

Global Future Council on Energy 2018-2019

# Accelerating access to sustainable energy: A key priority in energy transition

November, 2019



Ensuring energy access is a human imperative. As stated by the United Nations Sustainable Development Goals, “Be it for jobs, security, climate change, food production or increasing incomes, access to energy for all is essential.”<sup>1</sup> The 1 billion people without access to reliable, modern electricity and the 3 billion people who lack access to modern cooking solutions need the energy necessary to overcome poverty, join the modern economy and attain better living standards. Enabling clean energy access is also a climate imperative. If all Organisation for Economic Co-operation and Development (OECD) countries meet their Paris Agreement targets and non-OECD country emissions peak by 2030,

warming will almost certainly exceed 2 degrees Celsius.<sup>2</sup> Accelerating access to sustainable energy in the developing world is central to the energy transition.

Through a yearlong series of workshops and meetings, the Global Future Council on Energy (listed in Table 1 below) identified four levers that global governments and private-sector actors can pull to accelerate clean energy access. Below we have identified examples of the impact of implementing these concepts in action, motivating the profound change that these concepts could create if implemented at a global scale.

The critical levers to accelerating sustainable energy access are as follows:

1. Between the years 2000 and 2017, approximately 650 million people gained access to electricity. In fact, 2017 was likely the first year in human history that less than 1 billion people lacked access to electricity. Figure 1 shows the increase in the percentage of the population throughout many developing countries, highlighting the dramatic increase in electrification rates, particularly in places like India. Most gains have, however, taken place in urban areas.

Figure 2 highlights the rural-urban divide in electricity access, underscoring the fact that rural electrification rates in many countries remain disturbingly low. Policy-makers must recognize that the traditional approach to universal access – the extension of centralized solutions such as electricity or gas grids – is only one piece of the puzzle. The historical centralized-only approach will become increasingly inadequate as the electrification challenge focuses on reaching the millions of rural households and businesses throughout Africa and Asia.

Fortunately, dramatic cost declines in solar photovoltaics and energy storage are making off-grid and mini-grid solutions a reality. In the past decade, 150 million people have gained access to basic electricity services through renewable-powered off-grid systems.<sup>3</sup> Any plan that focuses exclusively on grid extension is incomplete. Such a narrow focus creates substantial risk for mini-grid and solar home system (SHS) developers, places undue financial constraints on utility companies and leaves homeowners and businesses without access.

## Case Study One

In Papua New Guinea, the utility provider is integrating solar home systems and lighting products into the national strategy for universal access.

Through a series of consumer education campaigns, the IFC worked to build a market for quality verified off-grid solar products, which attracted hundreds of thousands of potential off-grid customers; the (IFC)'s Lighting Papua New Guinea initiative serves 20% of the population against the state utility company's reach of 13%. The IFC also educated customers about quality solar solutions, which is a key requirement to promote the growth of a responsible market.

This goes hand in hand with support that the IFC is providing to the country's Ministry of Energy, which is seeking to expand the energy mix beyond the grid. Currently, an estimated 7 million people in Papua New Guinea don't have access to the country's electric power grid. In fact, just a fraction of the population – less than 15% – is connected to the grid. Those who do have electricity pay high prices while contending with frequent blackouts, even in urban centres.

The Ministry of Energy and National Institute of Standards and Industrial Technology (NISIT) are seeking to introduce quality standards for off-grid solar products in PNG.

These efforts are helping the growth of a sustainable market for quality solar products in a country that has seen rapid penetration of off-grid solar products in the last five years.

2. Independent and financially healthy public and private utilities are critical to maintaining the sustainability of the system and to attract private capital. Today, a minority of public utilities in Sub-Saharan Africa and South Asia are financially solvent.<sup>8</sup> Utilities must be independent and corporatized. A promising means to achieving this is to structure utilities like central banks: tied to, but not dependent on, political processes. Utility governance, investments and operations need to follow sound commercial and economic viability criteria. Where subsidies are required, they must be transparently supplied to the utility and targeted at the lower deciles of the population. Eliminating generalized regressive subsidies is essential to the financial health of utilities, as well as to climate change mitigation, as consumers have incentives to save energy. Furthermore, regulatory models that enable innovative partnerships between distributed and off-grid energy providers can improve the financial health of electric utilities while expanding clean electricity access.<sup>9</sup>

## Case Study Two

Mexico was able to increase its electricity coverage to 99% in 2018, by extending the distribution grid in those communities that were 5km away from the line, and by bringing off-grid photovoltaic systems to remote communities.

