SOLAR FOR AFRICA

Solar development begins to accelerate in Africa

Africa receives more hours of sunshine than any other continent on Earth. So why doesn't it have more solar power? *Andrew Mourant* looks at the companies and technologies that could finally help Africa make the most of this renewable resource.

S olar power remains Africa's great untapped energy resource. While it's true that economically-advanced nations like Morocco and South Africa are home to some enormous installations, African renewable developers have yet to fully exploit the continent's abundant solar resources.

There are many reasons for this – fragile economies and remote terrain among them. Some areas are geopolitically unstable and so are shunned by investors. Where more stable countries offer better prospects, China has been alert, funding numerous infrastructure projects since the early 2000s. According to the International Energy Agency (IEA), China was behind 30% of all electric power generated in Africa between 2010 and 2015.

More recently it has backed a 55 MW solar farm in Garissa, Kenya, the largest in East Africa. Launched by President Kenyatta in December 2019, Garissa is the country's first major plant of its kind, costing \$128mn and meeting around 2% of national energy demand. It covers 85 ha and its 300,000 panels can produce more

Noor solar complex, one of the continent's largest renewable energy installations Photo: Moroccan Agency for Sustainable Energy

An aerial view of Morocco's

than 76,000 MWh a year, enough to power 625,000 homes.

Garissa was built by China's Jiangxi Corporation for International Economic and Technical Cooperation with money borrowed from the country's Exim Bank. A deal was struck for Kenya Power and Lighting Company to buy power around 40% cheaper than the diesel-generated equivalent.

In 2019, the World Bank approved \$237mn of grants from the Clean Technology Fund (CTF) and International Development Association (IDA) to help foster a market for stand-alone solar products in Western and Central Africa. An additional \$22mn was added this year. The aim is to create 'an enabling environment' for the production of lanterns, home systems and water pumps, with an emphasis on encouraging start-ups and established businesses. Loans are also available to solar equipment distributors and 'productive end users' of systems, such as farms and commercial and industrial SMEs.

Multinationals have also begun partnering with specialist off-grid solar companies. Examples include a joint venture involving French energy giant EDF's Côte d'Ivoire subsidiary and Californian start-up Off Grid Electric. This project had an initial target of installing 100,000 domestic systems in rural areas by 2020. Customers make monthly payments to reimburse the cost of installation and become owners of their equipment after three years.

Concentrated solar

The largest projects in Africa have, however, proved complex to fund and set up. Morocco is home to Noor Solar, one of the world's largest concentrated solar plants. It represents an effort by the country's government to reduce dependence on imported fossil fuels. Morocco plans to generate 52% of its energy from renewables by 2030.

Noor, an installation of over 580 MW near Agadir, was built in three phases from 2013 and is said to have cost around \$2.5bn. Named for the Arabic word for 'light', the project was built by an international consortium that includes ACWA Power, the Moroccan Agency for Solar Energy, solar power company Aries and Spanish technology provider TSK.

Constructed on sands below the

High Atlas Mountains, Noor's first phase opened in 2016, generating enough electricity to supply 650,000 people. Its solar panels track the sun, concentrating rays onto synthetic oil running through pipes. This liquid is then heated to 350°C, creating water vapour that drives a turbine-powered generator.

The latter phase is made up of a single large tower surrounded by thousands of flat mirrors that track and reflect solar rays towards a receiver at its top. Molten salts inside capture and store the heat.

Southern solar expansion

At the tip of the continent, South Africa has developed several major plants. They include the De Aar project, developed by Solar Capital, which has an installed capacity of 175 MW. The first phase was commissioned in 2014 and became operational in 2016. It was backed by the government's Renewable Energy Independent Power Producers Procurement Programme and supplies green power to 100,000 homes.

South Africa's PV market is booming and is predicted to reach an installed capacity of more than 3.6 GW by 2026, up from 1.5 GW in 2019. This success has, by all accounts, been stimulated by government initiatives, as well as the falling price of PV modules and systems.

Yet South Africa remains plagued by outages as demand for continuous power increases. It's a familiar story across Africa. In Tanzania, for example, one analyst calculates that electricity outages cost local businesses around 15% of sales. There is also a disruptive impact on community facilities – hence the growth of off-grid solar to power schools, hospitals and health centres. In 2019, the World Bank granted Tanzania's government \$4.5mn to help fund a sustainable water supply via improved solar pumping systems in rural villages.

