



## Key messages

- Ethiopia has a target of increasing energy access for up to 4 million households by 2020. The Government of Ethiopia has ambitious plans for rolling out solar power in rural areas to achieve this, as part of its Growth and Transformation Plan II.
- Achieving the goals will require significant private sector investment. Current policy does not provide attractive incentives or create a sufficient enabling environment for private sector investment.
- Improving policy alignment will attract the private sector to invest and have positive co-benefits of creating employment and reducing import challenges.
- The Government can increase certainty for the private sector by:
  - sharing knowledge of its grid expansion and off-grid plans so the private sector does not invest in places that are soon to be connected
  - speeding up importation processes and reducing the associated costs
  - creating incentives for local manufacture that will increase employment opportunities and reduce the need for foreign exchange
  - insisting on quality products that ensure sustainability and build consumer confidence
  - supporting financing options that make these products affordable to the poor (including pay-as-you-go models).

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## A climate for solar power: Solutions for Ethiopia's energy poverty

**Solar energy is playing an important role in Ethiopia's rural electrification by providing off-grid energy to households and enterprises across the country. Under the country's Growth and Transformation Plan (GTP II), the Government of Ethiopia has set ambitious targets for expanding access to off-grid energy through solar technologies, including 3.6 million lanterns, 400,000 solar house systems and 3,600 solar photovoltaic (PV) systems for rural health centres, schools and other government service centres by 2020.<sup>1</sup>**

In 2005, only 1.2% of rural households used electricity, while the rest used kerosene and firewood. By 2016, electricity use in Ethiopia had increased to 26%, whereas kerosene and firewood use for lighting had dropped to under 8%.<sup>2</sup> Ten years ago, the penetration of solar systems in rural areas was negligible, whereas today these are used by more than 16% of the population – and this figure is growing.<sup>3</sup>

There is a range of off-grid products available to Ethiopia (see Table 1 overleaf). Off-grid electricity is currently used for lighting, charging mobile phones, and the provision of electric power to rural health centres, schools and water pumping systems, among other uses, and has seen remarkable growth in the past five years. In addition to falling global prices for solar equipment, this transformation can be directly attributed to the introduction of fiscal (e.g. tax exemptions for imports) and technical regulations (e.g. Global Off-Grid Lighting Association approved standards), as well as increased access to financing, made available to suppliers and consumers.

Dissemination of solar products for off-grid use is disproportionately larger

for solar lanterns than for solar home systems. According to information obtained from the Development Bank of Ethiopia, about 80% of the solar products imported into the country using the Bank's finance facility were solar lanterns. Information obtained from key stakeholders and end users in a recent market intelligence survey (see 'Recommended resources') also indicated that the price of a solar lantern is lower than that of a solar home system. In addition, it does not need a technician for installation, making it a more accessible technology than solar home systems. As a result, the rate of dissemination of solar lanterns in Ethiopia has been increasing sharply in recent years.

The involvement of the private sector to help meet the targets set in the overarching national policy is critical. However, the recent spike in demand for off-grid solar equipment has not been met by the supply end. The main challenges identified by the private sector include the lack of clear policy and standardisation procedures on solar equipment, limited foreign exchange availability and the involvement of

**Table 1. Types of solar products used for off-grid lighting**

Off-grid rural electrification with solar PV products can be broadly categorised into three types of technologies: solar lanterns, solar home systems and micro or mini grids

