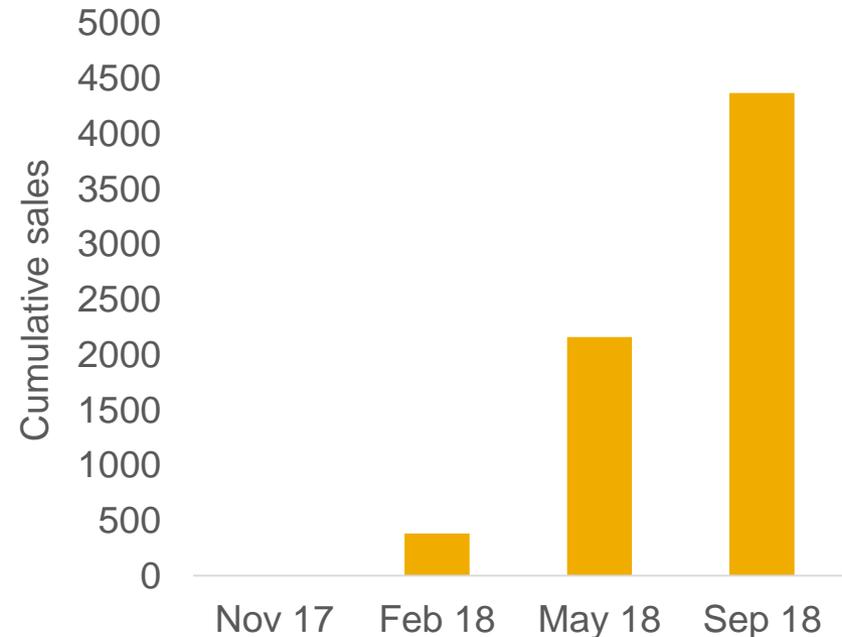


300,000
Targeted
total sales

Soleva

greenlight
planet

BBOXX cumulated sales since November 2017 [1]



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A methodology was developed to estimate the potential market for solar products sold on PAYGO/instalments in the 5 regions of Togo

Estimating the **potential market for solar products is crucial** for both the government and the private sector to respectively **adapt their policies** and **market entry strategies**.

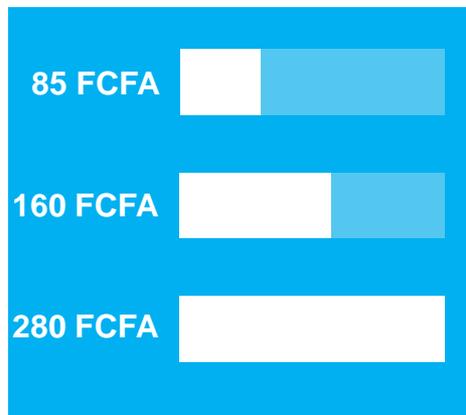
Methodology:

- ▶ This model estimates the potential market by **comparing** the population's **ability-to-pay** with the **price (daily payment)** of an off-grid solar product.
- ▶ The model uses a **combination of data inputs**, most importantly:
 - *Income distribution, electrification rates, household income* (based on data from INSEED, CEET, World Bank).
 - *Ability to pay.* In absence of a nationwide household survey, the ability-to-pay of the population is estimated as 10% of household income. This is based on national statistics, Africa-wide studies on kerosene use [1] and sample field surveys conducted in Togo. This assumption is further tested through sensitivity analysis (see annex).

Three PAYGO/instalment pricing points have been tested in the model

The model determines the number of off-grid households (per region) that can afford a certain level of daily expenditure on solar products, based on their income and current energy expenditure patterns. The model uses daily expenditure so that its results are comparable to the pricing of PAYGO products or products offered through other consumer-finance mechanisms, such as microfinance.

Methodology: 3 PAYGO prices tested



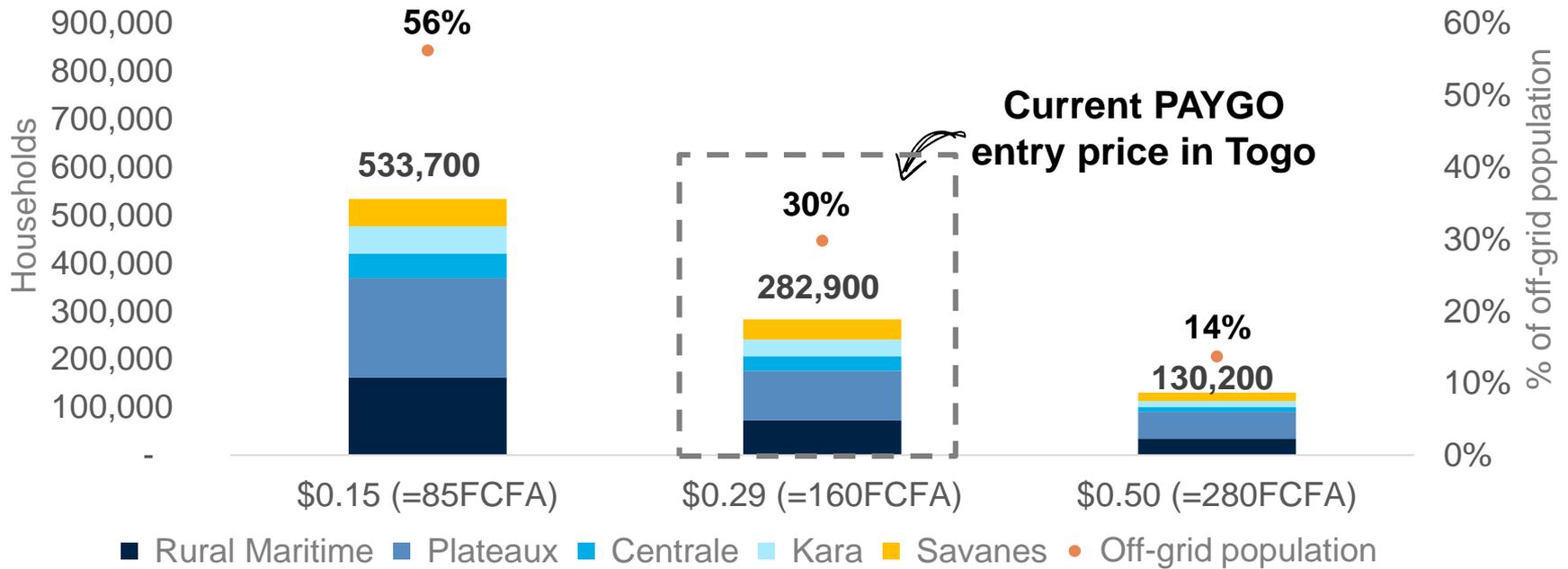
85 FCFA (\$0.15) per day, to represent either a **smaller system**, or a future offer due to cost reductions in technology and operations

160 FCFA (\$0.29) per day, which matches the **current offer of BBOXX for their basic SHS in Togo**

280 FCFA (\$0.50) per day, to represent either a **larger system**, or a pricing structure similar to that of companies in the more developed PAYGO markets in East Africa

At 160 FCFA per day, the current market for PAYGO products is ~280,000 units, representing 30% of off-grid households in Togo

