



## **G20 Forward-looking Options for Enabling Pathways for Universal Access to Energy**

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## Executive Summary

The past decade has seen significant progress towards achieving universal access to energy; however, despite this progress the world is not on-track to achieve universal access by 2030. The magnitude of the challenge is immense given that energy access underpins all development and is a requirement for sustainable development and economic growth. As the COVID-19 pandemic demonstrates, access to reliable, viable, and affordable energy is essential to power healthcare facilities, enable communication during social distancing, and develop resilient practices across the economy. Further, the pandemic risks damaging the critical supply chains for delivering all energy products and services, particularly off-grid and mini-grid power. In the long-term, there are policy and financing considerations that COVID-19 will bring to the forefront, such as subsidies, private sector investment, and other issues. Conversely, continued lack of access will constrain the achievement of development goals, in particular the prospects for economic growth which require reliable, affordable, and sustainable access to adequate levels of energy for improved livelihoods.

**Progress to date.** On a global level, progress has been made *in terms of increasing access to electrification* to more than one billion people between 2010 and 2018<sup>1</sup>. Despite these gains, the world is not on-track to meet the target of universal access to electricity by 2030. Significantly, an analysis of the global access deficit obscures the real differences across regions and between urban and rural populations. In terms of universal access, the challenge lies primarily in Africa, particularly in Sub-Saharan Africa, and in several countries in Asia. In many of these countries, increased access to electricity is being outpaced by population growth. The latest evidence suggests that nearly 800 million people currently lack access to electrification and millions many more have limited or unreliable access. It is estimated that over 600 million will still not have access in 2030<sup>2</sup> unless business and financing models are introduced to provide solutions and options for harder to reach populations. These models will need to consider energy affordability, increasing productive uses of energy (demand), approaches in fragile states, and reaching disadvantaged populations, among others.

**In terms of access to clean cooking**, there has been virtually no progress over the past decade. In 2010 an estimated 3 billion people lacked access to clean cooking while in 2018 approximately 2.8 billion people<sup>3</sup> still do not have access to clean cooking fuels and technologies. As a result, this overlooked sector continues to present a public health risk that results in the premature death of nearly 4 million people annually from illness attributable to household air pollution, disproportionately impacting women and girls.<sup>4</sup> (much higher than recorded mortality rates of COVID-19).

**On-going challenges and barriers.** In terms of *electrification*, chronic challenges exist in countries with access deficits where power utilities are weak and unable to serve the demand of growing urban populations and off-grid providers lack enabling policy frameworks and financing to serve customers that may not be able to afford cost-reflective tariffs, energy products, or services. While 85% of the current deficit exists in rural areas, among 19 high impact countries that represent approximately 80% of the access deficit, only 1.2%<sup>5</sup> of the electrification access

financing tracked is dedicated to off-grid solutions for populations that will require decentralized or stand-alone solutions, the remaining 98.8% of financing flows to on-grid solutions.

For universal access to ***clean cooking fuels and technologies***, efforts need to be massively scaled-up across Africa, in particular Sub-Saharan Africa, as well as Asia to address the 2.8 billion people<sup>6</sup> that do not have access. Current efforts are too fragmented or limited in scope to make a significant difference for one out of every three people on the planet who do not have access to clean cooking. At the heart of this intractable problem is the cross-cutting nature of clean cooking that requires cross-sector policy coordination. It is simultaneously a challenge facing energy, health, technology, environment, supply chains, local government, and household affordability. Bold leadership is required to re-think how to stimulate faster annual rates of increase that involve these different sectors, stakeholders, and market actors.

**Policy Proposal Options.** As we begin the final decade of the Sustainable Development Agenda, urgent action is needed for both access to electrification and clean cooking. The challenges inflicted by the current global COVID-19 pandemic and the needs of the economic growth and recovery further amplify the importance of making major progress on universal access over the next few years.

Meaningful progress will require targeted efforts in countries that are most off-track in terms of energy access, raising the urgent need of bold multi-sector approaches to the clean cooking challenge, supporting existing programs (where possible), and focusing on five forward-looking options:

- i. addressing data and financing gaps in off-track countries in terms of energy access for greater effectiveness of public and private investment;
- ii. reducing fragmentation of approaches to clean cooking by mobilizing a catalyst platform for clean cooking in Africa;
- iii. challenging countries to develop national clean cooking and universal integrated energy plans;
- iv. capacity-building of public and private sectors in targeted countries; and
- v. supporting institutions and enabling frameworks.

**G20 contributions to leadership in universal energy access.** The G20 Members remain committed to demonstrate collaborative leadership for ensuring access to affordable and reliable energy for all. G20 Members continue to progress through the Energy Access Voluntary Action Plans and advance learnings and achievements as reflected in Annex I. With the support of International Organizations, led by SEforALL, Members will synthesize the latest developments regarding universal access to electrification and clean cooking, including progress, remaining challenges, and options for action, as reflected in Annex II.<sup>7</sup>

## Overview

Since 2014 (Australian G20 Presidency), the G20 Principles on Energy Collaboration have outlined the agreement for G20 Members to work together to ensure access to affordable and reliable energy for all. Now, six years after the G20 Principles on Energy Collaboration and 10 years from the 2030 target for SDGs, **the landscape has become clearer regarding where populations are at risk of falling further behind and what should be the focus of urgent actions** for enabling universal access to electrification and clean cooking to achieve SDG7 targets. **The world is currently not on-track to meet these targets** and will fall short unless leadership and action are galvanized to put in place the pathways needed for both universal access to energy as well as a sound post-pandemic economic recovery.

