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Reaching the Last Mile: Effective Energy for the Poorest

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Background

The Sustainable Development Goals are important in pushing forward transformations in all parts of our lives. Through the digital revolution, sustainable food production, smart cities, education, gender equity and a more sustainable economies, we have been encouraged to believe that we can achieve prosperity for all whilst leaving no one behind. The evidence is compelling. For example, life expectancy has doubled over the course of a century; fewer people die by war and violence than suicide – still a shocking fact; and while far fewer people go hungry, one billion people are now obese. Energy has been a significant driver in these improvements, giving rise to cleaner water, education, heating and cooking. Which is of course why sustainable access to energy is considered to be the power to catalyse social and economic development and promote better educated, healthier, more productive and resilient communities.

Yet many families across the globe continue to live with inadequate access to reliable and affordable energy. The transformations that the SDGs rely on will only occur if we address the issue of access to clean and affordable energy by all. As we can see there are no low energy rich countries.

Decarbonizing energy systems requires integrated approaches across power generation, transmission, buildings, transport and industry, which fall into three distinct areas. The first covers the decarbonisation of electricity generation by shifting from fossil fuels to zero-carbon sources, including wind, solar, hydro, geothermal and tidal energy, among others. Some countries may also expand nuclear power or consider continued fossil-fuel use with carbon capture and storage. Smart-grid management and long-distance power transmission can address intermittency, reduce electricity storage needs and increase the efficiency of power grids. Second, we need to improve energy efficiency in final energy use, including transport, heating and cooling of buildings, industrial energy use and household appliances. The third is the electrification of current uses of fossil fuels outside of power generation, in cars and heaters, and various industrial processes such as steel and cement production. Biofuels and biomass can provide clean thermal energy, but their use must ensure consistency with food security, biodiversity conservation and other SDGs.

What proportion of the world does not have access to electricity?

Electricity is a crucial for poverty alleviation, economic growth and improved living standards. Measuring the share of people with electricity access is therefore an important social and economic indicator. There is no universally adopted definition of what ‘access to electricity’ means. However, most definitions are aligned to the delivery of electricity, safe cooking facilities and a required minimum level of consumption. The International Energy Agency (IEA) definition entails more than just the delivery to the household. It also requires households to meet a specified minimum level of electricity, which is set based on whether the household is rural or urban, and which increases with time. For rural households, this minimum threshold is 250 kilowatt-hours (kWh) per year and for an urban household it is 500 kWh per year.

At a global level, the percentage of people with access to electricity has been steadily increasing over the last few decades. In 1990 just over 71% of the world population had access; by 2016 this had risen to over 87%. This progress also holds true when we look at the total number of people without electricity access. In 2015, the total number without electricity fell below one billion for the first time in decades; very likely the first time in our history of electricity production.



This means 13% of the world or 940 million people did not have access to electricity in 2016.

Where do the people live who do not have access to electricity or clean energy and fuel?

High-income countries – or countries defined by the UN as ‘developed’ are assumed to have an electrification rate of 100%. Therefore, the increasing global share has primarily been driven by increased access in low and middle-income economies. In many countries, this trend has been striking: access in India, for example, increased from 43 percent to almost 85 percent. Indonesia is close to total electrification (sitting at almost 98 percent) – up from 62 percent in 1990. For countries with strong population growth, such improvements in the share of the population with access is even more impressive. Whilst the trend is upward for most countries, a number are still severely lagging. At the lowest end of the spectrum, only 8.8 percent of Chad’s population has electricity access. For some countries, significant improvements in access will remain a pressing challenge over the next few decades. Global access to electricity has been steadily rising in recent decades but the figure of 940 million people without access to energy is still unacceptably high — and gains in access are moving too slowly to reach the goal of universal access by 2030. This is particularly true for Sub-Saharan Africa — despite the share of the population with electricity rising steadily, population growth means that the total number of people without access was on the rise until 2016.

There has been a regional shift in electricity access over the past few decades: in 1990, nearly half (45 percent) of people in the world without access lived in South Asia. By 2016 this had shifted significantly: the largest share now lives in Sub-Saharan Africa (which is now home to nearly two-thirds of the world population without electricity access).