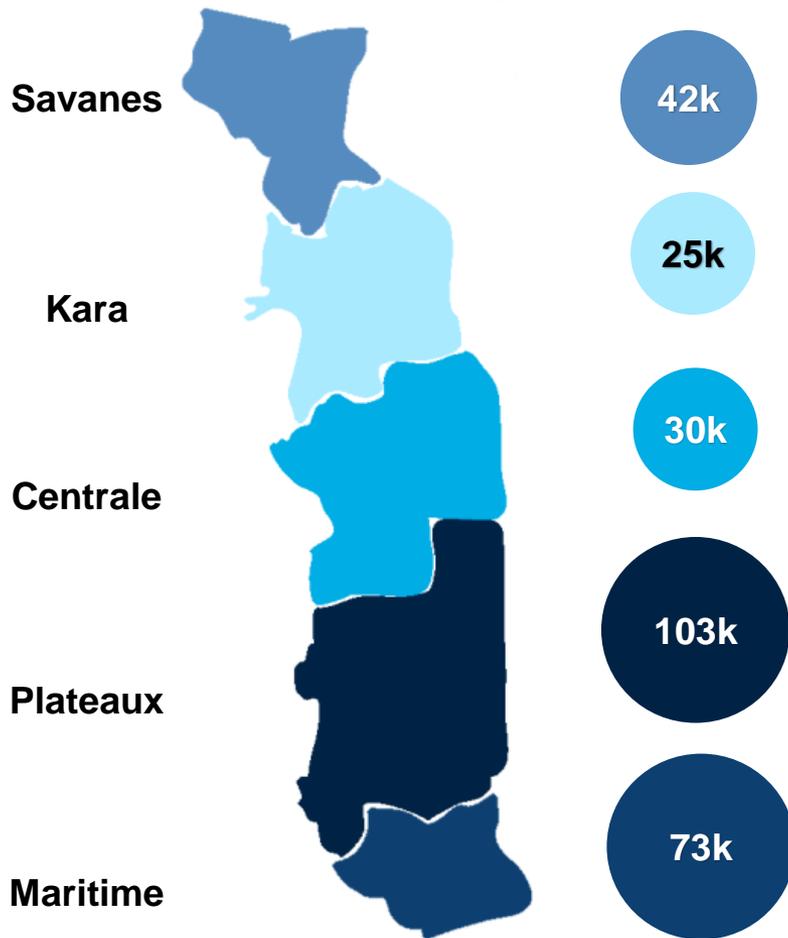
Potential market for off-grid solar products by per-day price



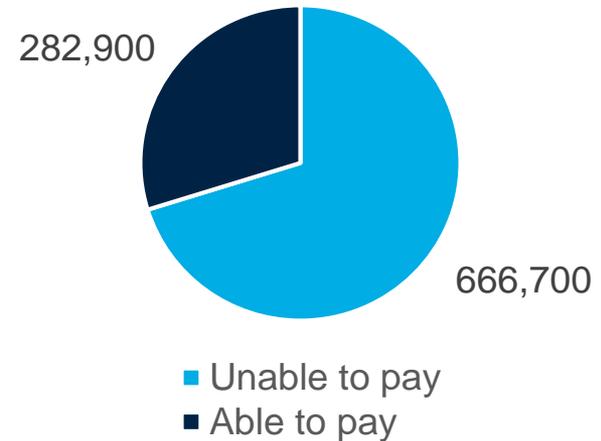
- ▶ **The potential market is ~280,000 units for products sold at 160 FCFA/day (30% of off-grid population)**
- ▶ **Reducing the price to 85 FCFA would grow the potential market to >500k units, or 56% of Togo's off-grid households (in line with the national electrification strategy target)**
- ▶ **The market for larger systems (280 FCFA/day) is small and concentrated in rural Maritime and Plateaux.**

More households are able to pay for SHS in Togo's southern regions

Market size by region for products at FCFA 160 per day

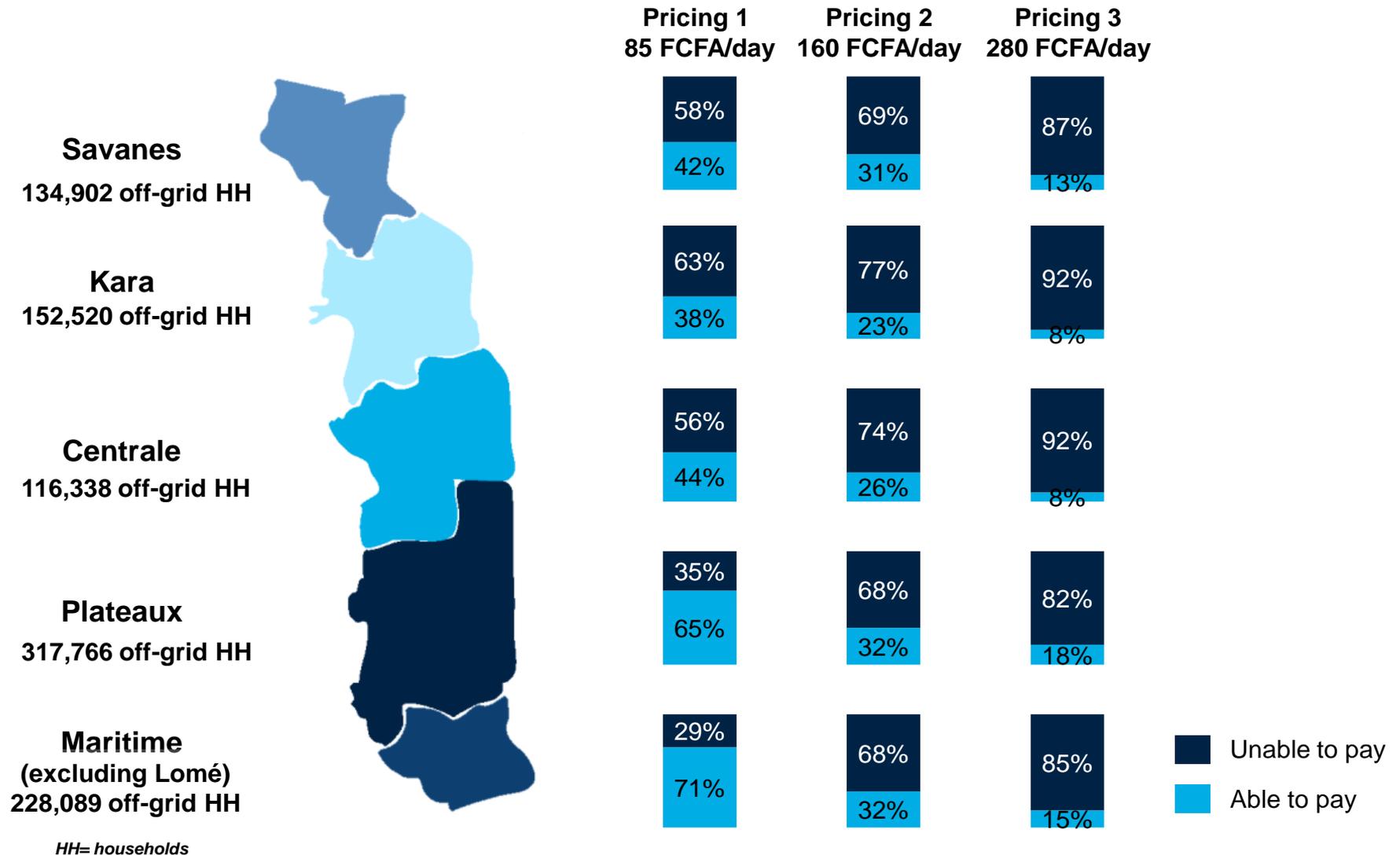


Proportion of households in Togo able to pay for off-grid solar products (at 160 FCFA per day)



- ▶ Maritime and Plateaux have the largest market. These regions are the most populous and have higher income levels.
- ▶ The grid electrification rate in Savanes is currently the lowest in the country, which means that wealthier households are likely to be off-grid. This explains the higher market potential compared to the population in the region.

