The low carbon energy lift

powering faster development in sub-Saharan Africa

green alliance...

The population of sub-Saharan Africa (SSA) has the lowest level of energy access in the world, accounting for forty one per cent of the world's energy poor.[1] Even with robust economic growth, its existing energy infrastructure is a brake on progress. With population growth continuing to outstrip electrification, the number of people without energy access is only projected to grow.

This has significant implications for development, with impacts on health, education and household economy. Disproportionate amounts of time and income are spent securing energy by other means, such as gathering wood, which also has detrimental impacts on the natural environment. Health centres lack the light needed for vital operations and the ability to keep medicines cool. Households go dark when the sun sets, preventing children from studying, adults from continuing productive activity and families from socialising.

Low carbon, decentralised energy can reach communities much faster than expanding existing, inefficient central grid systems. And it offers immediate improvements to people's lives. Projections for achieving universal energy access in SSA acknowledge this potential and assume that just over half the provision will need to be mini and off grid solutions. Such options will also be more resilient in the face of climate change.

On grid renewables are also growing and we have illustrated the plans of Kenya and Ethiopia. But barriers remain, and they are significant.

Achieving universal energy access in SSA requires more than a tripling of current capacity. This is a huge challenge. But it also means that expansion of low carbon energy is an opportunity that shouldn't be missed, both to accelerate development and by enterprising UK businesses with the expertise and appetite for new growth markets.

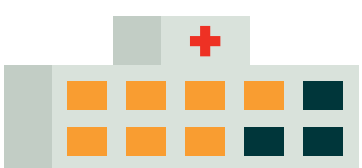
There is very limited access to energy in sub-Saharan Africa

How many people have access to energy?[1]

Only 20% are on grid

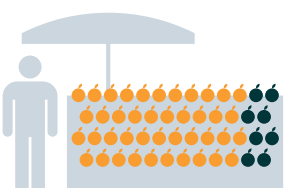
10% are 'under electrified' [2]

70% of the population have no access at all to electricity, with 4/5ths in rural areas



30% of health facilities have no electricity[3]

65% of primary schools have no electricity[3]



Informal traders lose 16% of their turnover due to unreliable energy[4]

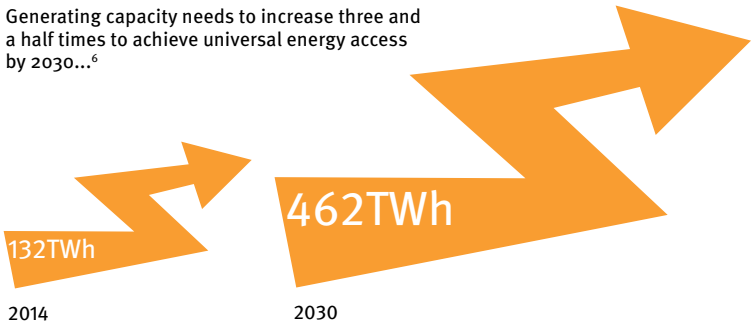
50% of vaccines are ruined due to lack of refrigeration[3]

Studies show an increase in academic age of 1.8 years with electric lighting[4]

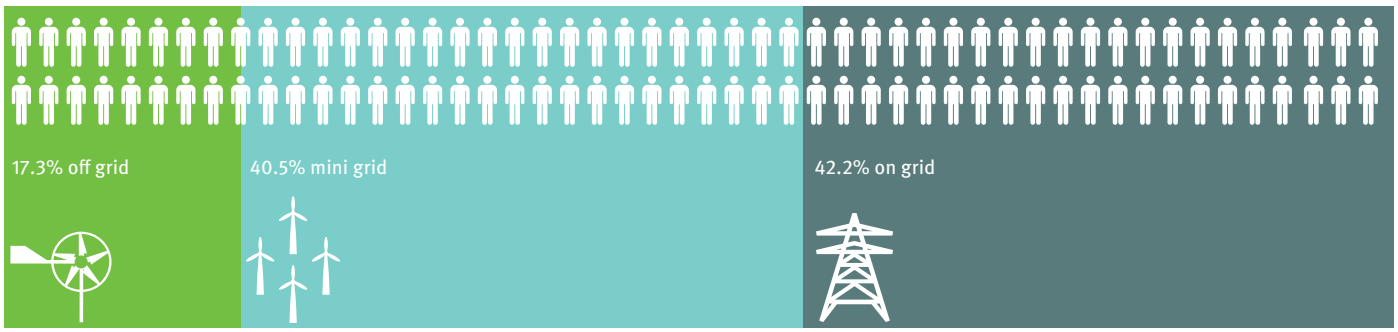
Factories experience power outages 56 days a year on average[5]