After the adoption of the G20 Principles on Energy Collaboration in 2014 and the Sustainable Development Goals (SDGs) in September 2015, subsequent G20 meetings have consistently highlighted the importance of coordinating efforts through a series of Voluntary Collaboration Action Plans for Sub-Saharan Africa (Turkey 2015), Asia and the Pacific (China 2016), and Latin America and the Caribbean (Argentina 2018). These Voluntary Action Plans also build on the linkages between energy access and other elements of the 2014 Principles, such as encouraging the collection and dissemination of high-quality energy data and analysis, facilitating the design, development, demonstration and widespread deployment of innovative energy technologies, and enhancing coordination between international energy institutions and minimizing duplication where appropriate. Further, each of these Voluntary Action Plans provided valuable overviews of energy access efforts taking place in the different Regions as well as highlighted different areas of prioritization and additional energy access challenges. For example:

- Voluntary Collaboration Action Plan for Sub-Saharan Africa. Outlines the leading efforts undertaken by the European Union, United Kingdom, Italy, France, Japan, the African Development Bank and others on a number of energy access initiatives in Sub-Saharan Africa. Recommends options for G20 Members to support electricity access in Sub-Saharan Africa, including policy and regulatory environment; technology development, dissemination and deployment; investment and financing; capacity building; regional integration; and coordination and collaboration.
- Voluntary Collaboration Action Plan for Asia and the Pacific. Provides five joint actions among G20 Members to improve access to electrification (investment and financing; national enabling policies and environment for private sector investment; develop and apply new technology; targeted support for developing countries and capacity development; harmonize with global commitments). In addition, highlights potential cooperation models around (i) voluntary financial support; (ii) decentralized energy systems and services; (iii) capacity building; (iv) regional connectivity; (v) coordinated country support; and (vi) developing innovative business models.
- Voluntary Collaboration Action Plan for Latin America and the Caribbean. Presents a series of voluntary actions for increasing the accessibility and affordability of energy for LAC economies. In addition, details 15 recommended voluntary actions including, among others, specific country support (to Haiti); developing off-grid and mini-grid options for rural areas; share lessons across countries and regions; specific support for expanding access to clean cooking; addressing the heating challenge; and more disaster resilient services.

All three Voluntary Collaboration Action Plans underline a number of common themes aimed at improving universal access to energy such as the importance of enabling policies, technology innovations, capacity building, investment, coordination and lessons sharing. Many of these priorities continue to be relevant and are reflected in the forward-looking options below. Some priorities, such as access to clean cooking, are given less emphasis in the previous action plans or are addressed more generally than electrification needs despite the clear target of universal access to clean cooking included in SDG7 and WHO's 2014 estimate that nearly four million people die prematurely each year from illness attributable to the household air pollution caused by lack of access to clean cooking<sup>8</sup> (higher even than COVID-19 estimated mortality rates). This document frames five potential forward-looking options to improve access to clean cooking and electrification for G20 consideration.

Because of the voluntary nature of these action plans and the absence of specific targets, a more accurate measure of progress towards universal access rates is provided by the Tracking SDG7 Report.<sup>9</sup> The value of these voluntary action plans, however, lies in the consistent affirmation by G20 Members of the strategic importance of universal access to energy. This year's Saudi Arabia G20 Presidency presents the opportunity to focus more specifically on the urgent actions needed to achieve universal access to energy and how these urgent actions contribute to the Circular Carbon Economy approach which promotes the utilization of all innovative technology solutions as well as all energy sources to monetize emissions for affordable, reliable, cleaner and more sustainable energy systems.

In addition, a new global reality has taken hold under the current G20 Presidency. The COVID-19 pandemic brings into sharper focus the importance of ensuring that universal access to energy includes public institutions such as health care facilities which will be needed to respond to a new wave of respiratory illnesses. Recent estimates indicate that only 28% of all health clinics in Africa have access to reliable electricity.<sup>10</sup> The pandemic also risks damaging the supply chains for delivering energy products and solutions, particularly off-grid and mini-grid power. In the long-term, there are policy and financing considerations that COVID-19 will raise to the forefront, such as subsidies, private sector investment, and other issues. As we look to the economic recovery from the pandemic-driven slow-down, we recognize the need to ensure access to energy as its backbone. Herein lies an opportunity for re-setting sustainable energy commitments including gender-appropriate responses.

### **Access to Energy: Where on-going deficits remain**

After the launch of the Sustainable Development Goals (2015), the Global Tracking Framework (2013, 2015 and 2017) evolved into the Tracking SDG7: The Energy Progress Report (2018, 2019, 2020). Now in its sixth edition, the 2020 Tracking SDG7: The Energy Progress Report provides an update of where access deficits remain and provides clear evidence from which G20 Members can best consider both individually and collectively their most strategic support. In order to be most effective, urgent steps need to be taken in countries where deficits continue to be high and where annual rates of increase remain low. These steps should be taken with a recognition of the root causes of energy poverty and an awareness that all countries should have the ability to access their indigenous resources on the path toward achieving and sustaining universal access.

Access to Electrification. Despite the acceleration over recent years in certain countries, the access expansion rate is still far from what is needed to achieve universal access targets. (The average rate of access worldwide is 90%.<sup>11</sup>) Of the existing deficit of 789 million people worldwide that do not have access to electricity, almost 70% live in Sub-Saharan Africa and 14 of 19 high-impact countries (countries with the highest deficits measured as millions of people) are in Sub-Saharan Africa (see Table 1). In fact, between 2016 and 2018, the number of people in Sub-Saharan Africa without access increased slightly by 0.6 million for the region as a whole and in 12 out of 19 high-impact countries population growth out-paced annual rates of increased access to electrification.<sup>12</sup> Most notably, in Nigeria and Democratic Republic of Congo, the two countries with the largest populations lacking access to electrification, the number of people without access increased by 3 million and 12 million, for the period from 2010 to 2018, respectively because electrification could not keep up with population growth.<sup>13</sup> Achieving universal access to electrification will not happen without aggressively addressing the persistent challenges in Africa, especially in countries with the lowest electrification rates.<sup>14</sup>

