Energy Access

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Background on energy access

Imagine life without electricity—no light at night, no radio to stay informed, no power to charge a cell phone and stay connected, no refrigerator to keep food or vaccines safe. Now think of the solutions people without electricity resort to: polluting kerosene lamps and inefficient cookstoves, walking hours and spending precious resources to charge a cell phone or buy batteries for a radio, making the most of limited access to information, fresh food, and basic healthcare.

More than a decade into the 21st century, this is a daily reality for the 1.2 billion people around the world who have no access to electricity, and the many development benefits it brings. A billion more only have intermittent access. These people rely on costly, outdated technologies that are harmful to their health and hinder their opportunities for social and economic advancement.

Clean and affordable modern energy revolutionizes lives—improving health, saving time, enabling education, decreasing vulnerability to violence, and empowering women. Sustainable energy enables businesses to grow, generates jobs, and creates new markets. Countries can grow more resilient, competitive economies; with sustainable energy, they can leapfrog over the limits of the energy systems of the past and build the clean energy economies of the future. In short, development is not possible without energy, and sustainable development is not possible without sustainable energy.

To address this challenge, UN Secretary-General Ban Ki-moon launched the Sustainable Energy for All (SE4All) initiative in 2011 to mobilise stakeholders to take concrete action toward three critical objectives to be achieved by 2030: ensuring universal access to modern energy services; doubling the global rate of improvement in energy efficiency; and doubling the share of renewable energy in the global energy mix.

There is no universally agreed-upon definition of energy access, and it can be a challenge to determine how best to capture issues such as the quantity, quality, and adequacy of service, as well as complementary issues such as informality and affordability. Based on an exhaustive analysis of existing global household survey questionnaires, the SE4All Global Tracking framework defines electricity access as availability of an electricity connection at home or the use of electricity as the primary source for lighting. [1]

Energy access is increasingly seen as a vital catalyst for wider social and economic development. Studies have shown that reaching universal energy access by 2030 will be challenging but achievable. According to the SE4All Global Tracking Framework, the universal access goal will be achieved only if every person on the planet has access to modern energy services provided through electricity, clean cooking fuels, clean heating fuels, and energy for productive use and community services. The International Energy Agency has estimated that off- and mini/micro-grid solutions will be the pathway to electricity access for roughly 60%

[1] Sustainable Energy for All initiative (2013) “Global Tracking Framework” http://www.se4all.org/tracking-progress/

of the people who now lack it, due to the costs and technical challenges of extending the power grid in remote areas of the world. [2]

Stand-alone approaches encompass a range of technologies, such as—but not limited to—home based solar photovoltaic systems, small solar thermal systems, solar lighting solutions, battery rental schemes, solar water pumping and drip irrigation for agricultural production. Mini/micro-grids are essentially community-level installations whereby a number of villagers receive their energy services from a centralised generation plant, such as a micro-hydro plant, a hybrid solar PV/wind/diesel system, a biomass gasification plant, or at the small end, a battery recharging station, as well as other solutions. Many of these solutions can be delivered through market-based mechanisms; further, solutions are available to help provide improved energy services to even the poorest households when structured to align with family cash flows and when supported by policies at both national and local levels.

It is estimated by the World Bank's Lighting Africa Program that annual global expenditures for kerosene-based lighting amounts to USD 37 billion. [3] The people depending on these rudimentary forms of lighting are often already paying the most as a proportion of their household income for inadequate, dangerous, and unhealthy energy sources that kill many women and children prematurely. To those who object to a market-based orientation in the delivery of energy services, it is clear that a market already exists.

Recent developments in the energy access space

To help meet this energy access challenge, the United Nations Foundation launched the global Energy Access Practitioner Network in 2011 to help catalyse efforts to scale energy access, and as a contribution focusing primarily on off-grid electrification, towards achieving universal access to modern energy services by 2030. Although several technology-specific and regional networks already existed, there was no pre-existing entity facilitating global interaction. The Practitioner Network therefore serves as a technology-agnostic "network of networks" to help develop a global approach to addressing energy access issues towards the achievement of universal energy access.