Decentralised energy is critical to increasing access

Generating capacity needs to increase three and a half times to achieve universal energy access by 2030...[6]



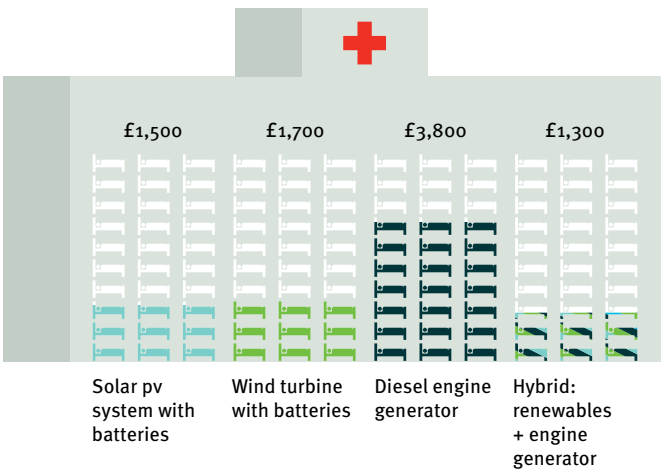
...to achieve this, over half the capacity will need to be decentralised, comprising off grid and mini grid technologies, as the central grid will remain inaccessible to many[1]



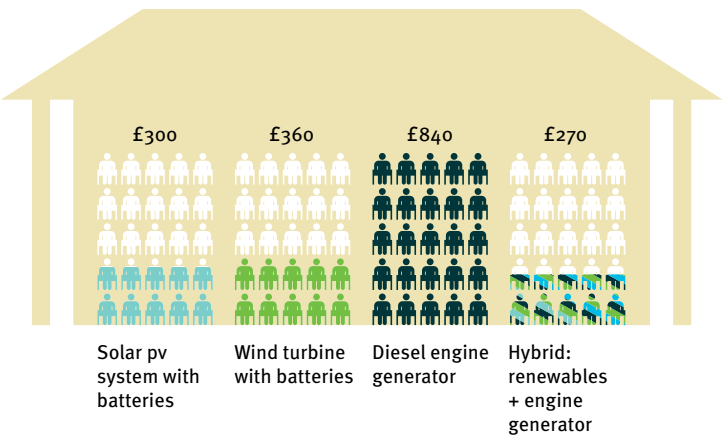
Low carbon energy options are cheaper

The annual operating cost of different energy options

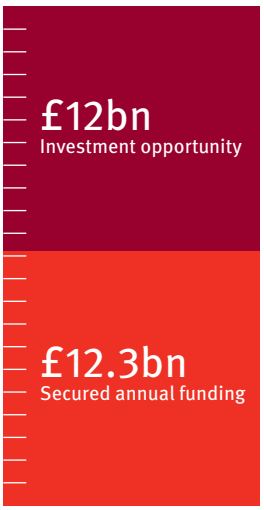
A health clinic with 120 beds using 25kWh per day[3]



A school with 100 students and four classrooms using 5kWh/day[3]



The challenges and opportunities for low carbon energy



£24.3 billion is needed annually to expand sub-Saharan Africa's power sector[7]

Large scale renewables

Private investment is essential. The UK has contributed £98 million to the Green Africa Power fund, which will finance ten renewable projects. It aims to stimulate investment, address market failures and demonstrate the viability of renewables; the UK has also given £11 million to REACT, a competition for companies providing access to low carbon energy for the rural poor.[8]

Expertise in large scale renewables still largely comes from overseas, but there are schemes committed to increasing local capacity. A British built solar plant in Ghana will include a training programme for local workers and renewables manufacturing sites are opening, including in Kenya, Ethiopia and Ghana.[9]

Policy context is important for investors. Sixty three per cent of countries in sub-Saharan Africa now have a formal renewables target and 19 per cent have a feed-in tariff (FiT).[10] Ghana's Renewable Energy Act and its FiT have galvanised solar investment in the country.