*Table 1. Electrification of 19 High-Impact Countries*

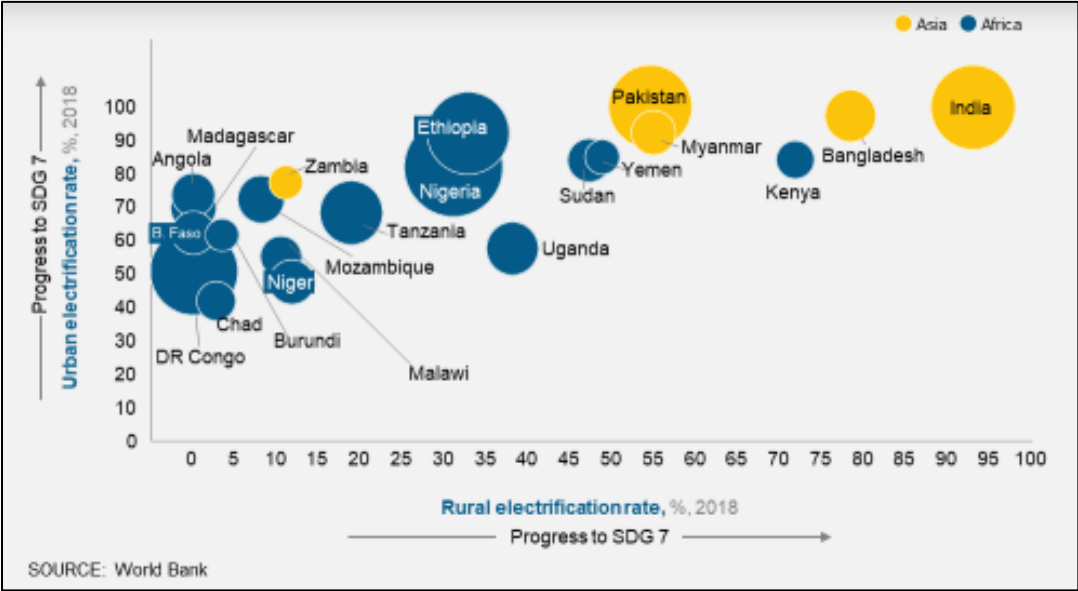
<b>High Impact Country</b>	<b>Access deficit, 2018 (million)</b>	<b>Urban Access Rate, 2018 (%)</b>	<b>Rural Access Rate, 2018 (%)</b>
<b>Nigeria</b>	85	81.7	31
<b>DR Congo</b>	68	50.7	0
<b>India</b>	64	99.7	92.9
<b>Pakistan</b>	61	100	54.4
<b>Ethiopia</b>	60	92	32.7
<b>Tanzania</b>	36	68.3	18.8
<b>Bangladesh</b>	24	97.1	78.3
<b>Uganda</b>	25	57.5	38
<b>Mozambique</b>	20	72.2	8
<b>Madagascar</b>	19	69.6	0
<b>Niger</b>	18	47.6	11.7
<b>Myanmar</b>	18	92.2	54.8
<b>Angola</b>	17	73.7	0
<b>Burkina Faso</b>	17	62.3	0
<b>Sudan</b>	17	83.8	47.1
<b>Malawi</b>	15	55.1	10.4
<b>Chad</b>	14	41.8	2.7
<b>Kenya</b>	13	84	71.7
<b>Yemen</b>	11	85	48.7

*Source: World Bank (2020).*

In addition to a clear geographic spotlight on the high-impact countries, particularly those in Sub-Saharan Africa, a differentiation between urban and rural populations without access to electricity provides an important reference for the electrification options that need to be considered. The 2020 Tracking SDG7 Report estimates that approximately 85% of the total global access deficit comes from rural areas (see Figure 1). While access rates have improved dramatically in rural areas from 2010 to 2018, greater acceleration of off-grid solutions is still needed for rural

populations as well as the public institutions (such as health facilities) that provide services to rural populations. This points to a second important reality: achieving universal access to electrification will need to rely on massive scale-up of off-grid solutions (mini-grid, micro-grid, solar home systems) as well as grid extension, densification, and intensification that address still unserved urban and peri-urban populations. In addition, long-term service provision would require the on-going practice of providers recovering their costs (either through cost-reflective tariffs or subsidies or both). According to IEA's latest geospatial analysis covering in detail 44 sub-Saharan African countries, decentralized solutions would represent the least-cost option for up to two-thirds of rural connections and one third of urban connections which need to be realized by 2030 to achieve universal access to electricity.<sup>15</sup>

Figure 1. Rural vs urban electrification rates (21 access deficit countries), 2018



Finally, as mentioned above, the COVID-19 pandemic highlights the importance of access to reliable electricity by public services, such as health clinics, demonstrating how energy underpins development needs while exposing the gaps that remain to achieve universal access.

Access to Clean Cooking. Progress of access to modern clean cooking (i.e., access to clean fuels and technologies for clean cooking) continues to be very slow and disproportionately affects women and children. Globally, the best estimates indicate that 2.8 billion<sup>16</sup> people (or 1 out of every 3 people) do not have access to clean cooking triggering a series of derivative effects from household air pollution to negative externalities for the environment. From 2010-2018, global access to clean fuels and clean cooking technologies increased annually by less than one percent. If the current rate of improvement continues over the next decade, an estimated 31% of people on the planet will not have access to clean cooking by 2030. This annual rate of improvement will need to be increased by more than three times in order to achieve the target of universal access.

Incremental improvements have been made in Asia with the introduction of cleaner fuels, such as natural gas and LPG, but still many remain without access. In Sub-Saharan Africa, the population growth continues to outstrip any global gains made in terms of overall access. Unlike access to electrification, the 19 clean cooking High-Impact Countries include 10 from Sub-Saharan Africa and nine from across South and East Asia (see Table 2).

*Table 2. 19 countries with the largest populations lacking access to clean fuels and technologies (2014-2018 average)*

<b>High-Impact Country</b>	<b>Access Deficit (millions)</b>	<b>Access Rate (%)</b>	<b>Annualized Increase (pp)</b>
<b>India</b>	727	45	2.0
<b>China</b>	544	61	1.3
<b>Nigeria</b>	173	7	1.6
<b>Bangladesh</b>	130	20	1.8
<b>Pakistan</b>	113	42	1.1
<b>Ethiopia</b>	98	5	0.5
<b>DR Congo</b>	76	4	0.0
<b>Indonesia</b>	74	71	4.3
<b>Philippines</b>	58	44	1.2
<b>Tanzania</b>	54	3	0.2
<b>Kenya</b>	44	10	0.4
<b>Uganda</b>	41	1	-0.1
<b>Myanmar</b>	41	23	2.4
<b>Vietnam</b>	37	61	1.6
<b>Mozambique</b>	28	4	0.2
<b>Madagascar</b>	25	1	0.0
<b>Afghanistan</b>	24	32	2.3
<b>Ghana</b>	21	24	1.5
<b>Sudan</b>	21	46	2.1

*Source: WHO*

Similarly, an important differentiation needs to be included regarding urban and rural populations. Urban dwellers will have access to more varied markets for clean fuels and technologies whereas people in peri-urban, semi-rural, and rural areas will have limited options and greater challenges to access both clean fuels and technologies. In 2018, 83% of urban dwellers were estimated to have access to clean cooking compared to 37% of rural dwellers even as access rates in rural areas are beginning to advance more rapidly than in urban areas.<sup>17</sup> Clean cooking solutions will need diversified responses according to the customer segmentation that exist within each country with a focus on developing markets and technologies while addressing behavior change of customers.