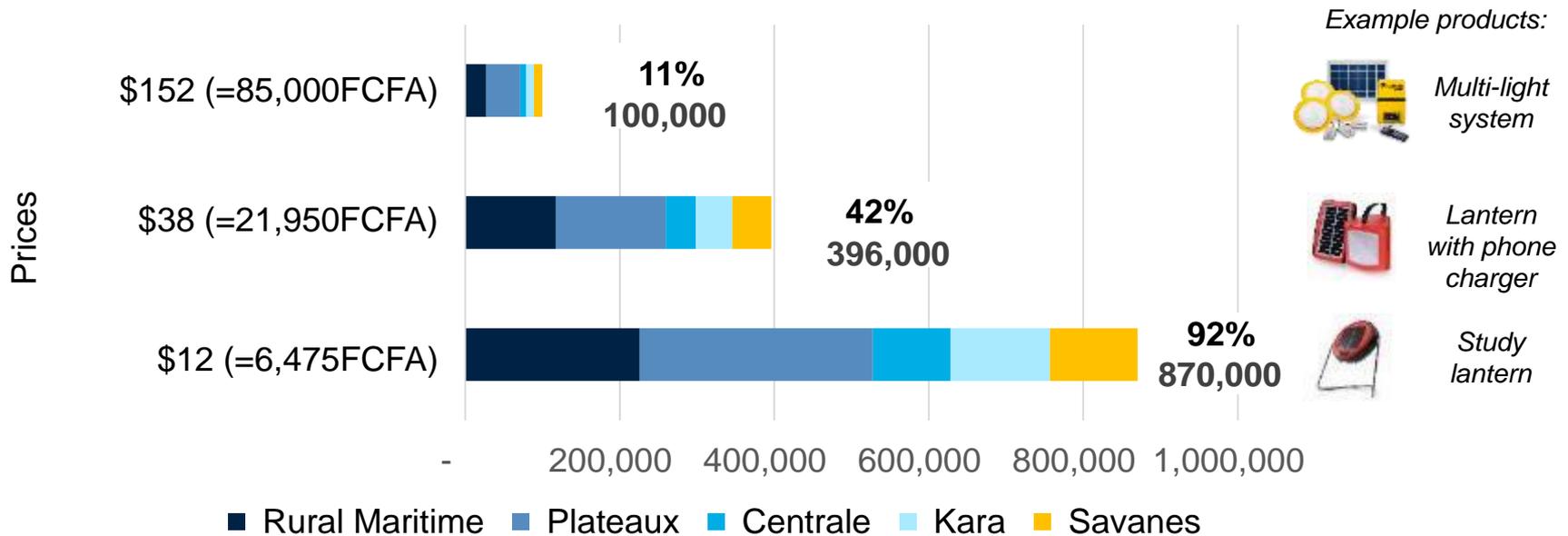
The potential market is sensitive to different price points



Sources: QUIBB, INSEED, World Bank, Pew Research, ENEA Analysis

Over 90% of households can afford to pay for a basic study lantern in cash, though only 11% can pay in cash for a multi-light system

Potential market for cash sales of off-grid solar products



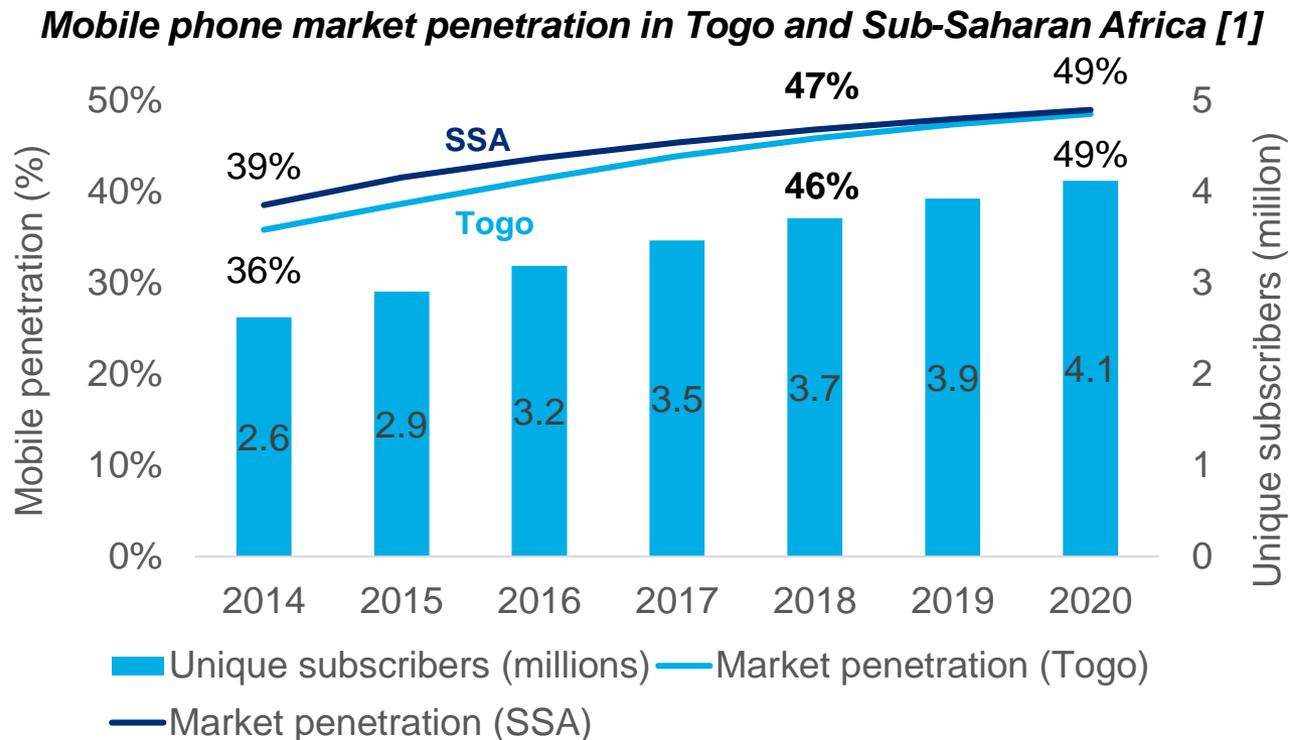
Methodology overview

- Market estimates are based on the fact household incomes are highly seasonal (e.g. BBOX study states 96.8% of solar customers have revenues that are not even over the year).
- Potential market calculation assumes rural household may receive a cash injection equivalent to six months of income at one time, and are willing to spend 10% of this injection on a solar solution.
- The cash market estimate uses the same income distribution profile as the instalment-based model (see annex for further methodology details and sources used).

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Mobile phone ownership is increasing, with Togo now close to the African market penetration average

PAYGO systems typically rely on mobile money for payments. Therefore, for a PAYGO company to be successful, good mobile coverage and active mobile money services are needed



- ▶ **46% of the total population currently own mobile phones**, which is still slightly lower than the Sub-Saharan Africa average. Togo is however expected to catch up by 2020.