Off grid renewables

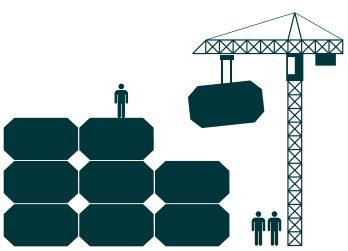
Upfront costs are prohibitive for households and communities. Pay as you go options, such as Indigo solar from UK company Azuri Technologies, make use of mobile phone payment networks which already have significant rural penetration. Customers buy scratchcards and activate access to solar energy via an SMS.[11]

Distribution is difficult as many people cannot get into towns and cities to learn about the options available. SunnyMoney, developed by UK charity Solar Aid, uses headteachers to communicate the benefits of solar lights, and networks of entrepreneurs to sell them to remote communities.[12]

Low carbon energy is already improving lives

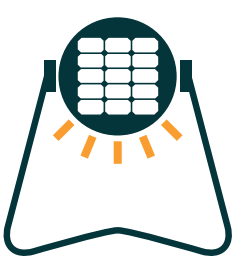
Growth in off grid solar pv has given 2.5 million households in Kenya access to energy[13]

Households save 12.6 per cent of their income by switching from kerosene lamps to solar lights[14]

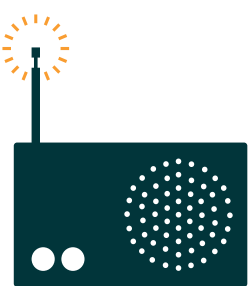


Large scale solar projects in Ghana are creating 2,150 permanent jobs and are expected to stimulate a further 2,100 in the wider economy[15]

Children study for an extra hour each night, on average, after switching to solar lights[16]