## Where financing is flowing ... and where it is not

Despite the existence of proven technologies, supportive policies, and the emergence of new and innovative business models (including public-private partnerships) that can increase access to clean, affordable and reliable energy, financing these projects and enterprises in the countries farthest from their SDG7 targets continues to be a challenge.

Financing access to electrification. While there has been an encouraging increase in electricity access investments over the last four years in 19 high-impact countries, the **electrification investment gap remains large where it is needed the most**, and its urgency is intensifying. Financing has increased for off-grid renewable energy paired with digital payments (“pay as you go”) but overall electrification investment is below what is needed.<sup>18</sup> In terms of 19 high-impact countries, there was a 20% increase in overall electrification financing commitments<sup>19</sup>, from USD 30 billion in 2015-16<sup>20</sup> to USD 36 billion in 2017<sup>21</sup>; however, this falls well short of the estimated USD 40 billion per year<sup>22</sup> needed to provide electricity to all by 2030. Furthermore, only USD 12.6 billion of the USD 36 billion total was committed for electrification of residential customers, the focus of electrification access.

There is also an important gap between financing flows to different high-impact countries (see Figure 3). For example, there continues to be chronic underinvestment in Sub-Saharan Africa where **4 of 13** Sub-Saharan African countries reported **an absolute decline in electrification finance** from 2015-2016 to 2017 while **10 of 13** each received less than USD 300 million. In contrast, the top four countries receiving the largest financing flows were India (USD 16.6 billion), Bangladesh (USD 7.1 billion), Nigeria (USD 6.3 billion) and Philippines (USD 1.4 billion).<sup>23</sup>

Finally, despite being the most cost-effective and quickest way of providing electricity access to many rural and remote populations (as mentioned above, these populations represent around 85% of the total global deficit), off-grid solutions (solar home systems and mini-grids) capture a small proportion of total energy access investments tracked (1.2%).<sup>24</sup> Addressing these persistent financing imbalances is paramount for closing the electricity access gap.

Financing access to clean cooking. Financing for clean cooking remains abysmally low and has decreased to USD 32 million in 2017 in 19 clean cooking high impact countries. This investment, taken as an order of magnitude given the difficulty in gathering accurate data in many countries, is a small percentage of the nearly USD 5 billion<sup>25</sup> annual investment needed by 2030 to address a problem faced by almost three billion people. Major coordinated efforts that go beyond the current fragmentation of approaches need to be made in order to create robust markets that can make clean cooking affordable and accessible for all, including financing the infrastructure for fuel delivery and development of technological innovations for the next generation of solutions.

Figure 3. Finance for Electricity Access in 13 of 19 High-Impact Countries in Africa (2019)<sup>26</sup>



### Policy options and regulations needed (electrification and clean cooking)

While the existence of policy and regulatory frameworks alone will not guarantee improvements (they must be enabled by good governance, accountability, and concrete regulatory mechanisms) they are a necessary tool that is missing in many off-track countries. Despite these limitations and barriers, some promising examples exist in high-impact countries that are making progress.

Access to Electrification. A conducive policy and regulatory environment for all solutions (on-grid, off-grid mini- and micro-grids, solar home and stand-alone systems), with established planning processes, dedicated incentives or support schemes, and assurance of financially sound utilities, combined with effective and transparent institutions and strict policy enforcement are fundamentals that drive investment. This type of framework will also enable greater support to public-private and exclusively private investment and the operation of viable energy services.

With policy incentives in place (e.g. national funding program, consumer finance mechanism, capital subsidies to utilities), India is at the forefront of energy access finance with USD 16.6 billion in committed financing that was tracked in 2017 even though it has one of the higher access rates among the 19 high-impact countries. In Sub-Saharan Africa, regulatory frameworks in Kenya are considered among the most conducive.<sup>27</sup> Here, progress is attributable to a combination of factors including innovative off-grid approaches in northern counties through the Kenya Off-grid Solar Access Project; continuous support by government for decentralized systems expressed through exemption from import and value-added taxes for solar products and the adoption of international

standards; grid densification efforts and the development of a mature mobile payment infrastructure that enabled innovative business models and payment mechanisms to emerge. For example, rural customers as well as developers in Kenya and Uganda have benefited from pay-as-you-go (PAYG) mechanisms based on combining functional digitization platforms, innovation using financial technology, and consumer behavior.<sup>28</sup>

It is critical that public spending is supplemented by private capital and that funding from DFIs is used to catalyze private financing especially in Africa, and especially in terms of off-grid development that can respond to rural energy needs. However, many countries in Africa limit private participation in the power sector: 16 out of 43 Sub-Saharan African countries do not allow private sector participation in power generation and electricity networks.<sup>29</sup> Grid densification will also have a role to play but will continue to be challenging for many utilities in high-impact countries that already face a number of difficulties for managing their current service obligations let alone expanding their network (often times to customers with very low energy demand). Table 3 provides one composite indicator tracked by RISE regarding utility creditworthiness.

Table 3. Utility Creditworthiness in 19 high-impact countries (2017)

High Impact Country	RISE Score	Urban Access Rate, 2018 (%)
	Strong Insufficient Weak	
Nigeria	Weak	81.7
DR Congo	Insufficient	50.7
India	Weak	99.7
Pakistan	Insufficient	100
Ethiopia	Weak	92
Tanzania	Weak	68.3
Bangladesh	Insufficient	97.1
Uganda	Insufficient	57.5
Mozambique	Weak	72.2
Madagascar	Weak	69.6
Niger	Insufficient	47.6
Myanmar	Insufficient	92.2
Angola	Weak	73.7
Burkina Faso	Insufficient	62.3
Sudan	Insufficient	83.8
Malawi	Insufficient	55.1
Chad	Weak	41.8
Kenya	Insufficient	84
Yemen	Weak	85

Source: Regulatory Indicators for Sustainable Energy (RISE). World Bank. 2018.

**Access to Clean Cooking.** Clean cooking has been the most overlooked area of the sustainable energy agenda, with very little progress being made on clean cooking access globally. As pointed out, the global deficit in clean cooking access has barely changed since 2000 and approximately 3 billion people remain without access, of which 19 high-impact countries accounted for 82% (2.5 billion) of global clean cooking access deficit in 2017, many of whom still rely on traditional

biomass fuels in the form of wood, straw, dung, charcoal, and other organic materials for meeting their basic household needs.