The creation of the Universal Electricity Service Fund was key in financing the programme. The fund received an initial endowment from the government, which increases through revenue generated by the operation of the electricity market. In its first set of grants in 2016, the fund allocated \$30 million to the national utility company, Comisión Federal de Electricidad (CFE), to extend the grid to 750 communities, and provided \$23 million for off-grid systems required to electrify 898 remote communities. In 2017, the fund disbursed \$63 million to bring electricity to 1,000 communities in 27 states. Within two years, more than 500,000 Mexicans had access to electricity. Success resulted from the joint effort of the national utility, CFE, which connected households to the grid, and an ecosystem of private companies, which developed off-grid solar energy systems in remote areas. Through the fund and new regulations, the federal government became a catalyst to extend coverage and provide financing to reach 100% by the end of the decade.

A notable case of what can be achieved with the right approach is that of Iluméxico, a social enterprise committed to reducing energy poverty in isolated communities. The company has installed more than 16,000 systems, reaching close to 76,000 users in 1,881 communities. The programme, started in 2009, developed a business model to service bottom of the pyramid families that live on \$1 dollar a day. Families pay for a home system by making installments equivalent to the amount they spend on candles, diesel and wood. Since servicing the last mile requires an effort to reach secluded regions, local youth

is hired and trained to install and maintain the equipment. As a result, in addition to bringing light to the community, the company provides job opportunities and develops ambassadors who promote the acceptance of photovoltaic remote systems. The improvement of quality of life goes beyond having lights at home. Benefits include supporting education (giving children extra hours to study), health (families stop inhaling fumes and can better see poisonous insects and snakes on the paths) and commercial benefits.

Mexico's approach to ensuring access to electricity relies on adequate regulation, public and private participation, sustainable funding and an approach that takes into account the local culture and context.

3. To create the enabling environment for new business models and technologies to flourish, an innovative and holistic view towards regulation should be incorporated. The right regulatory environment must exist for distributed energy access to emerge at scale. This includes regulation to enable mobile money, distributed generation and tax reform to level the playing field for distributed generation. Flexible regulations that keep up with and enable innovation are necessary. Where helpful, a lean, nimble and independent regulator can increase certainty to investors.

### Case Study Three

In Kenya, the introduction of Pay-As-You-Go (PAYGo) – an innovative business model that provided a much needed, alternative financing mechanism for last mile consumers – was met with an attractive regulatory environment. Mobile money was already well entrenched in Kenyan business and social settings, the solar market had already been established and the sales/client service pool of expertise was well integrated. This allowed IFC's Lighting Africa to quickly and easily work alongside the right parties throughout the sector and the Government of Kenya to obtain the necessary waivers for duties and value-added tax on solar that has since allowed companies like M-KOPA Dlight, Greenlight planet, Azuri and Omnivoltaic to flourish.<sup>10</sup>

The impact of PAYGo solar companies is undeniable. In less than five years, they have improved the quality of life for approximately eight million people – primarily in Sub-Saharan Africa – by bringing clean energy and financing to customers that traditional utilities and financial institutions have ignored. Without Kenya's strong enabling environment, the development of the off-grid market for off-grid solar was accelerated by the introduction of PAYGo. Today, as the government launches the Kenya Off-grid Solar Access (K-OSAP) project and the Kenya National Electrification

Figure 1: Percentage of the population with access to electricity, 2000 (left) and 2017 (right)<sup>6</sup>