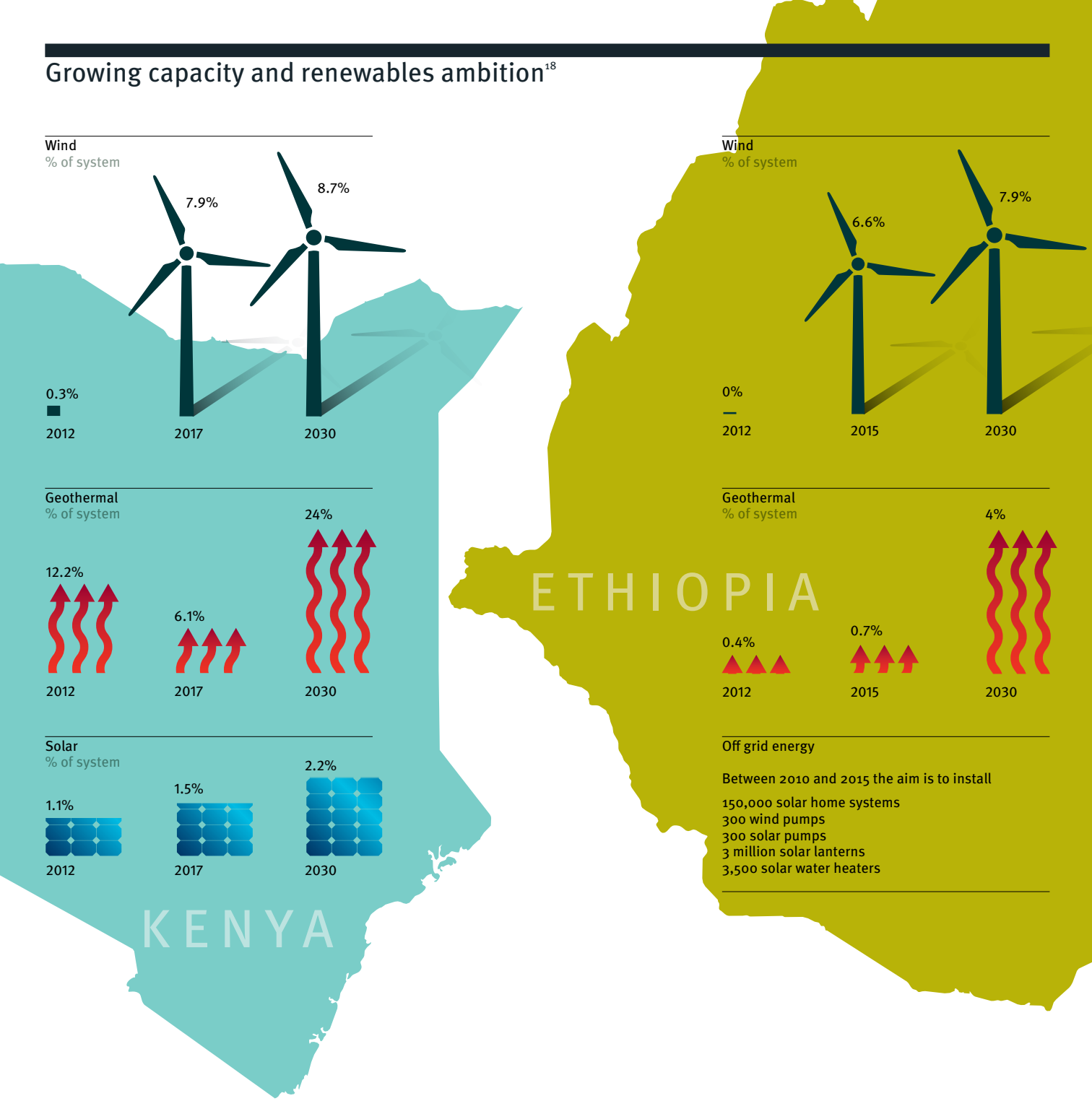


Two thirds of households replacing kerosene lamps with solar lights report health improvements[17]



Solar powered radios used by birth assistants in Uganda have helped to reduce maternal mortality by more than half in three years[3]

Growing capacity and renewables ambition[18]



Off grid energy

Between 2010 and 2015 the aim is to install

150,000 solar home systems
300 wind pumps
300 solar pumps
3 million solar lanterns
3,500 solar water heaters

Data sources

[1] A Doig and M Adow, 2011, *Low-carbon Africa: leapfrogging to a green future*, Christian Aid

[2] www.lightingafrica.org, 2014, 'Lighting Africa in numbers'

[3] Practical Action, 2013*, Poor people's energy outlook 2013: Energy for community services*

[4] Practical Action, 2010*, Poor people's energy outlook 2010*

[5] A Eberhard *et al*, 2008, *Africa infrastructure country diagnostic – Underpowered: the state of the power sector in Sub-Saharan Africa*, World Bank

[6] Meeting universal energy access by 2030 in SSA requires a capacity of 462 TWh, see reference 1; SSA's current capacity in TWh is calculated based on current energy use of 153 kWh/person (0.153 MWh), see IRENA, 2012, *Prospects for the African power sector*. Multiplied by the current population of 866 million it is 132,498,000 MWh (132 TWh). 132 TWh to 462 TWh is an increase of 3.5 times.

[7] Ecobank, *Middle Africa insight series*, 30 January 2014, 'Fully charged: key dynamics in middle Africa's power sector in 2014'

[8] DFID, 2012, *Business case and intervention summary: Green Africa Power (GAP)*; DFID, 2012*, Annual review of Renewable Energy and Adaptation to Climate Technologies (REACT)*, both accessed from http://devtracker.dfid.gov.uk

[9] J Hill, 2014, 'Largest African PV project to begin construction early 2014', www.cleantechnica.com; B Willis, 28 February 2014, 'Ghana in line for hundreds of megawatts of PV power and manufacturing capacity', www.pv-tech.org; S Oirere, 18 April 2012, ' Ethiopia to get its first PV assembly plant', www.pv-magazine.com; I Clover, 20 January 2014, 'Solar could power half of Kenya by 2016, according to experts', www.pv-tech.org

[10] 30 out of 48 countries have renewable energy targets in place and nine out of 48 have a feed-in tariff. Data from REN21, 2013, *Renewables 2013 global status report*, Paris REN21 Secretariat; www.map.ren21.net, 2014, *Renewables interactive map*

[11] www.azuri-technologies.com/indigo/how-it-works/

[12] www.solar-aid.org/how-it-works

[13] Observ'ER, 2013, *Fifteenth inventory – edition 2013*: *renewable origin electricity production details by region and by country*

[14] Average annual income in SSA is $556, see *The Economist* blog, 21 January 2014, 'Incomes in sub-Saharan Africa: standing still but going backwards'*;* households save an average of $70 switching to solar, see www.solar-aid.org/impact

[15] Ghana has nine solar plants in train. Each is expected to permanently employ 200 people and a panel manufacturing facility is expected to employ 350 people. See Z Shahan, March 5 2014, 'Ghana to get giant solar-parks and solar panel factory', www.treehugger.com; Blue Energy, 8 February 2012, 'Africa's largest solar (PV) power plant'

[16] www.solar-aid.org/impact

[17] SolarAid, 2013, *Health factsheet*, accessed from www.solar-aid.org/impact

[18] For references and methodologies for country profiles, go to www.green-alliance.org.uk/SSAcountries_sources

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