There is some evidence that policymakers are beginning to take more notice of the clean cooking agenda, such as the Government of India's PMUY<sup>30</sup> program for connecting poor households to LPG (see Annex III for more details). Studies indicate that there has been some evolution of policy frameworks since 2010, particularly in the area of planning (e.g. data tracking, existence of national plan and institutional capacity), however, little progress has been made on standard-setting for cookstoves<sup>31</sup> or on consumer and producer incentives to stimulate adoption of clean technologies. In the absence of a more coherent government strategy for integrating the fragmented pieces of market relationships, private sector and NGOs have attempted to fill this role to become market facilitators but with success that is limited or not easily scaled-up.

Therefore, cross-sector policy frameworks and accompanying regulations need to be reviewed and remade to enable sustainable deployment and adoption of clean cooking solutions and governments must support the sector's development through the full value chain supporting demand and supply of solutions. This will require greater shared responsibility and coordination across sectors given that clean cooking often lacks ownership by policymakers and slips through the policy cracks.

### **Barriers impeding more urgent progress**

The barriers impeding more urgent progress are found at the national and sub-national level of high-impact countries. Invariably, some of these obstacles will be more significant in certain countries than others. This is the terrain where SDG7 will be achieved (or not). Countries that have achieved rapid rates of electrification have done so by addressing some of these barriers as well as providing clear and enforceable rules of the game for investors. The previous experience of countries such as China and Thailand suggest that even high rates of increased electrification cannot be sustained when addressing all unserved populations and will decrease when the remaining unconnected populations become more remote and more difficult to reach. Steep yearly access rates will be easiest when providing access to urban populations but will become slower when beginning to address the access challenges of rural and dispersed populations as these solutions need different business models, technologies and decentralized capacity. In addition, there is a need to protect intellectual property when delivering access to energy solutions in order to ensure that all parties' investments and activities are respected and ensure economic interests are not negatively affected. At the same time there is a need to accelerate and expand arrangements for clean energy technology transfer to countries with access deficits on favorable terms, including on concessional and preferential terms, as mutually agreed.

The key barriers that need to be addressed in High-Impact Countries include:

#### Key Barriers to Access to Electrification:

- Lack of data standards for decision-makers from both public and private sectors to target efforts and decisions;
- Integrated approach to electrification that include a suite of on-grid and off-grid options is needed to identify least cost solutions;

- Enabling policy and regulatory frameworks are required to enable incentives and standards for the suite of on-grid and off-grid options;
- Lack of financing is impeding the progress in many countries in Sub-Saharan Africa;
- Liquidity challenge for many off-grid developers is at a critical crossroad as a result of the coronavirus pandemic<sup>32</sup>;
- Energy needs and affordability of the poorest unserved sectors need to be taken into account when designing access interventions;
- Consumer affordability of off-grid solutions will be challenging as private developers apply cost reflective tariffs which might not be affordable for the poorest of the poor nor competitive with the subsidized electricity from the grid. The balancing of subsidies and tariffs is a critical point to the business case of mini-grids;
- Lack of targeted measures to promote gender equality for women and girls and additional measures for disadvantaged groups;
- Greater capacity in policymaking, implementation, regulation and enforcement is needed;
- Capacity of mini-grid developers from the continent needs to increase, including the identification and strengthening of local developers and local teams across the value chain (design, installation, O&M, quality assurance, testing, etc.);
- Supply chains for components of off-grid systems need to be secured and more easily accessed by developers in-country which will require a review of customs and duty frameworks at the same time there is a need to strengthen local capacity for value addition and sourcing of components locally;
- Financial sustainability of electricity providers, including public utilities, which is hampered by non-cost-reflective tariffs and technical and nontechnical losses. Without financial sustainability, investments by electricity providers to maintain and expand electricity access are much less likely to occur

#### Key Barriers to Access to Clean Cooking:

- Lack of high-level political commitment;
- Policy environment is fragmented across different sectors and ministries at the national level, each addressing a part of the clean cooking response (health, energy and fuels, environment, housing development, etc.) and needs to be made coherent with enhanced collaboration between the sectors;
- Standardized data for planning and monitoring different parts of the value chain as well as household use of fuel(s) does not exist. Much greater effort to build standard data sets for use by national decision-makers is needed;
- Affordability and user preferences need to be prioritized and recognized across the many different markets that exist including the practice of fuel stacking;
- Market development will require the support of smart subsidies and public finance;
- Fuel chains need to be consolidated and regulated recognizing the need for multiple fuel chains for different market sectors;
- Lack of targeted measures that address gender needs for women and girls, and additional measures for disadvantaged groups;
- Lack of sufficient funding to achieve growth and scale in the clean cookstoves and fuels;
- Whole-market approach and partnerships for coordinating this approach is required.

## Forward-looking Options

As outlined in this Executive Brief, the most recent data available provides a clear picture of where energy access deficits continue to exist, what types of solutions need to be scaled-up massively, and what are some of the key barriers to overcome. On top of this snapshot, a new paradigm has emerged as a result of the COVID-19 global pandemic that will influence future responses to the energy access challenge. In particular, the global pandemic will underscore the important energy access deficits that remain in many countries, but most importantly in Sub-Saharan Africa, which will affect the ability to provide and dispense health care and catalyze an economic recovery. At the same time the effects of the pandemic can be expected to impact the financial viability of both utilities (already in a weak position) and off-grid providers who may not have the means to absorb additional financial challenges during the crisis because of the nascent state of the industry.