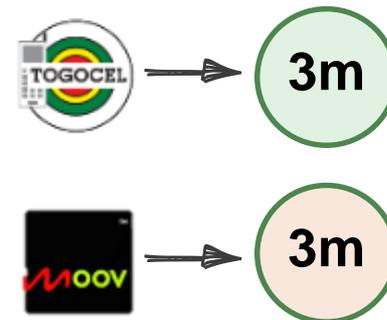
A strong mobile network coverage in Togo helps the development of mobile money and PAYGO for off-grid solar products

There are 2 mobile phone operators in Togo

Togocel, majority state owned, was the first mobile phone operator in Togo

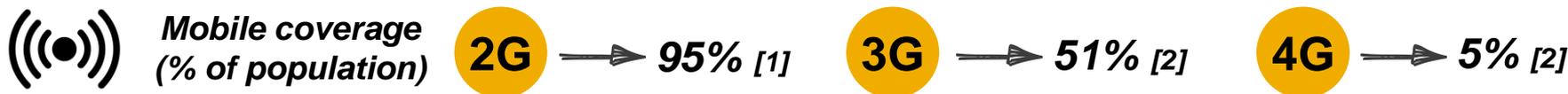
Moov is owned by Maroc Telecom, a multinational Morocco-based telecom service provider, currently operating in 16 countries

*Subscribers**



- ▶ These companies only have physical shops in major towns. To reach rural areas, Togocel and Moov rely on independent agents to sell phone services.

**Total connections higher than market penetration as many customers have two sim cards*

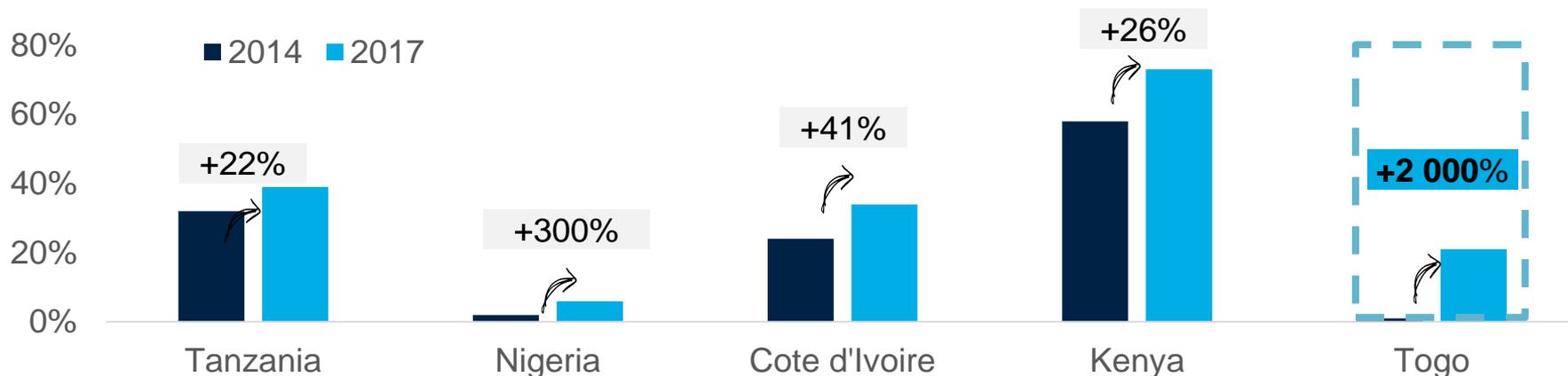


Mobile money needs only a 2G network to function. The **strong coverage** in Togo will facilitate its development

Source:
[1] Declaration from phone operators
[2] GSMA Intelligence data

Mobile money is growing fast, though many rural villages do not have mobile money agents

Percentage of adult population having a mobile money account [1]



Mobile money in Togo



2015



2017

- ▶ **Subscription** and **basic services** (deposits, recharge, purchase) **are free**
- ▶ Operators charge for other services, including transfers
- ▶ 90.4% of the rural population is interested to learn how to use mobile money if taught to [2]
- ▶ **Availability** of mobile money is still an **issue** with **70% to 80% of rural villages** having no agents / outlets [2]
- ▶ Availability was highlighted by solar product distributors as a **major barrier to PAYGO uptake**

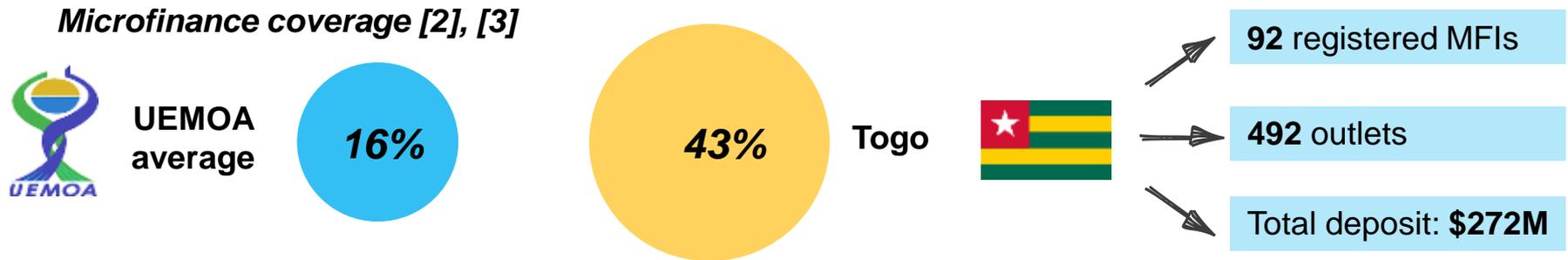
Source:
 [1] Global Findex Database (2014-2017)
 [2] CIZO survey, 2017

Togo's microfinance coverage is high compared to neighbours, and several innovative MFI solar programmes are emerging

Low ability to pay of the Togolese population is a major barrier to the uptake of solar

- ▶ Only 1.9% of the population is able to save money for purchases and only 33.8% only are able to save for emergencies. [1]

Micro Finance Institution (MFI) coverage is one of the highest in the region [2][3]



MFIs present a major opportunity to support the large scale development of solar in Togo:

- ▶ MFIs have **reach into deep rural areas** and are considered to have a **denser network** than any distribution firm in the country, so they could fulfil a dual role of financier and distributor.
- ▶ Small-scale **partnerships already exist** between MFIs and solar firms (e.g. **MIVO ENERGIE** and **ASSILASSIME**)
- ▶ **Largest MFIs** (FUCEC, WAGES, UMETCO) **considering** developing **solar-specific financial products**.
- ▶ **Development partners and government** can support and encourage MFIs to **start pilot initiatives**.