Having the means to store power is crucial. In 2018, the World Bank announced it would commit \$1bn for a seven-year programme to triple investment in battery storage in developing and middle-income countries. Its backing was expected to draw in a further \$4bn of public and private investments, sufficient to finance 17.5 GWh of storage by 2025.

Earlier this year, South Africa awarded preferred bidder status to Norwegian renewable energy developer and producer Scatec for 540 MW of solar projects along with 225 MW of battery storage. This is to be a three-stage scheme built across Northern Cape Province. Over 120mn African households lack access to reliable and affordable energy and 60mn could remain without electricity by 2030 unless action is taken Power is expected to be sent to the grid from 5:00 am to 9:30 pm daily. Scatec will be paid under a 20-year power purchase agreement, the value of which has not been disclosed.

This summer came news that Mozambique coal power generator Ncondezi Energy will link up with South African investment company Nesa Capital in a joint venture to supply solar energy and storage. The plan is to fund and run 67 sites across both countries that can generate 16 MW of power, with 1.1 MWh of battery storage incorporated. Funding details were due to be finalised this autumn.

Elsewhere, the World Bank is developing solar parks with 150 MW of PV and 200 MWh of battery storage in Mali and Burkina Faso, the largest in the region. Other World Bank projects include a combined solar and battery storage project in the Gambia.

Clearing hurdles

Finding a way to fast-track storage and solar in Africa is key, given that both technologies have fallen in price and installation times have improved. Katrien Hinderdael, who has worked with the US Trade and Development Agency's sub-Saharan team, has called for a regulatory system to encourage expansion. She believes such a system it would stimulate market competition along with local, private and government investment.

'It must attract foreign investment, and regulators must understand the technology to... catalyse deployment,' she says. But, she adds, there's a lack of such knowledge in some African governments 'as regulators are mainly politicians.'

In the summer, the European Investment Bank (EIB) and International Solar Alliance surveyed obstacles to widespread development of off-grid solar. Their report estimated that over 120mn African households lack access to reliable and affordable energy, and 60mn could remain without electricity by 2030 unless action is taken.

The study focused on detailed consultations in Uganda, Rwanda and Nigeria. It found that investment challenges – affordability, working capital and exchange rate risks – along with political and economic stability often scared off the private sector. But, the report added, hurdles could be overcome through combining commercial financing and support from development finance partners. Successful local initiatives

offered some pointers – how, for

example, aggregated purchase of solar home systems can cut costs and give low-income communities and refugees swift access to reliable energy. The EIB is supporting eight off-grid projects and last year provided €5mn for private and public investment in Chad, Comoros, Gambia, Kenya, Mozambique and Uganda.

Togo, meanwhile, is electrifying rural areas through off-grid solar at national level via its CIZO programme ('cizo' means 'light up' in Mina, a Togolese language). Here, the World Bank has funded support for the private sector. Besides powering community facilities through standalone solar, there is also a drive to increase the number of small farms using renewable energy.

Pay as you go

Under the CIZO scheme, households receive their power via smart mini grids. A pay as you go (PAYG) platform has been created to integrate payments and data collection. In fact, mobile moneyenabled digital payments have become central to the off-grid energy sector – a rapid expansion of PAYG solar home systems across Africa enables customers without bank accounts to pay remotely and securely. The systems can also monitor customer consumption and tailor repayment plans.

Malawi is another country where PAYG is taking root. Since 2018, the government's energy policy has focused on off-grid solutions to tackle a shockingly low level of electrification –11% overall and just 4% in rural areas. Its solar home systems initiative (SHS), besides increasing access, also aims to support private sector business offering operational support, capital and financing.

SHS has received \$2mn from USAID. Various companies such as SolarWorks, Vitalite, Yellow Solar and Zuwa Energy aim to deliver off-grid electricity to more 100,000 Malawian households before 2023. Financial backers include the government and national banks. Energy providers include pay-asyou-go service M-PAYG, which targets low-income households.

Scratch the surface of most countries across Africa and you will find a story of off-grid solar and battery storage helping the neediest. But the demand for more is immense. The answer to Africa's needs is sitting in the sky. But harnessing solar power on Earth so everyone can benefit remains a huge challenge. ●