The forward-looking options outlined below (see Annex II for greater detail) build on Energy Sustainability Working Group deliberations from previous years and aim to provide specific, ambitious options that require collective global leadership to increase the annual rate of progress being made on electrification and clean cooking and will be needed for both a COVID-19 response as well as for an equitable economic recovery that leaves no Region behind and strives for greater gender equality. These options can be applied, as needed, by G20 members either individually or collectively as well as for any sub-set of countries with access deficits as specific opportunities may arise. Individual circumstances of each country will need to be taken into consideration when determining the different fuel sources. Where possible, these forward-looking options should build upon existing programs with the aim of achieving scale when missing. The five forward-looking options include:

### **I. Initiatives to address the data and financing gaps (utilizing innovative financing mechanisms) in countries and Regions with the largest populations without access to energy.**

Data. An increasing number of policymakers are using geospatial-based integrated energy planning as a way of gaining a more comprehensive and data-driven understanding of the technologies and spending required to achieve universal energy access, including the efforts needed for providing reliable power to health care facilities. Countries such as Ethiopia, India, Kenya, Myanmar, Nepal and Togo are considering their electrification strategies with an eye to taking advantage of all available technologies and leveraging the private sector's expertise to meet SDG7. While this is an encouraging trend, the increasing use of geospatial least-cost modeling also highlights one of its key challenges: data gaps and quality. These gaps limit policymakers from identifying where unconnected populations exist, their proximity to existing assets, willingness and ability to pay, and energy consumption needs are deepest in the countries where energy access is most needed. Initiatives to reduce these gaps are underway in many countries through technical assistance provided by the World Bank, Rocky Mountain Institute, Power Africa, World Resources Institute, but need to be further enhanced and quickly scaled-up. The next two years will be critical for closing this data gap in order to achieve the SDG7 targets and the economic recovery that will be required around the world.

Financing. In addition to the data gap, achieving SDG7 requires a variety of financing tools, including public finance and concessional financing to governments, debt finance and equity finance for private enterprises, and more financial innovation to leverage commercial funding (e.g. blended finance, risk sharing instruments, crowd sourcing, etc.). Among these, results-based

financing (RBF), a development funding mechanism that links pre-agreed and verified results with funding once the results are achieved,<sup>33</sup> is a proven, viable alternative to procurement approaches to energy projects to deliver connections faster and more efficiently while aiming to scale-up concessional and commercial funding to complement publicly financed RBF as needed. By shifting the focus to outcomes rather than inputs, RBF incentives allow governments and donors to share risk of delivery with the private sector, provide regulatory certainty to the industry about financial support to be provided, and aggregate financing and scale support across multiple countries. Other funding mechanisms, such as crowd sourcing or other innovations, could also be explored as a way of leveraging commercial finance.

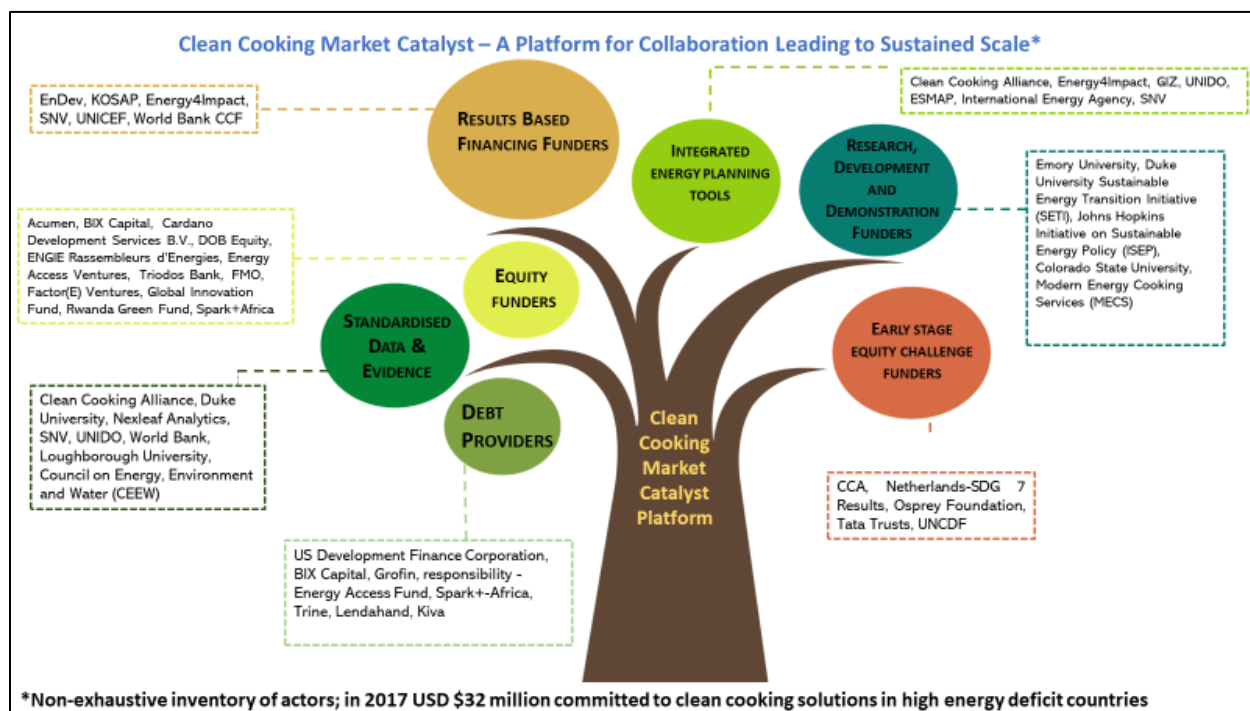
## **II. The mobilization of a catalyst platform to avoid fragmented approaches and dramatically increase access to clean cooking in countries in Africa.**

The concept of a Clean Cooking Market Catalyst Platform (CCMC) is not intended to create a new fund. Instead, it aims to be a global public good that addresses the current fragmentation of the clean cooking sector that will better articulate the multi-dimensional challenges of building market-based solutions around seven building blocks<sup>34</sup> (research, development & demonstration; standardized data and evidence; equity fund for existing companies; early stage equity challenge fund for the next generation of enterprises; results based financing—Clean Cooking Fund; debt facilities; integrated energy planning tool). The CCMC would provide integrated and streamlined support to developing countries, donors, consumers (many of whom are women) and the private sector, and could strengthen the coordination among current initiatives.

A mechanism that brings together the fragmentation of the clean cooking sector has been acknowledged by leading organizations to be absent and needs to be built – with partners -- to increase the efficiency of the many actors, public and private, currently engaged in the clean cooking sector (See Figure 4). Often times, however, efficiencies and effectiveness are sacrificed due to the disjointed set of programs. Many current efforts are either not operating at-scale (pilot initiatives that address a narrower portion of the clean cooking market or focus on a limited number of countries) or are focused on one part of the clean cooking solution.<sup>35</sup> The CCMC would enable disparate components to align for scale and accelerated impact, leveraging greater public and private funding, which in 2017 reached USD 32 million of commitments in 19 high-impact countries.<sup>36</sup>

The platform would aim to catalyze significantly more public-private coordination and would bring together a suite of financial products and services across the development and finance continuum of clean cooking to build greater efficiency and effectiveness that is needed to address this global challenge. Through a secretariat, the platform would draw upon existing solution providers and offerings, such as the Clean Cooking Fund, managed by ESMAP with initial funds provided by the Netherlands, Denmark, and Norway, and the Clean Cooking Alliance's Spark+ Africa Fund, as well as stimulate new voluntary approaches and products to fill gaps in the sector's ecosystem.