Category	Description	Descriptive sketches
<b>Solar lantern</b>	<ul style="list-style-type: none"> <li>• A typical solar lantern is a one-light system, which may have a jack for phone charging</li> <li>• All system components except the solar panel are integrated and contained in one unit</li> <li>• The power rating is usually less than 5 Watt peak (Wp)</li> </ul>	
<b>Solar home system</b>	<ul style="list-style-type: none"> <li>• These may contain two or more lights with phone-charging capacity</li> <li>• Higher capacity systems may provide sufficient power to operate several light bulbs, TVs and refrigerators</li> <li>• They usually have a capacity of more than 10 Wp</li> </ul>	
<b>Micro/mini grid</b>	<ul style="list-style-type: none"> <li>• These can be powered from one or more power sources</li> <li>• Power is distributed to end consumers using low voltage distribution lines</li> <li>• They generate 10 kilowatts (kW) to 10 megawatts (MW) of electricity, which households and enterprises can use for their energy needs</li> <li>• They consist of distributed generation and interconnected loads within a clearly defined electrical boundary that acts as a single controllable entity with respect to the grid<sup>4</sup></li> </ul>	

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several government actors in the various stages of the import process.<sup>5</sup> A recent assessment of the sub-sector concluded that finding workable solutions to lifting these barriers is critical to ensuring the viability of off-grid solar as an effective energy alternative in rural electrification, and to meeting the targets set in the GTP II and Sustainable Development Goal 7.

### Barriers to off-grid solar expansion

#### Capacity constraints

The Government of Ethiopia's commitment to off-grid rural electrification does not match its commitment to on-grid electrification. For example, in 2008 the Rural Electrification Fund (REF) focusing on off-grid connectivity had a budget of US\$45,000 from the Government and US\$1 m. in grant funding from multilateral sources, and only four employees. In contrast, the Universal

Electricity Access Program (on grid) had a budget of US\$45 m. for the same period and employed more than 2,000 people, making it the largest electrification programme in sub-Saharan Africa.

The lack of availability of long-term grid expansion plans by the Government of Ethiopia<sup>6</sup> has resulted in a lack of confidence in the private sector for investing in micro-grid infrastructure in rural areas.

While the markets for off-grid lanterns and solar household systems have grown, the technical services infrastructure – including capacity for design, manufacture and assembly, as well as installation and service provision – has not grown along with the rapid increase of sub-standard solar products on the market.<sup>7</sup> As a consequence, customers have had to deal with faulty installations, encountering technical problems with their devices and problems with poor quality.

#### Investment barriers

Too many organisations are involved in the business licensing, quality verification and taxation processes for off-grid solar products. The process involves numerous actors, ranging from ministries to banks and agencies working together in a system that is not streamlined.<sup>8</sup> This has led to delays and increased the transaction costs for enterprises. In addition, it has made the off-grid business unattractive for investors and made higher-wattage off-grid equipment unaffordable for most end users, thereby decreasing the penetration rate of off-grid solar equipment.

The involvement of various agencies in the importation process has also created communication gaps that inconvenience enterprises involved in the import and distribution of solar products. This is compounded by unclear jurisdiction in terms of which agency is in charge of verifying and approving quality certificates for solar products when they

arrive at customs.<sup>9</sup> It appears that the Ministry of Water, Irrigation and Electricity, the Ethiopian Energy Authority, the Ethiopian Revenues and Customs Authority, the Ministry of Trade, and the Ethiopian Conformity Assessment Enterprise all assume some responsibility, depending on various factors that are neither clearly defined nor effectively communicated to importers.

Presently, solar equipment that is imported into the country takes about 47 days to be fully tested. Testing is conducted without unloading the goods from the truck, which brings about high demurrage expenses for the importer.

### Financial constraints

The limited availability of foreign currency requires importers to wait up to three months or longer to access the foreign exchange needed to purchase solar products.<sup>10</sup>

Lack of sufficient consumer financing, coupled with high interest rates for solar products, have depressed demand and made solar products unaffordable for many. Enterprises are required by multilateral financial institutions to deposit 10% of the value of the products being imported. Multilateral financial institutions also charge interest rates of 15–20%. Similarly, commercial banks provide loan guarantees to solar enterprises to access a loan facility from the Development Bank of Ethiopia. While the Bank charges 12% interest, commercial banks add an additional 4% to secure the loan guarantee, increasing the total interest to 16%, which is directly accrued by the end user – increasing costs further.