Major Microfinance Institutions in Togo

MFI	Estimated size of membership [1]	Company details [2]	Solar program information
 <p>FUCEC – Faïtière des Unités Coopératives D’Epargne et de Crédit du Togo</p>	900,000	FUCEC-TOGO was established in 1969 and is now the leading MFI in Togo. It manages more than 50% of the total amount of savings and total loan portfolio in the country. It particularly targets urban workers.	FUCEC do not have a solar-specific credit product but have been in active discussion with distributors and international financiers willing to support the sector.
 <p>WAGES – Women and Associations for Gain both Economic and Social</p>	288,000	WAGES is a Togolese MFI recognized by the Ministry of Economy and Finance which was created in 1994. It has 9 agencies in Lomé, 7 in other cities and 5 agencies dedicated to rural credits. It offers several financial services, including different kinds of microcredits designed specifically for rural areas	They have no credit product for solar at the moment but are considering offering their branch network for marketing of such products.
 <p>UMECTO - Union des Mutuelles d’Epargne et de Crédit du Togo</p>	139,000	Recognized by the Ministry of Economy and Finance of Togo in 2001, UMECTO is an MFI targeting mostly women. It aims to support its customers by providing both financial services and operational support.	Had a solar specific product in 2016, but not very active in the space.

Sources:

[1]: Size communicated during interviews. Figures not publicly available [2] Company websites

The banking sector is already supporting the development of the solar industry

Banking sector overview [1]

- ▶ There are **13 banks** in Togo (7 international and 6 national), and the state owns important stakes in 5 of them.
- ▶ They operate **205 outlets** in the country and have **785,400 accounts**.
- ▶ Several banks expressed willingness to lend to PAYGO actors **providing business plans solid**.

Major banks in Togo



First large loan for solar companies in Togo

Under CIZO, UTB provided **\$4 million in local currency** to BBOXX with the support of the African Guarantee Fund.



The World Bank's **ROGEP** programme also envisages to provide credit lines to local banks and other regional programmes are under consideration (e.g. African Development Bank).

Market challenges for banks to lend to PAYGO sector

Togo-specific advantages and challenges

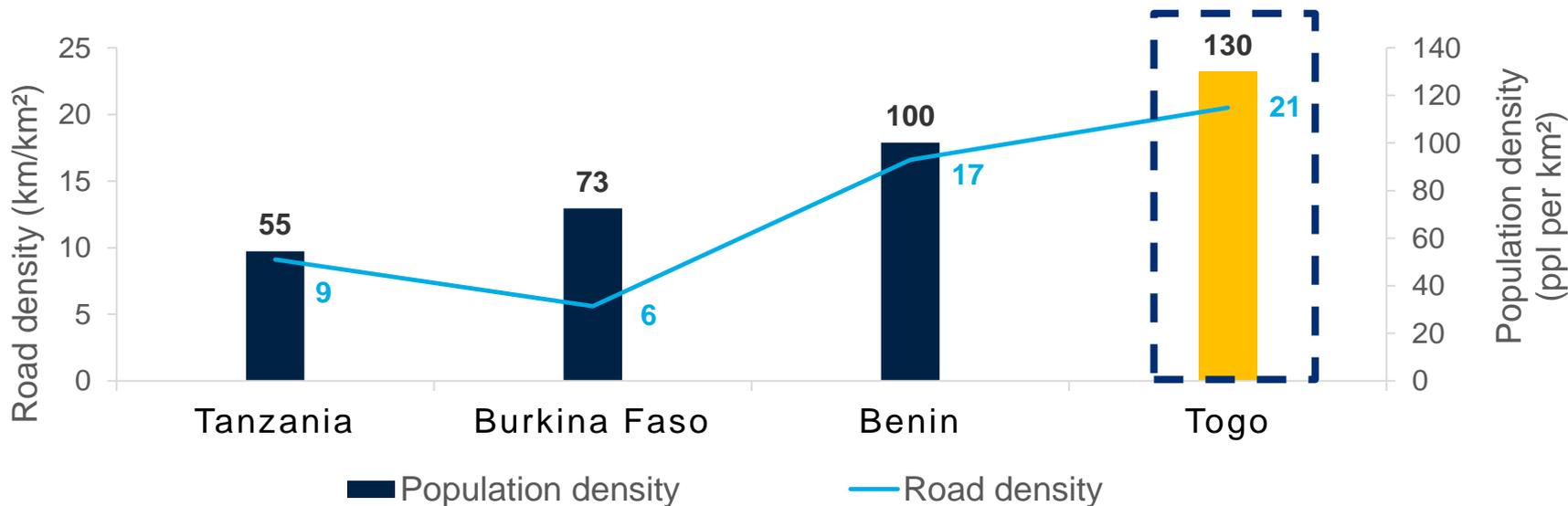
- ▶ FCFA peg to euro means exchange rate risk lower compared to East Africa or Ghana/Nigeria, as no need to hedge currency.
- ▶ No Togo-specific programmes for green credit facilities that exist in other countries (e.g. SUNREF).

General challenges for banks lending to off-grid solar [2]

- ▶ Unfamiliarity with PAYGO and solar technology and therefore unable to determine risk.
- ▶ Credit default rates for PAYGO can be higher than banks typically accept.
- ▶ Securing credit guarantees can be burdensome.

Logistics are simpler than in neighbouring countries due to high population and road density

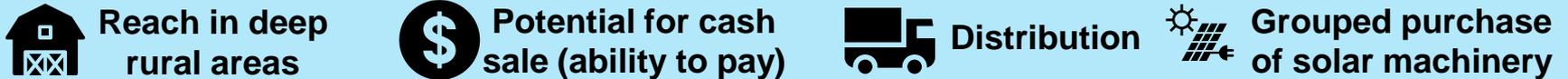
Population [1] and road density [2] in selected African countries



- ▶ Togo is a small and densely populated country with a relatively extensive road network which makes **distribution easier** than in other African countries.
- ▶ Last-mile distribution to reach the furthest villages can be challenging due to the quality of roads. However, the **road network is improving rapidly**, with the main highway (RN1) being recently refurbished. Many off-grid villages are not too far from major roads.
- ▶ During interviews, no solar distributor pointed to distribution logistics as being a major challenge in Togo.

Both private and public agricultural cooperatives can be promising channels for solar sales given higher disposable income and organized groups

- ▶ Agricultural cooperatives are found throughout rural Togo and exist for **both staple and cash crops**
- ▶ They may represent a **major opportunity** for the solar industry, allowing:

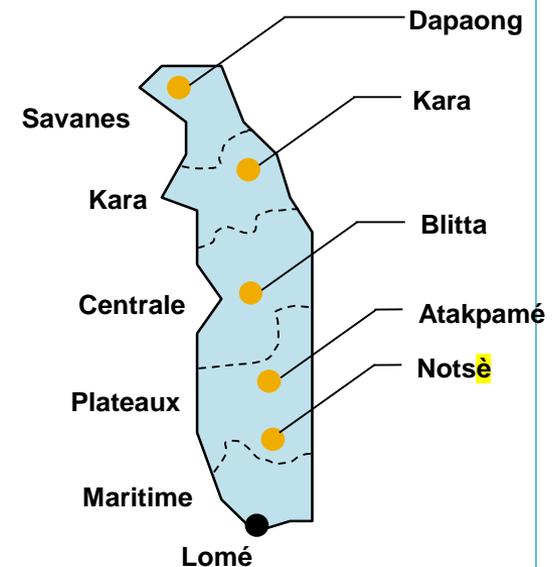


Example of potential channel : National Cotton Society (public)

Role: purchase cotton from producers, manage processing and market the processed product

Relevance to the solar industry:

- ▶ Established in 1974
- ▶ **Presence in all 5 regions**
- ▶ **103,000 producers (2014)**
- ▶ Purchase cost (to producer): 240 FCFA/kg



Other distribution channels frequently used in rural Togo

The assessment did not find any large distribution firms in the country. Supermarkets have the largest distribution channels, developed and operated by them. However, supermarkets mainly operate in dense urban areas. With regards to rural and last-mile distribution, some examples are described below.