Figure 4. Ecosystem of clean cooking programs and funds



The CCMC will be designed in consultation with partners to ensure alignment with programs, such as the Clean Cooking Fund, and will reflect outputs from the Clean Cooking Sector Strategy, currently under development and being managed by the Clean Cooking Alliance with funding from Norway.

### III. G20 challenge grants to high-impact countries that match efforts to develop and implement national clean cooking and universal integrated energy plans.

Integrated energy planning uses a full-systems approach to make most effective use of resources, available electrification and clean cooking technologies, fuels and energy service provision models to deliver modern, reliable and affordable energy to all at a lower cost, and more rapidly. To be as effective a planning instrument as possible, each of these universal integrated energy plans will be nationally driven based on local needs. By using geo-spatial modelling, big data, and least-cost analyses, plans can help governments and their partners focus attention on where it is needed the most, coordinating the activities of utilities, mini-grid developers, solar home system companies, and clean cookstove providers and providing baseline data to make their activities more efficient. (A critical target for these analyses would be the health care facilities that need access to reliable electricity.) Having a comprehensive and data-driven understanding of the technologies and spending required to achieve universal access will aid governments in prioritizing and raising the funds required to execute the plans and will stimulate private sector investment in energy access. While many countries are underway in their development of integrated energy plans, only a handful have finalized and officially adopted these plans complemented by accompanying regulations and policies and all are focusing only on the electrification side of the challenge. Much more needs to be done to include the clean cooking challenge as part of the integrated planning outputs.



Challenge grants will help to put the initial universal integrated energy plans in place but will require country counterpart contributions, commitments or other evidence of ownership to implement and maintain this universal integrated energy plan system as well as align subsequent financing to this integrated energy plan approach.

#### **IV. A capacity building initiative aimed at public and private sector decision-makers for north-south and south-south capacity building in High-Impact Countries and Regions.**

As other financial, policy and regulatory inputs are introduced to increase the rate of energy access in high-impact countries, a potential bottleneck needs to be addressed, namely the capacity to make the ecosystem work. In-country capacity will need to increase in order to implement policies and strategies, engage with private sector stakeholders and developers, manage public-private partnership processes, ensure supply chains and operation and maintenance of decentralized systems across the country, and build the capacity of the financial sector to invest in new energy access projects.

A capacity-building effort (including technical assistance, training, advisory, and lessons sharing) that can address a system-wide vision for capacity building gaps and needs will be a necessary element for massively scaling up energy access and making it work for the overall development needs of the country. Critical support is needed for least developed countries (LDCs), land-locked developing countries (LLDCs) and small island developing states (SIDS)<sup>37</sup> to develop regulations and policies to spur home-grown solutions and innovations that protect intellectual property rights.

#### **V. Support for institutions and enabling frameworks to accelerate energy access and clean cooking in critical off-track countries and Regions.**

In order to leverage the full potential of the private sector to support governments in meeting the energy access challenge, clear and transparent regulatory frameworks specific to different access technologies are therefore required in order to ensure that a) private sector resources are targeting the right geographies and customers in line with the Integrated Energy Plan; b) the private sector is providing a minimum service standard and adhering to quality assurance requirements; and finally c) that investments are protected in order to allow the market to grow and the enterprise to scale up and reduce the cost to customer. Often times the regulations restricting the scale-up of energy access technologies and business models are outside of the scope of the Ministry of Energy entirely, relating to issues of business and asset ownership laws, restrictions of the use of foreign currency, import duties and customs clearance delays. It is for this reason that Ministries of Finance and authorities mandated to attract Foreign Direct Investment must be coordinated with to ensure that all national laws and regulations affecting energy access are in line with the government's integrated energy plan and commitment to SDG7.

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<sup>1</sup> IEA, IRENA, UNSD, WB, WHO (2020). *Tracking SDG 7: Energy Progress Report 2020*. Washington DC.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