### Recommendations to expand off-grid solar uptake

In mid-2017, the Energy Compact was signed between the Government of Ethiopia and the Government of the UK. The Energy Compact can provide

additional opportunities for private sector actors to provide long-term financing arrangements for end users to purchase solar products. Given that access to foreign currency is a constraint affecting imports to Ethiopia as a whole, solutions that reduce this dependency are highly encouraged by the Government of Ethiopia.

There are five key steps that the Government of Ethiopia can take to unlock further investment in the off-grid solar sector.

- 1. Share knowledge of the Government's grid expansion and off-grid plans.** The Government of Ethiopia can reduce the uncertainty preventing private actors from investing in off-grid projects by developing and communicating its electric grid expansion plan clearly and effectively. In addition, off-grid solar can be placed on a sustainable track by restructuring the REF to meet its full mandate and allocating a larger government budget. A larger budget allocation can be leveraged to increase the level of donor funding by proactively seeking match funding.

In addition, an update of the off-grid electrification master plan study conducted in 2006 should be undertaken by the Government to reflect current realities and a broader scope (focusing on the potential for renewable micro/mini grids, micro hydro, wind farms, etc.). Furthermore, key elements of the plan, particularly those focusing on market intelligence, should be updated every two or three years. Providing market intelligence, risk guarantees and capacity-building in off-grid solar financing to banks (development, commercial and microfinance) would enhance their readiness to lend to off-grid solar product suppliers and consumers.

- 2. Speed up and reduce the costs of the importation process.** Parallel formalisation and streamlining of institutions and regulations involved in the import process will go a long way to addressing the hurdles behind the import barriers. A 'Green Line' declaration to fast track customs clearance procedures could be introduced to streamline the process. A 'Green Line' is essentially a customs clearance fast-tracking mechanism for all goods certified by the Pre-export Verification Conformity. This will help avoid delays in customs, reduces potential losses from the importation of non-compliant products, directly reducing the price of goods for the end user.

The recent adoption of third-party verifications through Pre-export Verification Conformity seems to be working well for other countries in East Africa (e.g. Kenya, Tanzania and Uganda).

- 3. Create incentives for local manufacture.** Providing the necessary policy instruments – such as tax-free 'holidays', tax-free import privileges for equipment to manufacture and assemble solar technologies, the creation of awareness in industry hubs, and the establishment of associations to build capacity among local investors – will entice the private sector to manufacture and/or assemble solar equipment locally, as has been the experience in neighbouring East African countries. This would have wider co-benefits, not just in addressing the foreign exchange issue, but also in creating employment and reducing the import challenges that are currently prevalent.
- 4. Insist on quality products.** Appropriate conformity standards must be defined in line with the local context, specifically for renewable

off-grid mini/micro grids, as they have large market potential in Ethiopia. The Pre-export Verification Conformity mechanism of importing solar equipment can address capacity constraints at the Ethiopian Conformity Assessment Enterprise. Granting tax-free privileges only for equipment that meets the Pre-export Verification Conformity standards will encourage the private sector to import certified equipment – ensuring quality products are imported into the country.

**5. Support affordable financing options.** Increasing access to consumer finance through microfinance institutions (MFIs), pay-as-you-go technology providers and other sources is needed. Promoting arrangements such as risk guarantees and grants would reduce the high interest rates charged by banks and MFIs, and make solar products more affordable. Long-term financing arrangements are needed for end users to purchase solar products.

One way in which this could be addressed is through the implementation of the pay-as-you-go model, which allows people to purchase solar home systems by

making small payments at regular intervals using mobile money. Pay-as-you-go not only makes the product affordable to low-income rural households, but the fact that it is distributed and maintained by professional companies ensures that any technical issues are addressed appropriately.

### Recommended resources

Ethio Resources Group (2017) 'Off-grid solar development in Ethiopia: Market intelligence study report'. Study commissioned by the Climate and Development Knowledge Network (CDKN).

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