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Off-grid solar power

Africa unplugged

GAKENKE

Small-scale solar power is surging ahead

A FEW miles down a rutted dirt road, and many more from the nearest town, a small farmhouse stands surrounded by dense green bush. On the inside of one wall gangly wires reach down to a switch and light that are connected to a solar panel. Readers in rich countries may well consider electric lighting mundane. But in northern Rwanda, where fewer than one in ten homes has access to electricity, simple solar systems that do not rely on the grid—and use a battery to store electricity for use at night—are a leap into modernity. A service once available only to rich Africans in big towns or cities is now available for just a few dollars a week. People are able to light their rooms, charge a smartphone and listen to the radio. In a few years they will probably also be watching television, powering their irrigation pumps and cooling their homes with fans.

In short, poor people in a continent in which two of every three people have no access to power may soon be able to do many of the things that their counterparts in rich countries can do, other, perhaps, than running energy-hogging appliances such as tumble dryers and dishwashers. And they will be able to do so at a fraction of the cost of traditional sources of energy while also acting as a testing ground for technologies that may even make their way back from poor countries to rich ones.

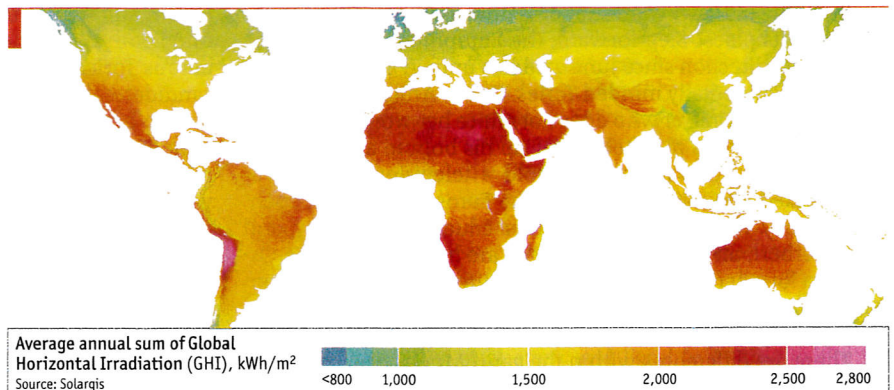
Off-grid solar is spreading at an electrifying pace. An industry that barely existed

a few years ago is now thought to be providing power to perhaps 600,000 households in Africa. The pace of growth is accelerating in a continent that, more than any other, is rich in sunshine (see map). Industry executives reckon that over the next year the number of home-power systems on African roofs will grow by 60-100%. M-Kopa, the market leader, has installed 400,000 systems and, at its current rate of growth, may add another 200,000 to that number over the next year. Smaller rivals such as Off Grid Electric, Bboxx and Azuri Technologies may well double their client base over the same period.

This fast pace of growth suggests that, if sustained, off-grid connections will within a few years outstrip the rate at which people are being connected to the grid, leap-

frogging power lines in much the same way that mobile phones bypassed fixed-line telephone networks. This promises not just to improve millions of lives but to help deal with a chronic shortage of power that, the World Bank reckons, trims about two percentage points from Africa's annual economic growth.

Extending electricity grids across Africa might seem a better alternative. But, for the moment, it is unrealistic. Rwanda, one of Africa's most densely-populated countries, found that it costs an average of \$880 to link a house to the grid. Yet even that figure is misleading since it changed its policy to concentrate on connecting only those homes that are already close to existing power lines. Before this change it cost an average of about \$2,000 per connection, about ten times the cost of an off-grid system. The Africa Progress Panel, a group of experts led by Kofi Annan, a former UN secretary-general reckons that more than 600m people are not connected to grids and that to wire them up, investment in electricity infrastructure would have to rise to about \$55bn a year from the current \$8bn. On current trends it would take until 2080 to link all Africans to the grid. ▶▶



Just a few years ago the idea that “off-grid” systems could fill the gap seemed preposterous: the market was dominated by charities giving away solar-powered lanterns that could produce a few hours of light at night. But as technology and venture capital firms have entered the market, the industry has quickly evolved, helped by three developments.

The first has been an 80% fall in the cost of solar panels since 2010, according to the International Renewable Energy Agency to as little as 52 American cents per watt of capacity. A more important innovation has been the “pay-as-you-go” business model, based on selling electricity as a service rather than selling solar cells. A bevy of companies have sprung up offering to install systems and then charge customers a weekly or monthly fee. This allows poor households to have part-use of solar systems costing as much \$250 that they would struggle to buy outright. Many firms have connected their systems to mobile phone networks so that they can bill customers using mobile money and cut them off the moment a payment is missed (some are building in Wi-Fi routers to offer internet connections, too). Default rates are anyway low because many rural Africans already spend some \$100-\$140 a year on kerosene lamps and candles, and another 15-25c each time they charge their phones.