Distribution channel	Comments
	<p>Fast Moving Consumer Goods (FMCG)</p> <p>Stores selling FMCG in rural villages typically have their own vehicles and collect goods from nearby markets. They sell mainly inexpensive products (less than 1,000 FCFA per unit), paid for in cash, upfront. This type of retailers have no experience selling durable goods, such as solar products, and may not have access to the required working capital.</p>
	<p>Agricultural Goods</p> <p>Agricultural shops in rural areas sell crops, fertilizers, and basic machines. The main agricultural products sold by wholesalers are not energy-related. However, some sell basic machines (e.g. maize mills). Most of these products are far cheaper than the solar-based productive use machines. These shops typically do not provide credit to customers.</p>
	<p>Telecom shops</p> <p>TogoCel and Moov have a network of physical shops in major towns, but these mainly sell mobile-phone services, rather than phones or other electronics. To reach rural areas, TogoCel and Moov rely on independent agents to sell phone services. Whilst these agents could sell solar products, they tend to specialize in phone credit and FMCG.</p>
	<p>La Poste</p> <p>La Poste du Togo is the company in charge of the postal service in Togo. Warehouses and outlets of La Poste are being used as distribution centers for solar products. This was facilitated by the government through the CIZO program. La Poste is also launching an agency banking initiative, which would increase the reach of mobile money, by providing agents with means to deposit and withdraw cash.</p>
	<p>Agricultural cooperatives and companies</p> <p>Agricultural cooperatives and companies can be a promising channel for solar products, given high incomes and organized groups. Mivo already has a pilot with coffee and cotton producers in Kara. In other countries, this channel has already proven successful (e.g. tea cooperatives in Kenya providing financing facilities for farmers to buy goods, including solar products).</p>

Source: Interviews with distributors

In 2018, the government of Togo introduced several policies and regulations to support the off grid solar market

National Electrification Strategy [1]

- Targets universal access by 2030, i.e. providing access to an additional 1.3 million households (53% through grid, 43% SHS, 4% mini-grids)
- Total investment requirement: FCFA 995 billion (\$1.78 billion)
- SHS fall under CIZO (555,000 households, investment of FCFA 435 billion) (\$0.78 billion)

Law for the promotion of renewables [2]

“*Loi relative à la promotion de l’électricité à base des sources d’énergies renouvelables au Togo*” passed in July 2018. Law includes off-grid energy (article 29), mentioning requirement to obtain a license. In addition, it mentions:



- Fiscal incentives (exemptions and reductions of import duties, company tax, minimum flat tax, professional tax, property tax and VAT) for approved off-grid solar companies (art. 33-36)
- RE systems are to be compliant with quality and safety standards to be set by the Bureau of Standards (*Agence Togolaise de Normalisation, ATN*) (art. 42-43)

Quality standards for SHS



- The GoT (through the ATN) adopted IEC standards for solar products, including IEC TS 62257-9-5, which is the Technical Specification used by Lighting Global [3]
- Imported products are required to include a certificate of conformity from a recognized third-party test centre.

Development partner programmes will further drive the sector



- ▶ Support to the development of the National Electrification Strategy (completed)



- ▶ Regional Off-Grid Electrification Project (ROGEP) to identify and address barriers (regulatory standards, import tax, VAT on solar products, etc.). Credit lines offered through local commercial banks.



- ▶ Funding CIZO programme (\$1M)
- ▶ Funding available to companies through the regional AfDB DESCO funds and the Financial Energy Inclusion Facility.



- ▶ Credit lines to MFIs
- ▶ Access to finance for SMEs in the renewable energy sector (e.g. guarantee facilities such as ARIZ).



- ▶ Pro-Energy Programme including decentralised solutions (EUR 4m, 2017-2020)

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Limited ability-to-pay remains the main medium-term challenge for off-grid solar in Togo

- ▶ According to the potential market model, **at current prices** for off-grid solar home systems (160FCFA per day), **70% of off-grid households** cannot afford a system.
- ▶ **Only 1.9%** of the population is able to **save money** for purchases and only **33.8%** can save for emergencies. [2]
- ▶ As much as 97% of rural households have **seasonal revenues**, affecting their ability to pay for daily or monthly instalment payments (such as PAYGO). [3]

“People are extremely interested in solar products, they just cannot afford purchasing them”

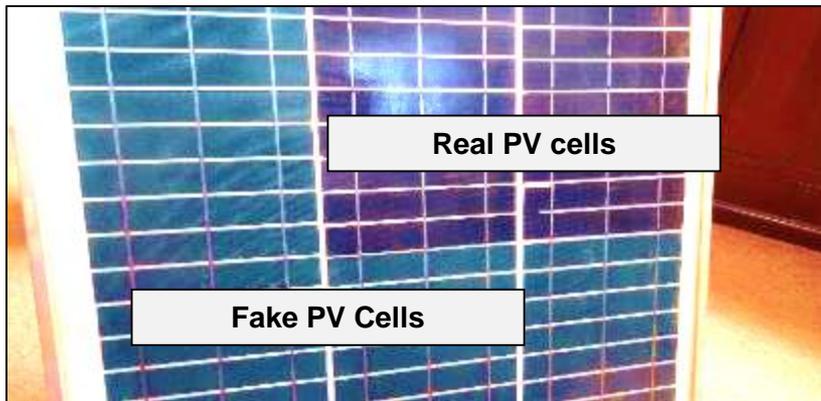
 *Solar distribution company CEO, June 2018*

Potential solutions

- ▶ New solar market entrants should focus on offering low cost solutions to reach a larger part of the market
- ▶ Microfinance institutions (MFIs) can enter the market and potentially offer products at lower per day/month rates, either through offering small/low price products, or through lower effective interest rates

Cheap, low-quality solar products affect consumers' price expectations and trust

- **Component-based systems**, which represent 85% of the solar market are often **cheap but of low quality**
- The **predominance** of **low quality** products can lead to **mistrust in solar** products
- In addition, the widespread use of **cheap battery torches** further **reduces consumers** willingness to invest in high-quality solar



Poor quality panel with fake cells, June 2018

“Our main competition for now is against artisanal solar. Such products are cheaper but our competitive advantage lies in after-sale service and flexibility in payment”.

 *Solar distribution managing director, June 2018*

Potential solutions

- Tightened and better enforcement on quality standards can restrict the entry of low-quality products into the market
- A national consumer awareness campaign to help customers understand the importance of buying quality solar products could be considered

People know of solar products but there is a lack of understanding regarding how these work (types, sizes, quality)

- ▶ **In most villages**, there is at least one home with solar power. In the village focus groups, **100% of respondents knew** what **solar** was. [1]

“Almost everyone today has heard about solar. They however do not all know how these products work.”

Solar distribution managing director, June 2018

- ▶ The remaining **lack of awareness** often results in :
 - Mismatches between reality and expectations (e.g. one customer interviewed bought a TV but the power of their solar system did not allow them to use it)
 - Improper, unsafe, utilization of solar products
- ▶ This is exacerbated by the fact that uncertified local vendors often **do not** provide **consumer financing or** and **after-sales service**.