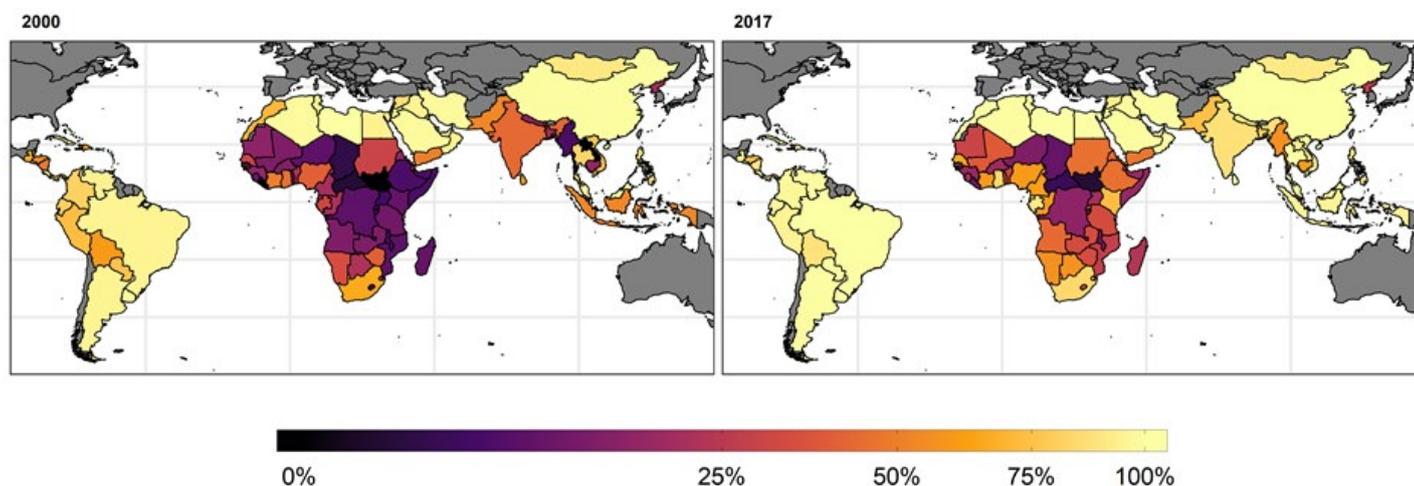
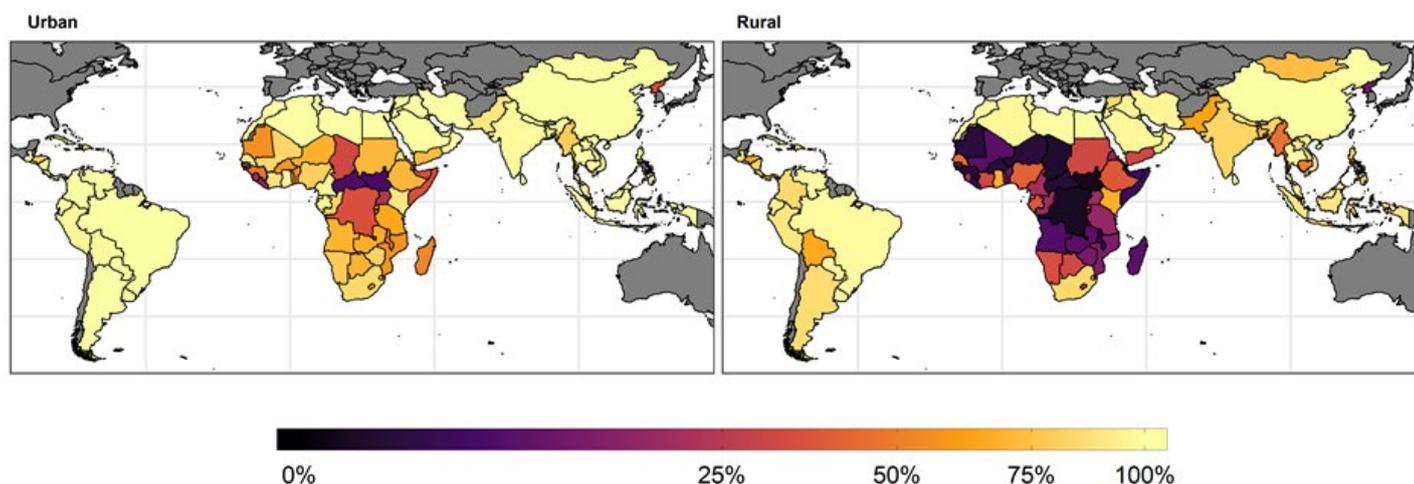


Figure 2: Percentage of the population with access to electricity, urban (left) and rural (right)<sup>7</sup>



Strategy, a target of 1.9 million solar home systems has been set as part of the drive for universal electrification by 2020. Whereas the affordability of solar home systems would have easily been a concern in the past, PAYGo has proved that innovation, regulatory efficiency and the incorporation off-grid systems will rapidly increase energy access for on-grid and off-grid customers.