The third big change has been in the development of devices that use less electricity. The most important of these are light-emitting diode (LED) bulbs, which provide illumination with about 20% of the energy of conventional bulbs. But energy savings are also spreading to phones, televisions, fans and radios. Azuri Technologies is taking this a step further by building intelligent solar systems that learn how their users typically use energy. The system then uses this information to ensure it never leaves them in the dark. If a cloudy day reduces the amount of power it collected then it will imperceptibly dim the lights and television to keep them running.

The biggest constraint to faster growth is a shortage of finance, since most off-grid firms are putting up the money for new installations, but are only getting paid back by their customers over time. A second constraint is production. Mansoor Hamayun, the CEO of Bboxx, laments that he can't make systems quickly enough. “It's not about a lack of demand...we run out of stock frequently,” he says.

To be sure, home solar will not solve all of Africa's power problems. Current systems can already light up small shops and service businesses such as hairdressers—Lumos Global reckons that about a quarter of its systems are used in hospitals and businesses. Several firms are working on scaling them up to provide power to small factories and farms. But even so, off-grid power will not displace the traditional

sort when it comes to big industries.

For the moment many policymakers in Africa see the two technologies as competing and fret that off-grid power companies will eat into the customer base of state-owned electricity monopolies. Instead they should encourage the competition that is lifting the burden of rural electrification from the state while allowing it to concentrate its investment in improving power supplies in those areas where it can be used to power industrial growth. ■



The International Criminal Court Exit South Africa

JOHANNESBURG

A terrible blow for the court, and for a beleaguered country

UNDER Nelson Mandela's government, South Africa championed the creation of a court to try the world's worst criminals. Out of apartheid and the Rwandan genocide came a boon for international justice. “Our own continent has suffered enough horrors emanating from the inhumanity of human beings towards human beings,” Mr Mandela said ahead of the Rome statute adopted in 1998, which established the International Criminal Court (ICC). So strongly felt was this mission that South Africa incorporated the ICC's founding treaty into its own domestic laws.

But under President Jacob Zuma the country has taken a radically different turn. On October 21st South Africa's government filed notice of its intention to quit the ICC (the process will take a year). This puts South Africa in the company of Burundi, which said it was leaving after the

ICC began investigating the wave of killings that followed President Pierre Nkurunziza's decision to cling to a third term. Other African countries may follow suit. The Gambia, another human-rights abuser, says it will do so. Kenya, Uganda and Namibia have made similar threats.

South Africa's explanation for leaving rings hollow. Its official notice complains that its obligations under the Rome statute clash with conventions around diplomatic immunity for heads of state and hinder its ability to broker “peaceful resolution of conflicts.” This was the case when Sudan's president pitched up in Johannesburg for an African Union summit last year. Under the ICC rules, South Africa was obliged to arrest Omar al-Bashir, who is wanted by the ICC on genocide charges for the deaths of hundreds of thousands in Darfur. Instead Mr Zuma (pictured, left) welcomed him. Mr Bashir bid a hasty retreat back to Khartoum when civil-society groups took the South African government to court in an attempt to force his arrest.

Many South Africans, including the liberal opposition and human-rights bodies, see the decision to leave the ICC not as a triumph for pan-Africanism but as another moment in the country's descent under Mr Zuma, who has repeatedly shown little respect for the law. Even the leftist Economic Freedom Fighters (EFF), which roundly criticises the ICC for bias against Africans, has condemned the move as irresponsible.

The timing is also questioned, with Mr Zuma and his government facing a string of legal challenges. Two lower courts have ruled that the government broke the law by failing to arrest Mr Bashir. The Constitutional Court was due to hear an appeal next month, though the justice minister now says it will be withdrawn. There are also questions over the process of leaving the ICC. The opposition Democratic Alliance has launched a court challenge arguing that the move is unconstitutional because the government failed to seek approval from Parliament.

Meanwhile the president, beset by a battered economy, violent student protests and factional disputes within his party, has his own legal woes. Earlier this year Mr Zuma was found to have violated the constitution in a row over expensive improvements to his house. He now faces the potential reinstatement of corruption charges linked to an arms deal. At the same time the country's respected finance minister, a rival of Mr Zuma, is due in court on spurious charges. George Kegoro of the Kenya Human Rights Commission reckons that South Africa's move to withdraw from the ICC is a response to Mr Zuma's political problems: “Impervious to the country's political history...the South African leadership is marching the country to a legal wilderness, where South Africa will be accountable for nothing.” ■