The 940 million people without access are mostly in rural areas, and indeed there are still rural communities in developed communities using traditional sources of energy such as peat and cow dung. In the UK, energy poverty, another indicator of a lack of access to affordable clean energy, is still as high as 48 percent in parts of the country. In addition, there are 2.8 billion people, many in urban slums, who still do not have access to clean fuel and technologies for cooking.

Are there gender differences?

Energy exclusion is endemic among the poor and women are often more likely to be excluded. This is because they tend to be more income constrained and have different energy needs and preferences — a result of gendered economic and social roles — a fact that is not be reflected in the energy solutions.

For example, electricity availability is a very important ingredient in agriculture. With electricity availability, farmers can achieve cooling for fish, meat and milk which can boost production but promote good health. Small scale farmers use electricity for irrigation and electrical pumps.

There is also a positive correlation between electricity connectivity and security. The majority of gender crimes in developing countries occur in darkness. With electricity providing lighting, there can be a significant reduction in crime levels. Lighting can also lead to increased business hours and by extension better conditions for both businessmen and the populace.

A recent analysis from the International Network on Gender and Energy on how gender aspects need to become better embedded in energy policy concluded that:

- i) Universal energy access targets are unlikely to be met unless energy policies are aligned to women’s as well as men’s energy needs, their assets, skills, limitations and capabilities, and existing gender norms.



- ii) Involvement of women in energy-system supply chains is good for women and their families, and it is good for business.
- iii) Modern energy services for women's productive uses contribute to women's empowerment.
- iv) End-use appliances that deliver modern energy services to reduce drudgery and save time can transform gender roles and relations.
- v) Improving the affordability, reliability, capacity and convenience of modern energy services can help achieve gender-equitable outcomes and will be critical for universal energy access.
- vi) Engaging with political processes can help women access modern energy services and change gender norms.

Other measures of access to electricity

The fact that those being connected never needed electricity is wrong because citizens not connected to electricity buy small solar kits, generators and accumulators just for lighting, charging their mobile phones, listening to radio and watching television. A key characteristic often used to express development is mobile and internet penetration. The figures are astonishing and point to a fundamental transformation that has taken place in our society. 4.78 billion phones, of which 3.5 billion are smart phones, 9.82 billion connections, 5.28 billion unique subscribers. The figures are projected to rise to 7.33 billion users by 2025, and 72% of all internet users will solely use smartphones.

Off grid and the rise of women entrepreneurs as energy ambassadors

All across the world, villages, rural areas and communities are shifting to renewable energy. It is getting cheaper to purchase the equipment and an entire green economy has opened up over the last decade partly in response to climate change concerns and legislation, but also due to the falling costs.

Africa and in many developing countries electricity is increasingly being delivered by women entrepreneurs through off grid technologies¹. Small holders and villages alike are finding ways to invest in their own off grid energy systems. Today, these are becoming affordable even for the poorest: a small system with one charging point and four lights in a house costs approximately 40USD. With small payments spread over a year even the poorest can often find the way to equip their home. And it is this process, working at the village and hyperlocal level that is creating the real transformation around rural poverty. Farmers are able to afford a small solar system to pump water; craft workers can continue their activities in the evening and children can read and do their schoolwork. People are connecting via mobile phones and overall communication channels are reaching even the remotest rural populations.

But the linkages between energy and development outcomes are complicated and not deterministic. Culture plays a critical role and needs to be properly factored in when planning interventions around electricity such as the last mile connectivity projects. It is often people's contexts that matter. And benefits such as sense of worth and inclusion are generally overlooked in energy discussions. If not done with these issues in mind, electrification can have significant negative impacts and lead to a rising sense of income disparity.

Last Mile Projects

In recent years, the concept of delivering energy to the last mile has grown as populations have needed to be connected to gain access to increasing numbers of basic services.