In the most recent survey conducted of the Practitioner Network's membership[4] as a representative segment of the energy access sector, in the time period of June 2013–July 2014, responding members reported providing over 21 million individuals with decentralised energy solutions, consisting of almost 2.5 million installations completed and products sold—ranging from small solar lanterns to large mini-grids. The same organisations, representing about a quarter of the Practitioner Network's membership at the time, confirmed reaching over 230 million individuals throughout the organisations' collective lifetimes, highlighting the significant impact they have already had in the decentralised energy sector.

Practitioner Network members are on the front lines of innovative approaches: In recent years, pay-as-you-go models saw a significant rise and scaling, with successful organisations such as M-KOPA, Azuri Technologies, Mobisol, Angaza Design, and Simpa Networks leading the way. Other end-user financing options, such as rent-to-own, have also become more popular, and lowering the upfront cost of capital for

[2] International Energy Agency (2011), World Energy Outlook 2011, Special Report – Energy for All, https://www.iea.org/publications/freepublications/publication/weo2011_energy_for_all.pdf

[3] International Finance Corporation (2012), From Gap to Opportunity: Business Models for Scaling Energy Access, http://www.ifc.org/wps/wcm/connect/ca9c22004b5d0f098d82cfbbd578891b/energyaccessreport.pdf?MOD=AJPERES

[4] Energy Access Practitioner Network (2014), Energy Access Practitioner Network infographics based on the United Nations Foundation's 2014 annual survey: "Growing the Network: Building Impact", http://www.energyaccess.org/images/content/files/EAPN_Infographic.pdf

the consumer seems to be a continuing trend. More companies such as Off Grid Electric, BBOXX, EarthSpark International are focusing on decentralised energy delivery as a service rather than a product, and have set up training academies to increase staff retention, facilitate maintenance and create local jobs.

Practitioner Network members have developed innovative ways to reach the last mile: Solar Sister's supply chains and entrepreneurship model of training women as distributors in their own communities in Africa has been taken up by a number of organisations in the last year, including Empower Generation (Nepal), Kopernik's "Wonder Women" (Indonesia), and Frontier Markets' "Solar Sahelis" campaign (India). One Degree has found success in partnering with a well-known company with a vast supply chain network, Coca-Cola, to bring solar power to rural retailers in Kenya.

In the broader sector, there has been a marked shift towards high quality, durable products that meet the Lighting Global Quality Standards which now account for 50% of the off-grid market share, up from 3% in 2009.[5] Nexus issues, such as the linkages between energy and health, education, clean water, income generation, nutrition, and others have also become a focus for the international community, especially in the context of energy being included in the Sustainable Development Goals.
The SE4All initiative has a focus on energy for women and children's health for the next two years, which is reflected in the High Impact Opportunity area of Energy for Women and Children's Health.[6] It has also established another focus area which focuses on some of these same linkages via the Water-Energy-Food Nexus.

There has also been a shift to larger energy systems; in 2014, among the Network's membership customer base, solar home systems were for the first time more popular than solar lanterns.[7] This is a testament to the growth of the energy access sector in recent years, where the sector has evolved from simple solar lanterns as a first entry product to larger, more permanent systems, thus allowing the end users to move up on the energy ladder and benefit from the associated growth and development opportunities. In parallel, mini-grids have continued to receive increasing attention, exemplified by the establishment of the SE4All's newest High Impact Opportunity area on Clean Energy Mini-grids.[8]

On a country level, India continues to be a country of focus; showcased by the development of a new off-grid energy access network in India, to serve as a vehicle for showcasing the work of and advocating for the sector across that country. The Clean Energy Access Network or CLEAN[9] is a recently launched initiative that seeks to be a unifying entity with a clear mandate to support and grow the decentralised clean energy sector in India. In particular, it aims to represent the needs of practitioners who are working to improve energy access for the rural and urban poor by focusing on interventions in the areas of Policy Advocacy, Access to Finance, Skills and Training, Technology Innovation and Networking and Information.

