



M-Kopa has a large presence in the African off-grid solar market already, and was one of the pioneers of the pay-as-you-go model that has proven popular in many African countries.

New solar frontiers: Unconnected Africa

Off-grid Africa: As off-grid solar takes off in various markets worldwide, **p_v magazine** spoke with the major players in the sector's hotbed, Africa, where it is growing faster than anywhere else, and where innovation is playing a key role in bringing electricity to households for as little as \$0.50 a day.

Off-grid solar is growing at an unprecedented rate. In the second half of 2015 there was a 40% growth in sales worldwide compared with the first half of the year, according to the Global Off-Grid Lighting Association. But it is not growing in developed and well-established economies, but rather in emerging economies. In a case of "reverse innovation," the latest technology is being delivered first to developing economies – those

that need it more than already developed economies. Nowhere is this more evident than in Africa, which is leading the way in terms of off-grid solar sales and innovation – most recently with the introduction of delivery drones. Off-grid solar is now providing consistent power for millions of people on the continent, and as the market expands, so do the numbers of companies that want a piece of it: Approximately 40 are now operating

in Africa. As developments continue to form, **p_v magazine** got in touch with four of the biggest players in Africa's off-grid solar market – including a tour of Mobisol's new office in Berlin – for an update.

Leading the way

Established in 2011, and having connected more than 330,000 African homes to date, M-Kopa has the largest presence in the African market in terms of sales.

In fact, for financed solar, or “pay as you go solar,” M-Kopa makes up more than half of the market. The company’s numbers are impressive, installing more than 500 new systems every day, with a global workforce of over 2,000 people.

M-Kopa currently operates in Kenya, Tanzania and Uganda, where it has a network of some 100 service centers, and operates through a partner in Ghana. Plus, it’s keeping tabs on any new markets for fresh opportunities. “We are always keeping an eye on the mobile money penetration of new markets, since that is an important input into our offering for expansion opportunities,” cofounder of M-Kopa Chad Larson explained.

The largest company in terms of capacity installed in East Africa is Mobisol. Although it doesn’t sell as many systems as some of its competitors, its arrays – ranging from 80 to 200 W – tend to be larger. “We are the largest in East Africa in terms of capacity by far,” Mobisol Corporate Development Manager, Klaus Maier, proclaimed as he showed **pv magazine** around the company’s new headquarters in Berlin. “We have more than

5 MW of off-grid solar in operation in East Africa. The largest solar plant in East Africa is 8.5 MW, and it’s only running at half of its capacity, so we actually generate more power than that.” A digital ticker on the wall of the office counts every system that gets installed in Africa. At the start of the tour it was at 48,827 – by the end it had reached 48,836.

Mobisol sells its systems in Tanzania and Rwanda, and will soon be expanding into Kenya, with ambitious plans to expand across the entire continent. “We are in discussions with three or four countries in Africa who would like us to start operating there,” continued Maier. “Of course, we would like to go everywhere, and that is the eventual goal.”

Another major company with operations currently limited to Tanzania and Rwanda is Off-Grid Electric. After installing PV systems to over 100,000 homes, and now growing at a rate of 10,000 a month, Off-Grid Electric has the largest market share in Tanzania, and has the third largest in Rwanda, even though it has only been operating there for six months. As with the others, Off-Grid

i AT A GLANCE

- A handful of entrepreneurial solar companies are shaping Africa’s off-grid solar market
- Differing in approach, the firms share one common goal – to bring solar power to Africa’s underserved regions.
- Each business model, despite ostensibly charitable foundations, has a key aim: to continuously attract investment and raise funds for further growth.
- End users, however, reap the benefits of such “reverse innovation,” with PV-powered products proliferating across the region.

Electric has its own ambitions to expand into this thriving market and consolidate its already well-established position, cofounder and CTO Joshua Piece said, explaining that the company would be expanding into at least one West African country by the end of the year, but did not say which one that is.

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gies is another pioneering company on the African off-grid solar scene. Currently operating in 12 countries in Africa, it has the widest reach of any off-grid provider in sub-Saharan Africa, which enables it to maintain a unique position in the market. “The company has recently launched Azuri East Africa in Nairobi to consolidate our growing presence in the region and also has activity in West Africa, particularly Ghana and smaller activities in Southern Africa,” Azuri CEO Simon Bransfield-Garth said.

Pricing and funding

Azuri is another of the off-grid companies that has incorporated a “pay-as-you-

go” payment structure into its business model, so that its customers only pay for the energy they need, while paying off the system over an extended period of time. Carlin explained the process to **pV magazine**. “The process starts with an Azuri solar home system being installed at a customer’s house. The equipment will start storing energy straight away, but in order to access this energy, the customer must top up their unit with credit.