¹ <https://solarsister.org/impact-story/hilaria/>



The Government of Kenya is no exception. It has a goal to ensure affordable electricity connections to households and universal access by 2020. In the first phase, the existing distribution transformers in all the 47 counties were maximized. All customers within reach of 600m from these transformers were connected in this phase at a cost to the customer of a Ksh 15,000 (150 USD) fee or an option to pay in instalments which is paid alongside their monthly bills for a period of 36 months. This project aimed to foster the livelihood of Kenyans by enabling increased economic activities from the utilization of electric power.

These connections went a long way to make the flow of information in the country much easier. Many Kenyans are able to charge their mobile phones, watch TV and listen to Radio allowing them to follow developments in the country and around the world.

However, there were still many people in rural areas who wanted to be connected but are too far from one of the transformers. This is where last mile connectivity comes in. Often it is seen as a way to address more than just access to lighting and instead can eliminate some of the negative health effects such as from indoor air pollution and fire accidents that emanate from the use of conventional alternatives such as wood, charcoal, candles and kerosene lamps.

Last Mile Connectivity is also billed as helping education, enabling children to study and complete their assignments after dusk. This will lead to better grades, better jobs and a generally better quality of life for them, so the thinking goes.

Today, as part of the Sustainable Development Goal 7, access to energy is seen as a crucial element in development. In Kenya, electricity is the right of every citizen regardless of their economic status. Stating that people in grass thatched houses do not require electricity is biased. So as part of the Last Mile Project, end-boards with the necessary safety features are installed. Small and medium sized businesses are now coming up in rural Kenya, and these are helping to improve productivity and livelihoods. However, watching the Last Mile Connectivity project going into the very end of the Last Mile gave me pause for thought.

Living in the rural part of Kenya, it took some time for the last mile connectivity to arrive. In fact, it came with the road being constructed. One day contractors arrived and started putting up concrete poles. Now I live next to what many consider to be the eighth wonder of the world – the Maasai Mara Game Reserve. It is in all senses an area of natural beauty. Dark skies mean that the stars can be seen very clearly and because of the wild animals the majority of people stay home in their villages at night - street lighting is not a necessity in the bush. The poles were an immediate eyesore. Did we need grid energy – most villages by now have bought solar panels and have a light in their houses. Some, as in my village have invertors and the ability to charge phones, run computers and have Wi-Fi. But what was so wrong was the lack of consultation. Many of the villagers thought that as the poles were being put up for free then electricity would be free. There had been no prior consent to go across people's land and when it was explained that they had to find 180 USD to connect and then pay a monthly bill, most of the elderly were perplexed. Having never had utilities before, not being part of the cash economy, bills and monthly payments had never been a part of their lives. So, the last mile is unlikely to get connected where I live.

Unreliability of electricity supplies and adaptability

In rural Norwegian households, daily life changes during power outages and households experience the complex consequences of such outages in different ways. Electricity disruptions temporarily break the linkages between electricity-dependent practices, but Norwegian households have learnt how to reassemble the elements of the electricity system and forged linkages between other items and technologies, embodied knowledge and competences, so as to continue daily life. These behavioural changes explain how rural Norwegian households can cope relatively well with lengthy power outages. Rather than worrying about the economic costs of power outages, households focus on maintaining their daily routines. The ability to adapt during outages demonstrates a relatively high level of flexibility. The same is true of many island communities.



Energy Justice and COVID

The social dimension of how the energy system operates is of growing importance. The Corona Virus pandemic underlined the fact that despite every effort by countries to encourage people to work at home, to have children working on their lessons via different e-learning platforms, to use social media to stay connected and online platforms to communicate, many millions of people were unable to retain any form of connection because of a lack of electricity or electronic device.

More pessimistically, the loss of employment hit hardest amongst those with no access to mobile phones or to the internet. The collapse has been rapid and without exception will have enormous negative societal impacts. Even in the UK, a developed country with a strong electricity network, connectivity still remains a problem for many.

In the post-COVID setting, creating energy solutions that combine sourcing and deployment of renewable energy grids, along with combined with the capacity building and skills training in energy entrepreneurship at local levels could transform livelihoods, ensure local access to clean and affordable energy and put an end to energy poverty.

Readings

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