Potential solutions

- ▶ A national campaign to educate customers on building knowledge of solar technologies could be launched
- ▶ Solar firms should ensure in their marketing materials what solar home systems are capable of (and what they are not)
- ▶ Solar firms can offer after-sales support (e.g. a call centre) to advise clients on use of product

Lack of working capital and challenging business environment make it difficult for solar companies to establish distribution networks in Togo

Supply chain in Togo



Cash is king: all players have to **pay upfront**

Very **limited credit** is offered along distribution channels

"In Togo, everything must be paid by everybody up front"

 *Solar distributor, June 2018*

- Importers and large distributors do not provide payment terms to retailers. Retailers in turn do not provide credit to final customers.

Solar firms need to be offered appropriate financing solutions

- Only **38% of the companies** in Togo had **access to bank credit** and **34%** to **MFI financing** (2016) [1]
- **Local financing** is critical for solar firms (especially PAYGO) to **finance their inventory**
- As the PAYGO model is based on the customer paying over an extended period, solar distributors **have to advance large amounts of money** for their inventory and sales, until the customers gradually pay back the cost of their products

Potential solutions

- Identify possible incentives by development partners to encourage MFIs and local banks to enter the sector
- Local agricultural cooperatives can be a potential source of consumer finance, as well as a distribution channel
- New development partner programmes are emerging to provide green credit lines

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Public sector recommendations

Challenges	Recommendations
1. Systems are unaffordable for a major portion of the population	<ul style="list-style-type: none"> • Establish “Bottom-of-the-Pyramid” strategy for energy access, in collaboration with development partners, to address the portion of the population that cannot afford SHS • Allow eligible firms within the CIZO initiative to distribute high-quality PAYGO products with capacity lower than 20W • Extend exemptions of VAT and import duties to solar companies outside the CIZO programme for all products that are compliant with Lighting Global quality standards (incl. solar lanterns)
2. Cheap, low-quality solar products distort price expectations and increase consumer mistrust of solar	<ul style="list-style-type: none"> • Increase enforcement (e.g. number of spot-checks, level of fines) of solar quality standards, both at the border and at the retailer level • GoT may also want to consider demanding Pre-Export Verification of Conformity (PVoC) [1] for products entering Togo • Launch education campaign on the benefits of high-quality solar kits, and drawbacks of low-quality solar systems
3. Lack of understanding on SHS functionality	<ul style="list-style-type: none"> • Launch national education campaign on how to use SHS • Enforce correct advertising of the products by solar operators benefiting from tax exemptions through a code of conduct
4. Challenges to establishing solar distribution networks and lack of working capital	<ul style="list-style-type: none"> • Educate and encourage agricultural cooperatives, and microfinance institutions, on the benefits of distributing solar products • Organise a national forum dedicated to distribution inviting off-grid solar firms, microfinance institutions, agricultural cooperatives, distribution companies and banks to meet and discuss how they can support solar distribution • In the long-term, work with development partners to establish fiscal incentives for microfinance and agricultural cooperatives to enter the solar market • Work with Togolese banks to ensure they are aware of the forthcoming ROGEP and AFDB programmes that will supply regional green credit lines

[1] PVoC is a procedure which requires companies exporting products into a market to apply for a Certificate of Conformity (CoC) prior to shipping. A CoC is issued following an inspection against national standards (e.g. quality; health and safety).

See GOGLA 2017 for further details. Link [here](#)

Private sector recommendations

Challenges	Recommendations
1. Systems are unaffordable for majority of the rural population	<ul style="list-style-type: none"> • Ensure product offering is tailored to bottom-of-the-pyramid customers (e.g. smaller, more affordable systems) • Provide longer loan tenures to allow households to pay lower daily rates • Engage with microfinance institutions, who have deep rural reach, and may be able to offer lower effective interest rates to customers
2. Cheap, low-quality solar products distort price expectations and increase consumer mistrust of solar	<ul style="list-style-type: none"> • In marketing campaigns, emphasise advantages of Lighting Global certified products to low-quality solar home systems, which are also widely available in Togo, and to battery torches which are used by 78% of the population. • Alert government officials to sellers of non-quality products, to allow and encourage better enforcement
3. Lack of consumer understanding on SHS functionality	<ul style="list-style-type: none"> • In marketing campaigns, describe clearly the capabilities of SHS, what services they can provide, and what they are not able to do
4. Challenges to establish solar distribution networks and lack of working capital	<ul style="list-style-type: none"> • Engage with agricultural cooperatives and microfinance institutions who have strong reach into rural areas and establish partnerships • Given lack of national distribution networks, private firms will likely have to establish their own vertically integrated distribution networks. • Private sector firms should create partnerships with local banks (list in earlier slide) to benefit from new emerging concessional credit programmes from the World Bank (ROGEP) and AfDB
<i>Other recommendation based on potential market model</i>	<ul style="list-style-type: none"> • Solar distributors may want to initially target the two southern regions, Plateaux and Maritime, which collectively have 62% of the potential market for solar products in Togo. Savanes, though one of the poorest provinces, has the 3rd largest regional market given low electrification levels.

ANNEX

Description and main inputs used for the market potential model

About the potential market model

- ENEA Consulting has developed a model to estimate the potential market size for off-grid solar products paid on instalments at a given daily rate. This daily rate reflects the price per-day of a pay-as-you-go product, or, alternatively, the price per-day of a product offered on credit by a financial institution.
- The model can be used to compare the market size between regions/countries, and the impact of a change of the daily rate on the potential market.
- The model has also been adapted to measure cash sales, estimating the level of income seasonality
- The model relies on data from official statistics agencies. A list of data sources is provided below.

Data used in model	Main sources
Population, population	INSEED, CEET
Electrification rates	CEET, Stratégie d'électrification du Togo
Grid extension plans	Programme d'électrification des localités du Togo 2018-2032
Population distribution by income	INSEED
Median Daily Income	INSEED, CIZO
Percentage of offgrid people in wealth quintiles	FinAccess dataset, Financial Sector Deepening Kenya, 2016, Consortium analysis based on Togo context
Maximum percentage of daily income spent on lighting	INSEED, CIZO, ETD, Acumen