“The customer uses a mobile money service from their phone to send the correct amount. They receive a unique top-up code via SMS from Azuri in return, which they can type into their unit. Over the course of typically 18 months, the

purchase of top-up pays off the cost of the solar home system. After this time, the customer fully owns the system.”

Other companies, such as Mobisol use microfinance models, where they give microloans to their customers, who can pay back their systems over a maximum course of three years. Of course, customers may choose to pay for the system outright, or pay it back quicker. However, many are not in a position to do so, which means that ongoing sources of funding is required to facilitate continuing rollout.

Although Mobisol, M-Kopa, Azuri and OGE are playing a commendable role in the development process, by bringing electricity to communities that previously did not have regular access to reliable energy sources, they are quick to point out that this is not the main driver of their businesses. Rather, they are self-sustaining entities, which are attractive to outside investors. Each of the four companies that **pV magazine** spoke to have a sustainable source of funding, which is comprised of revenues from their own customers, as well as funds from private investment.

“Customer revenues are the main source of funds, but we have strong venture capital backers and lenders who assist as well,” said Larson from M-Kopa. The investment figures across the industry are impressive, as even a smaller company, in terms of revenue, such as Azuri has received \$12 million of investment since 2010. Off-Grid Electric has attracted more than double that, and is continuing to find innovative ways of funding. “We have raised \$25 million in equity, and also received the first-of-its-kind debt refinancing of \$45 million, which proves to the world that investors are seeing a genuine investable opportunity in the market,” added Piece.

Innovation driving the industry

The reason that these companies have managed to stay ahead of the curve is through their innovation and ability to think outside of the box. Nowhere is this more evident than at Mobisol, which is now using drones to deliver spare or replacement parts for its PV systems to its customers more efficiently. “There is not always a great road network to get to our rural customers,” explained Maier, “plus there is less traffic in the air. Right now they can only take small parts, but they could potentially take many other things

Photo: pV magazine/Sam Potheccary



Klaus Maier is Mobisol’s corporate development manager and told **pV magazine** that the company currently has more than 5 MW of off-grid solar power installed in Africa.

in the future. They could even take things like medicine to remote areas.” The systems that Mobisol offers come with the option to have various electric appliances included, such as TVs, speakers, radios, irons, and stoves, as well as things that can generate its customers income, such as hair clippers, or charging docks. “It’s like an iPhone, the reason that the iPhone is popular is because of the apps,” continued Maier. “If it didn’t have the apps then people wouldn’t have too much they could do with it. This is why we include the appliances people can use. Plus, it’s good for us if our customers can generate income.”

M-Kopa offers much smaller systems, ranging from 8 to 20 W, so they don’t have the capacity to include so many appliances, but still include vital equipment and for an affordable price. “Right now we have two products at \$0.50 per day with an 8 W panel – two lights on long cables with wall switches, phone charging module, battery pack, rechargeable radio, rechargeable flashlight – and a \$1.25 per day product with all of the above, but with a TV and a 20 W panel

with larger battery capacity,” Larson noted. He also confirmed that the company is working on a refrigerator that can be attached to the system.

Similarly, Off-Grid Electric uses a closed loop system, which includes a number of its own appliances and CTO Piece hinted that a new product line, in partnership with another firm, which will be launched soon.

“We’re incredibly excited about what is happening in the industry,” Piece continued. “The developments that are happening have allowed us to invest in our products. So there is a next generation of products that is on its way. The goal is to unveil the products in 2017.”

The way that Azuri is trying to make itself stand out in the market is by incorporating its own unique HomeSmart technology into its organic PV systems that are all developed in-house. The kits that Azuri offers are relatively small, as they range from 5 to 10 W, but it is the HomeSmart technology, which was introduced in 2016, that it believes sets it apart. “Azuri’s unique HomeSmart technology ‘learns’ the customer’s usage pat-

terns and then manages power provision to provide the best experience based on the available battery power, allowing users to depend on solar even in poorer weather conditions,” clarified Azuri CEO Bransfield-Garth.

“While we are beginning to see the idea of self-learning intelligent automation appear in high-end households, this is the first time that such intelligent technology has been applied to entry-level solar home systems. In a developed nation, intelligent automation may save around 25% of energy costs. Whereas, in a developing nation for off-grid communities, it’s the difference between being able to see at night or not.”

With this quartet of offgrid innovation leading the way in both technology, finance and delivery, it is easy to see why off-grid solar in Africa is in a healthy position. Enthusiasm at each of the companies is palpable, as even though they are driven by traditional business necessities, the goal of bringing electricity to communities that can benefit drives them even further. ♦

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