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Electricity does not change poor lives as much as was thought

Getting a power connection to the poorest of the poor may be the wrong priority for a cash-strapped government



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THOUGH SHE lives in one of the world's poorest countries, Drocella Yandereye is a picture of upward mobility. Her small farm in Rwanda, where she grows maize, beans, bananas and coffee, is thriving. She has built a new house and turned her old one into a chicken shed. Her interests range well beyond her village, evidenced by the two posters on her living-room wall showing African leaders and the countries of the world. What makes her even more unusual is that she has electric light.

ADVERTISING



It is not the kind of bright, leave-it-on light that people in rich countries take for granted. A small solar panel on Ms Yandereye's roof is connected to a wall-mounted battery, which powers a radio and three LED ceiling lamps. Ms Yandereye also uses the battery to charge her mobile phone and a portable lamp that she hangs around her neck. All the lamps are rather dim. But they produce just enough light to allow her children to study after sunset, and they do not kick out foul fumes, like the kerosene lamps she used to depend on.

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Almost 140 years after Thomas Edison began selling filament light bulbs, just under 1bn people worldwide still lack access to electricity, according to the International Energy Agency, a research group. Almost two-thirds live in Africa, mostly in the countryside. The UN believes all should have power, and has set a target date to achieve universal access of 2030. That sounds plausible—since 2000 the number of people without power has fallen by 700m. Sadly, it is unlikely to happen. And recent economic research shows that rushing to illuminate the world is a bad idea.

The old-fashioned way of bringing electricity to the masses entails building power stations and transmission lines. This is still popular. Last year India's government claimed that it had connected every village to the power grid, although this does not mean every household is connected, still less that power is available 24 hours a day (see [article](#)). Myanmar and Senegal are racing to do the same.

In the past few years, though, governments and aid agencies have put more faith in solar power. They have built or paid for "mini-grids" that can power a village or a school. More often they have given tax breaks and subsidies to firms that sell small solar kits. In Bangladesh, the number of solar home systems (that is, closed electricity systems powered by a small panel on the roof) shot up from 16,000 in 2003 to 4.1m by the end of 2017. Ethiopia's "national electrification programme" calls for connecting 35% of the population to small solar systems by 2025. That proportion is expected to decline thereafter as more homes are plugged into the grid.

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are often sold on a pay-as-you-go basis. Every few months, a household is asked to pay another instalment, which can be done by mobile phone. The company then sends a code, which the householder types into the battery. That keeps the lights on.

Rwanda is trying all of these approaches at once. The government already claims to have connected 31% of households to the electricity grid, up from less than 10% in 2009. Another 11% are thought to have solar power. Helped by foreign aid,

officials are now trying to connect every household to the grid or to solar power by 2025. This is just about feasible. Rwanda is small and densely populated, if annoyingly hilly, and its government is competent. Yet the projected cost is huge. Add up the mini-grids, the transmission lines, the new power stations and the credit lines to sellers of solar home systems, and Rwanda's energy plan amounts to \$3.1bn over six years. The entire government budget this year is \$2.8bn.

Not surprisingly, people enjoy having even small amounts of electricity. Ms Yandereye, who bought her lamps from One Acre Fund, a charity, says that her neighbours admire them. She has found uses for the power. She uses a portable lamp to get to her local church at night and another to light her chicken shed. Two years ago, her chickens caught a disease. Now that they have a light, she can keep the door closed, which she hopes will protect them.

Yet most people who live in poor remote places are like Ms Yandereye's neighbours: they desire electric light and power but cannot afford it, even with modest subsidies. For essentials, such as charging a phone, they can pay a neighbour or a shop. One study of Rwanda published last year, by Michael Grimm of the University of Passau and others, found people ready to pay between 38% and 55% of the retail price for solar-lighting kits, on average. The researchers' kits cost between \$13 and \$182 depending on power levels and quality.

Even small towns in Rwanda have shops selling solar home systems—but not necessarily to poor farmers. Local salesmen for Bboxx and Mobisol, two of the market leaders, report that many of their customers are middle-class urbanites already connected to the electricity grid. Some are buying kit for their parents in the villages. Others have become frustrated with flickering mains power and want a backup.

A connection to the electricity grid is far more expensive. As a rule of thumb, it costs at least \$1,000 in a rural area. Academics at the University of California, Berkeley, have tested Kenyan villagers' willingness to pay. They offered a large subsidy, which brought the price of a connection down to \$171. Only 24% of people plumped for it.

If electricity and light truly transformed people's lives, it might make sense to offer large subsidies for solar systems and grid connections or even to give them away. It might bring benefits that people could not have imagined. Or they might know about the benefits but be unable to afford the upfront cost. But there is little evidence of this. Another study by Mr Grimm and his colleagues found that Rwandans who were given solar lamps responded by lighting their households more brightly, for more hours each day. They burned less kerosene, and their children studied a little more, especially at night. But the adults' working lives changed hardly at all. Solar lamps appear not to rescue people from poverty.

Nor even does a grid connection. A detailed study of rural Tanzania, where America's Millennium Challenge Corporation built power lines and subsidised connections, found little effect on adults' welfare. Offering cheap connections cut the proportion of people living on less than \$2 a day from 93% to 90%—hardly a transformation. Children's lives changed, but perhaps not in a good way. Those who were connected went from watching almost no television to one and a half hours a day, and did even less housework than before.

Another study, of Bangladesh, found that the benefits of grid power accrue mainly to better-off households. Hussain Samad and Fan Zhang of the World Bank estimate that connections boost the spending of people in the top fifth of the earnings scale by 11%. People in the bottom fifth see a benefit of 4%.

A connection to the electricity grid often puts the utility company—and ultimately the government—on the hook. Many newly connected households pay little or nothing for their power, either because the power company has a progressive tariff, because people refuse to pay, or because they tap transmission lines illegally. An ongoing study of Bihar in north India

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The passing of the torch

One oft-cited benefit of connecting a person to the grid or to solar energy is actually diminishing. That is because many people who lack electricity no longer rely on kerosene. One Rwandan woman who is picking up her first solar lamp at a distribution point in Nzaratsi says that she has hitherto used simple torches—just batteries wired to LEDs. These are

extremely cheap, costing about \$0.25, and are available from village shops. People tend to throw the dead batteries in their latrines, which is hardly ideal, but is not as immediately harmful as the smoke from kerosene lamps.

Electrification may bring benefits that economic studies miss. Robin Burgess of the IGC argues that a short-run study of households may not be the right lens: electrification might mostly benefit businesses, and not at once. Moreover, countries will have to bring power to their people eventually. But to spend a lot of scarce cash doing so now, in the hope that benefits will turn up, hardly seems enlightened.

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