[5] Lighting Global standards, https://www.lightingafrica.org/ & https://www.lightingglobal.org/
[6] http://www.se4all.org/hio/energy-and-womens-health/
[7] Energy Access Practitioner Network (2014), Energy Access Practitioner Network infographics based on the United Nations Foundation's 2014 annual survey: "Growing the Network: Building Impact", http://www.energyaccess.org/images/content/files/EAPN_Infographic.pdf
[8] http://www.se4all.org/hio/clean-energy-mini-grids/
[9] http://thecleannetwork.org/

Remaining barriers

The Practitioner Network membership is a testament to this rapidly evolving marketplace, with over 50 percent of the 2014 survey respondents having been operational for less than five years. It also showcases the potential of market-led decentralised energy applications, with 40% of these same entities having grown their annual revenues to USD1-5 million in a short space of time. Funding, however, continues to be an ongoing need: 75% of responding organisations reported that it was the biggest bottleneck to improved delivery, installation, and ongoing maintenance.

In the off-grid sustainable energy space, there is often a disconnect between investors who may not be aware of potential investment pipelines consisting of viable projects, and practitioners who may not know which investors are appropriate to approach for their funding needs. For energy entrepreneurs, the off-grid finance spectrum involves upstream support in obtaining start-up funds, operating capital, and project finance, as well downstream financing for end users. The impact sought in delivering energy access for all is limited by the challenging "mid-life" phase, which comprises three key issues: availability of the right type of capital, awareness of players providing these types of capital, and capital affordability.

Recent interest by the financing community in off-grid solar companies highlights the shift in the sector to address some of these issues: in 2014, early-stage investments in off-grid solar companies operating in developing countries stood at a record USD 63.9 million,[10] led by two large deals by Practitioner Network members M-KOPA and Off-Grid Electric. In the first month of 2015 alone, USD 42 million has been invested into off-grid solar companies working in developing countries, mostly in Africa, including significant deals for Practitioner Network members M-KOPA, Fenix International and Greenlight Planet. [11]

In addition to funding, the pioneers that are delivering electricity services in this market confront a myriad of obstacles that must be tackled to grow, expand, and replicate their approaches. Assistance around marketing, recruitment, distribution channel development and end-user financing is also expected to facilitate organisation as well as sector growth. Based on a series of consultations in its first year,[12] the Practitioner Network identified a number of priority areas that continue to be critical to the scale-up of off-grid energy service delivery, some of which have been elaborated upon in this paper: understanding the market; improving policy and regulatory frameworks; facilitating finance; advancing mini- and micro-grids; and improving standards and testing.

Implementing these priorities will require the engagement of a range of organisations, including governments, the private sector, entrepreneurs, financiers, international development organisations, NGOs, and others. The Practitioner Network will continue to strengthen and integrate existing partnerships among these stakeholders under one global umbrella, while developing new alliances in strategic sectors to accelerate the uptake of off-grid energy services, contribute to economic and social development, help to inform and make progress toward the Sustainable Development Goals in the post-2015 agenda, and foster collaborative and innovative solutions to modern energy access.

[10] http://impactalpha.com/solar-startups-ride-off-grid-wave-to-64-million-in-2014-investments
[11] www.greentechmedia.com/articles/read/off-grid-solar-firms-raised-35-million-in-the-first-month-of-2011
[12] United Nations Foundation (2012), "Energy Access Practitioner Network: Towards Achieving Universal Energy Access by 2030" http://www.energyaccess.org/images/content/Practitioner_Network_report_final.pdf

Challenge Questions

1. What will it take to achieve SE4All's three energy objectives globally by 2030?
2. How can we reach scale in the energy access sector in a uniform, sustainable and replicable way when decentralised energy solutions are by nature geography and context dependent? Is it realistic to expect harmonisation of global standards and evaluation metrics for a given technology to assist in this?
3. For achieving real scale in the decentralised energy sector, what are some concrete measures to ensure coordination of off-grid energy policies at the national, local and regional levels? Can countries with similar needs or resources work together to build their rural electrification plans?
4. How can the international community channel and aggregate financing for the sector, especially for companies in the challenging mid-life phase? What are some innovative financing mechanisms, including an energy access fund that could assist in this?
5. Are mini-/micro-grids viable, scalable and most economical solutions for a more permanent approach to providing energy access, particularly in rural settings, to reach IEA's estimate that over 40% of installed capacity to achieve universal energy access by 2030?[13]

[13] International Energy Agency (2011), World Energy Outlook 2011, Special Report – Energy for All, https://www.iea.org/publications/freepublications/publication/weo2011_energy_for_all.pdf