4. Financial innovation can unlock energy access investments. This includes mechanisms for managing jurisdictional and currency risk, enabling greater levels of local and foreign financing. It also includes sound deployment of blended finance solutions, whereby development finance, philanthropy and commercial finance each take on the level of risk/returns that are commensurate with their ability to absorb potential losses for a given level of impact. There are multiple models that can be showcased with risk mitigation instruments or early stage riskier exposures. Specific programmes to support local project development – technically and financially – can be very effective in catalysing investments. Today, many such models exist.<sup>11</sup> With the right enabling conditions – such as those highlighted above – more models can flourish.

## Case Study Four

Nithio<sup>12</sup> is a newly established finance and analytics platform that allows for more detailed understanding of consumer credit risk and energy demand, as well as geographic and behavioural differences, even among individuals with similar profiles in Africa. By combining geospatial techniques and credit scoring best practices, this platform serves as a powerful tool to enable more efficient financing in the off-grid energy sector to Solar Home System Companies, also called Distributed Energy Service Companies (DESCOs).

The Nithio platform serves as the infrastructure for capital delivery through a multi-country, multi-DESCO Financial Intermediary (FI), which intermediates funding to help facilitate the funding of Solar Home System receivables, providing DESCOs with asset-backed financing and much needed liquidity to help scale up their operations.

Africa's growing population without access to power provides the motivation for the creation of this platform. Although many commercial and development institutions have deployed resources, the problem looms large. Currently, more than 600 million people on the continent do not have access to modern energy, and yet many of them have the means to pay for power. Of the many issues plaguing the off-grid energy sector in Africa, the limited ability of DESCOs to access Solar Home Systems pay-as-you-go receivables financing through debt at scale remains acute.

Although, the distributed power sector is projected to experience significant growth, this growth is occurring within a highly fragmented ecosystem. To scale up rapidly and continue extending household loans through the sale of pay-as-you-go solar home systems, these firms will need larger pools of capital. Moreover, the current off-grid energy stakeholders are not penetrating the largest markets of unconnected populations in the Democratic Republic of

the Congo, Ethiopia and Nigeria. Effective financial support of this ecosystem needs to be more systematic, precise and comprehensive to deliver services to the households throughout the continent.

## New debates and opportunities to progress

The pace of the energy transition is accelerating beyond what many industry analysts and observers have forecast or even acknowledge, and past assumptions may no longer hold true when it comes to projecting the energy future. Nevertheless, the world is not on track to meet the Paris Agreement goals. Although there is now clarity with regards to some aspects of the transition, important issues remain to be resolved. It is exactly in these areas of further work where the World Economic Forum and the Global Future Council can play a useful role:

There is an imperative to spread energy access. The technologies to bring cost-effective low-carbon energy to those at the bottom of the pyramid are available. Policy-makers, business leaders and investors must address four key issues to enable these solutions to flourish. These are:

- Governments and utilities companies must adapt planning processes to recognize the central role of distributed energy solutions.
- Governments must allow – and utilities companies must strive – for the financial sustainability of the public utility sector.
- National regulatory environments must encourage solutions, such as mobile money and distributed energy.
- Concessional capital and fiduciary capital must partner to manage jurisdictional and foreign exchange risk to enable greater capital flows. It must also continue to deploy blended finance solutions, whereby development finance, philanthropy and commercial finance each take on the level of risk/returns that are commensurate with their ability to absorb potential losses for a given level of impact.

# Contributors

## **Scott Burger**

Research Associate and MIT Energy Fellow,  
Massachusetts Institute of Technology (MIT)

## **Hela Cheikhrouhou**

Chairman and Chief Executive Officer, Nithio

## **Lourdes Melgar Palacios**

Research Affiliate, Massachusetts Institute of Technology  
(MIT) and Non-resident Research Fellow, Baker Institute

## **Milagros Rivas Saiz**

Global Head, Cross Industry Advisory,  
International Finance Corporation (IFC)