Assumptions of the sensitivity analysis

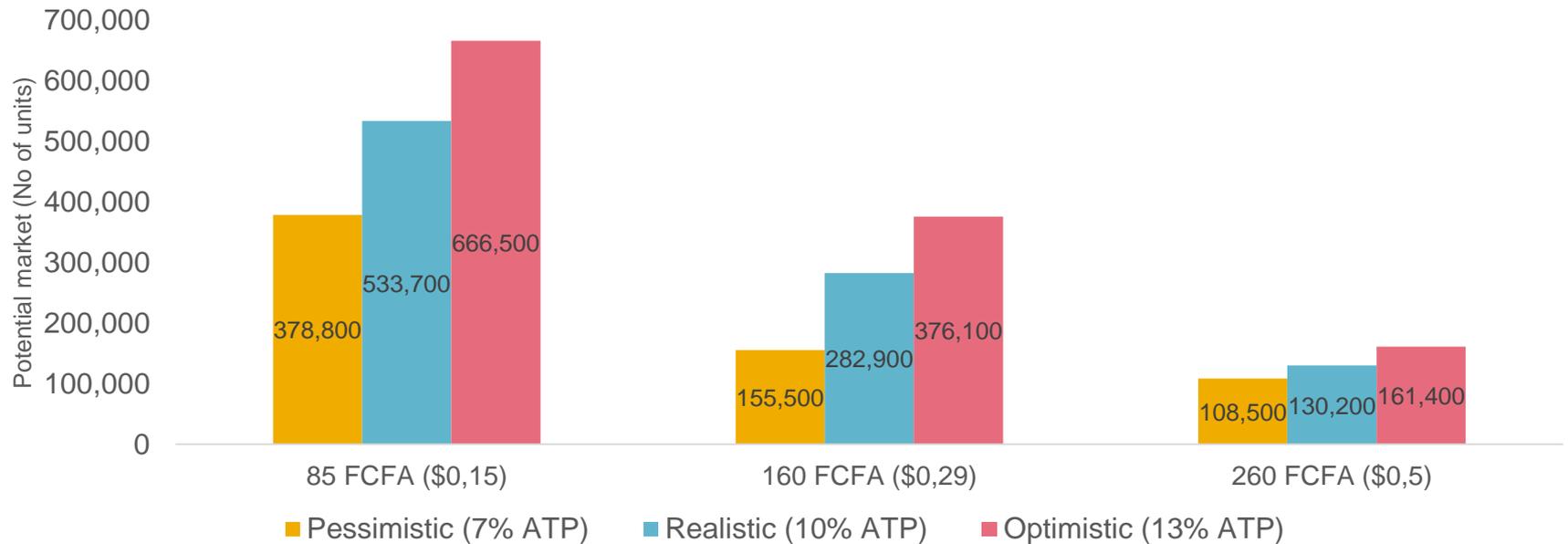
- ▶ The results presented in section II assume that off-grid households would be ready to pay for solar products as much as they currently spend on basic forms of energy (i.e. affordability = current level of energy expenditure). Households may however be ready to spend a higher amount on products that deliver a better level of service. Inversely, they may not be willing to spend more given affordable alternatives such as battery torches.
- ▶ The next slide presents the **impact of 3 different ‘ability-to-pay’ scenarios** on potential market size.

Summary of scenarios tested in the sensitivity analysis

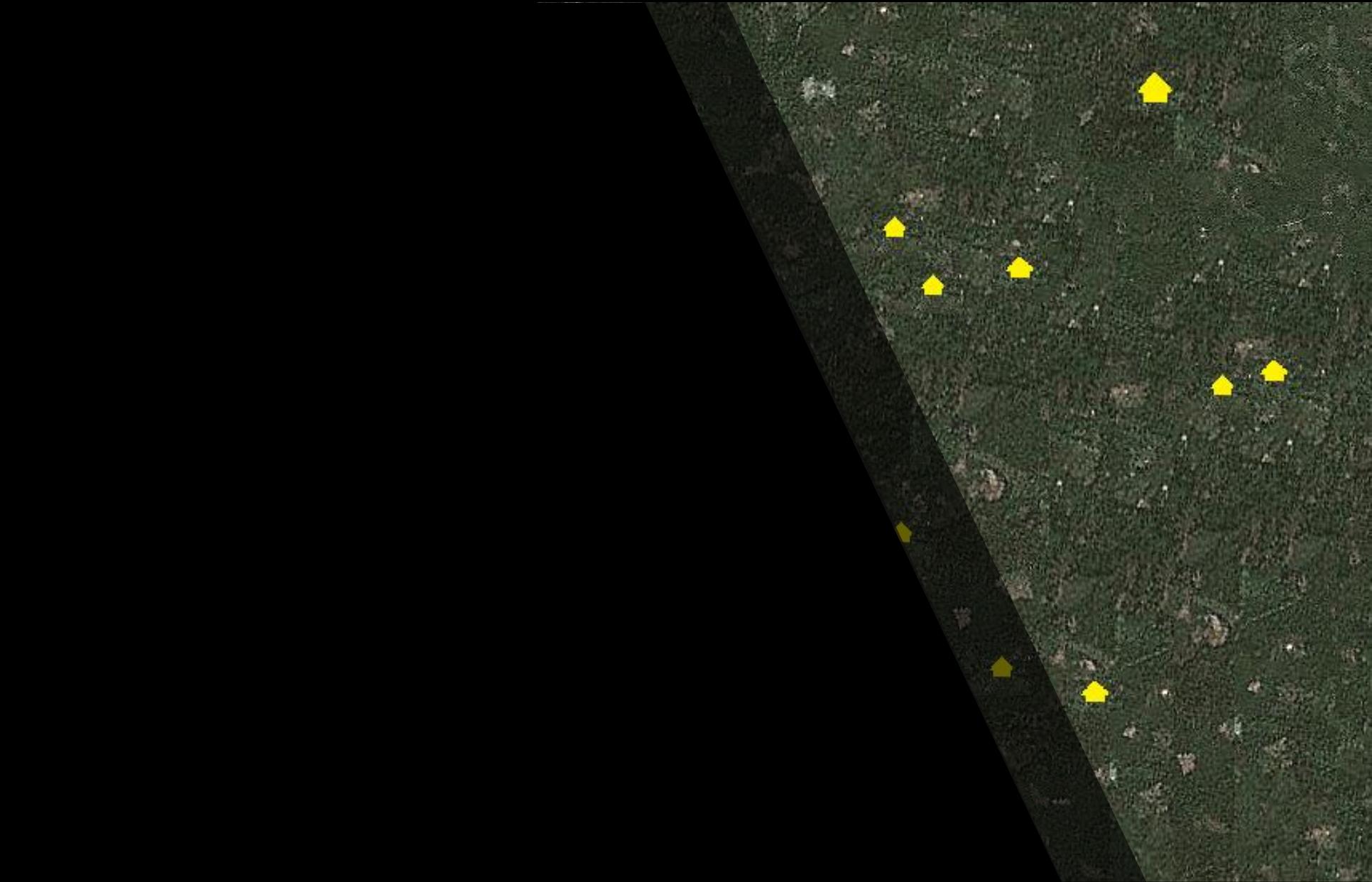
Scenario	% of income willing-to-pay	Rationale
Low ATP (pessimistic)	7%	This figure was chosen based on the results from the CIZO survey, in which the monthly household expenditure on energy was compared to the household’s revenue. On average, this figure was 6.9%.
Medium ATP (base case)	10%	<p>According to UNEP/Bloomberg Energy Finance, households in Togo are estimated to spend an average of \$137 p.a. (PPP) on lighting. Assuming a national median monthly income of 25,000 (QUIBB 2011), this would represent a share of 10.2% of revenues allocated to lighting.</p> <p>In a 2016 survey conducted by ENEA in 4 villages in rural Togo, households were found to spend around 10% on lighting and phone charging</p>
High ATP (optimistic)	13%	<p>This figure was selected based on the field survey conducted as part of this study. On average, interviewed villagers are spending 12.6% of their revenue on lighting (9.3%) and phone charging expenditure (3.3%)</p> <p>This figure matches the results of a D.Light household study stating that people spent 13% of income on lighting and phone charging prior to acquiring solar lamps.</p>

The model has a high degree of sensitivity: there is a 42% increase in potential market size between the pessimistic and optimistic scenarios

Sensitivity analysis of potential market size with different ability-to-pay assumptions



- ▶ **The model is highly sensitive to variations in ATP and daily price levels**, with the market increasing by ~90,000 households if a more optimistic assumption is taken for products at FCFA 160/day compared to the base case
- ▶ A full nationwide study would be required to determine exact ability-to-pay. It is recommended that future national surveys include questions on current energy expenditures




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