# Appendices

**Table 1:** Members of the World Economic Forum's Global Future Council on Energy 2018-2019

Jules Kortenhorst	Chief Executive Officer	Rocky Mountain Institute
Christina Lampe-Onnerud	Founder and Chief Executive Officer	Cadenza Innovation
Wang Zhen	Deputy Director-General	China National Petroleum Corporation
Nidhi Tanti	Vice-President; Head, Business Review Committee and New Business	(CNPC)
Brian Dames	Chief Executive Officer	African Rainbow Energy and Power
Jane Burston	Managing Director	Clean Air Fund
Nandita Parshad	Managing Director, Energy and Natural Resources	European Bank for Reconstruction and Development (EBRD)
Milagros Rivas Saiz	Global Head, Cross Industry Advisory	International Finance Corporation (IFC)
Hela Cheikhrouhou	Chairman and Chief Executive Officer	Nithio
Andrew Herscowitz	Coordinator	Power Africa
Amadou Hott	Vice-President, Power, Energy, Climate and Green Growth	African Development Bank (AfDB)
David G. Victor	Professor	University of California, San Diego (UCSD)
Zoe Knight	Group Head, Centre of Sustainable Finance; Managing Director	HSBC Holdings Plc
Joisa Saraiva	Professor	Fundação Getulio Vargas
Jeremy Bentham	Vice-President, Global Business Environment	Royal Dutch Shell Plc
Kingsmill Bond	New Energy Strategist	Carbon Tracker Initiative
Lourdes Melgar Palacios	Research Affiliate Non-resident Research Fellow	Massachusetts Institute of Technology (MIT) Baker Institute
Samah El-Shahat	Vice-President	China-i Ltd
Jon Moore	Chief Executive Officer	Bloomberg NEF
Sanjayan Velautham	Executive Director	ASEAN Centre for Energy (ACE)
David Giordano	Managing Director, BlackRock Alternative Investors (BAI)	BlackRock Inc.
Maximo Pacheco Matte	Executive Board, Engineering (DUOC) School	Pontificia Universidad Catolica de Chile
Matar Hamed Al Neyadi	Undersecretary	Ministry of Energy and Industry of the United Arab Emirates
Scott Burger	Research Associate and MIT Energy Fellow	Massachusetts Institute of Technology (MIT)
Espen Mehlum	Head of Knowledge Management, Shaping the Future of Energy	World Economic Forum

*The findings, interpretations and conclusions expressed herein are the result of a collaborative process within the Global Future Council on Energy facilitated by the World Economic Forum, but they do not necessarily represent the views of the individual Global Future Council members listed as contributors or their organizations, or those of the Forum and its partners.*

# Endnotes

- 1 UN, 2018. Sustainable Development Goal 7: Ensure access to affordable, reliable, sustainable and modern energy. Available online: <https://www.un.org/sustainabledevelopment/energy/>
- 2 Cambridge University Professor (Reader) Emeritus, Dr. Chris Hope performed these calculations using the PAGE integrated assessment model, the same model used in the Stern review on the Economics of Climate Change. See: Hope, Chris. "The US-China Climate Deal: Don't Get Carried Away." Available online: <https://www.chrishopepolicy.com/2014/11/the-us-china-climate-deal-dont-get-carried-away/>
- 3 <https://www.irena.org/newsroom/articles/2018/May/New-Estimates-Show-Rapid-Growth-in-Off-Grid-Renewables>
- 4 <http://news.mit.edu/2016/tata-researchers-tackle-rural-electrification-0121>
- 5 Climatescope, 2018. Emerging Markets Outlook 2018: Energy transition in the world's fastest growing economies. Available online: <http://global-climatescope.org/assets/data/reports/climatescope-2018-report-en.pdf>
- 6 Authors' visualization. Data source: IEA Electricity Access Database: <https://www.iea.org/energyaccess/database/>
- 7 Authors' visualization. Data source: IEA Electricity Access Database: <https://www.iea.org/energyaccess/database/>
- 8 World Bank Group IEG, 2016. Financial Viability of the Electricity Sector in Developing Countries: Recent Trends and Effectiveness of World Bank Interventions. Available online: [http://ieg.worldbankgroup.org/sites/default/files/Data/reports/lp\\_financial\\_viability\\_electricity\\_sector\\_0.pdf](http://ieg.worldbankgroup.org/sites/default/files/Data/reports/lp_financial_viability_electricity_sector_0.pdf)
- 9 <https://rmi.org/insight/under-the-grid/>
- 10 <https://www.weforum.org/agenda/2019/07/pay-as-you-go-africas-solar-energy/>
- 11 <https://www.electrifi.eu/>
- 12 <https://www.nithio.com/>