<sup>4</sup> <https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health>

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- <sup>5</sup> Sustainable Energy for All and Climate Policy Initiative (2019). Understanding the Landscape 2019: Tracking Finance for Electricity and Clean Cooking Access in High-Impact Countries. Vienna.
- <sup>6</sup> Ibid.
- <sup>7</sup> The following International Organizations provided valuable inputs to this report: Clean Cooking Alliance, IEA, Islamic Development Bank, OPEC Fund for International Development, SNV, UNIDO, WHO, World Bank.
- <sup>8</sup> <https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health>
- <sup>9</sup> IEA, IRENA, UNSD, WB, WHO (2020). *Tracking SDG 7: Energy Progress Report 2020*. Washington DC. See also <https://trackingsdg7.esmap.org/>
- <sup>10</sup> WHO, World Bank (2015). *Access to Modern Energy Services for Health Facilities in Resource-constrained Settings*. Geneva.
- <sup>11</sup> IEA, IRENA, UNSD, WB, WHO (2020). *Tracking SDG 7: Energy Progress Report 2020*. Washington DC.
- <sup>12</sup> Ibid.
- <sup>13</sup> Ibid.
- <sup>14</sup> The focus on high-impact countries should not discount the importance of addressing unserved populations in other countries, such as Papua New Guinea (3.5 million without access), Solomon Islands (218,000 without access), or Vanuatu (112,000 without access).
- <sup>15</sup> IEA (2019). *Africa Energy Outlook 2019*. Paris.
- <sup>16</sup> IEA, IRENA, UNSD, WB, WHO (2020). *Tracking SDG 7: Energy Progress Report 2020*. Washington DC.
- <sup>17</sup> Ibid.
- <sup>18</sup> World Bank, IFC, GOGLA (2020). *2020 Off-grid Solar Market Trends Report*
- <sup>19</sup> Financing tracked includes international and domestic sources, public and private sources.
- <sup>20</sup> An average of USD 30 billion was tracked in each of the two years (2015 and 2016).
- <sup>21</sup> Sustainable Energy for All and Climate Policy Initiative (2019). Understanding the Landscape 2019: Tracking Finance for Electricity and Clean Cooking Access in High-Impact Countries. Vienna.
- <sup>22</sup> IEA (2019). *World Energy Outlook 2019*. Paris.
- <sup>23</sup> SEforALL and CPI (2019).
- <sup>24</sup> Ibid.
- <sup>25</sup> IEA (2019). *World Energy Outlook 2019*. Paris.
- <sup>26</sup> Ibid.
- <sup>27</sup> According to RISE 2017 (World Bank), South Africa, Ghana, and Kenya are the three Sub-Saharan African stand-outs with high scores in terms of energy policies and regulations. See <https://rise.esmap.org/scores>.
- <sup>28</sup> In 2018 in Kenya, customers of GOGLA associates' solar product providers only paid for \$18 million of the \$112 million in sales in cash, according to 2019 Power Africa Off-grid Solar Market Assessment Report.
- <sup>29</sup> IEA (2019). *Africa Energy Outlook*.
- <sup>30</sup> Pradhan Mantri Ujjwala Yojana (PMUY) was launched in 2016 with the objective of connecting 50 million poor households to LPG for cooking.
- <sup>31</sup> Notwithstanding the 2018 voluntary performance targets for cookstoves developed by the International Organization for Standardization (ISO) addressing benchmarks for efficiency, emissions, safety and durability.
- <sup>32</sup> Impact investors and donors are mobilizing a Relief Fund for off-grid companies to meet this challenge. <https://www.energyaccessrelief.org/>
- <sup>33</sup> From the World Bank's Global Partnership for Results-Based Approaches (GPRBA). According to GPRBA, through a range of mechanisms, RBF helps deliver development outcomes, improves accountability, and drives both [innovation and efficiency](#).
- <sup>34</sup> The concept of a Clean Cooking Market Catalyst Platform around seven building blocks was developed during the SEforALL Charrettes (2019) among 29 organizations working across the ecosystem of the clean cooking challenge.
- <sup>35</sup> The Clean Cooking Alliance – previously named the Global Alliance for Clean Cookstoves until November 2018 – was founded in 2010 with the ambitious mission to work with a global network of partners to build an inclusive industry. The Alliance is focused on accelerating a sustained, well-coordinated, ecosystem-level effort that

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harnesses strengths and resources from a broad range of actors to develop a range of affordable, appropriate, user-friendly cooking solutions – including stoves *and* fuels.

<sup>36</sup> Sustainable Energy for All and Climate Policy Initiative (2019). Understanding the Landscape 2019: Tracking Finance for Electricity and Clean Cooking Access in High-Impact Countries. Vienna.

<sup>37</sup> Any support to specific countries will be guided by individual G20 Member selection criteria.

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G20 Member Country	Areas of collaboration of G20 countries with Sub-Saharan African countries	Summary of the recommendation	Summary of the collaboration	Progress and outcomes identified	Good practices and lessons learned	Countries collaborated with	Link
Japan	Policy and regulatory environment	Support efforts to help governments at the country-level strengthen their policy and regulatory environment.	<p>1. Angola: Power Sector Reform Support Program (Yen Loan): The project will provide a Development Policy Loan with the aims of: 1) restructuring the power sector and improving the regulatory environment, 2) fostering private sector investment , 3) enhancing transparency and efficiency in public finance, 4) enhancing gender mainstreaming and environment and social safeguards, and 5) improving the business environment for FDI.</p> <p>The fifth aim is a policy improvement objective that JICA assists with independently, as the private sector strongly needs a better business environment in such areas as: 1) revisions to the investment laws, 2) improvements to the procedures for acquiring visas and remitting money overseas, and 3) stable operation and improved transparency in the regulations pertaining to private business. Loan agreement signed in 2015.</p>	Ongoing		AfDB	<a href="https://www.jica.go.jp/english/news/press/2015/150817_01.html">https://www.jica.go.jp/english/news/press/2015/150817_01.html</a>

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Japan	Policy and regulatory environment	Support efforts to help governments at the country-level strengthen their policy and regulatory environment.	2. Southern Africa: Data Collection Survey on Southern African Power Pool (Data Collection, 2015-2017).	Completed	The Survey allowed the survey team to recognize role of each organization to boost SAPP priority projects. The Team was able to identify areas for subsequent cooperation and made recommendations for each organization to consider future actions.		
Japan	Policy and regulatory environment	Support efforts to help governments at the country-level strengthen their policy and regulatory environment.	3. Angola: The Project for Power Development Master Plan (Technical Cooperation Project, 2019-2021).	Ongoing			
Japan	Policy and regulatory environment	Support efforts to help governments at the country-level strengthen their policy and regulatory environment.	4. Djibouti: Test Well Drilling Project for Geothermal Development (Technical Cooperation Project, 2019-2022).	Ongoing			
Japan	Policy and regulatory environment	Support efforts to help governments at the country-level strengthen their policy and regulatory environment.	5. Tanzania: Project for Domestic Natural Gas Promotion and Supply System in Tanzania (Technical Cooperation Project, 2015-2020).	Ongoing			
Japan	Policy and regulatory environment	Support efforts to help governments at the country-level strengthen their policy and regulatory environment.	6. Nigeria: The Project for Master Plan Study on National Power System Development (Technical Cooperation Project, 2015-2019).	Completed	Formulation of Master Plan on National Power System Development for 25 years. Technical Transfer to the Nigerian counterparts.		
Japan	Policy and regulatory environment	Support efforts to help governments at the country-level strengthen	7. Mozambique: The Project for Integrated Master Plan on Mozambique Power System Development in the Republic of Mozambique	Completed	By the ensured commitment from the Government, some projects proposed by the		

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		their policy and regulatory environment.	(Technical Cooperation Project, 2016-2018).		Master Plan are already implemented.		
Japan	Policy and regulatory environment	Support efforts to help governments at the country-level strengthen their policy and regulatory environment.	8. Ethiopia: Advisor for Geothermal Exploration and Development in Ethiopia (Technical Cooperation Project, 2015-2021).	Ongoing			
Japan	Policy and regulatory environment	Support efforts to help governments at the country-level strengthen their policy and regulatory environment.	9. Kenya: PPP Advisor for the Energy Sector (Technical Cooperation Project, 2016- 2018).	Completed	The Ministry of Energy's capacity on policy making regarding PPP was enhanced with the help of Japanese PPP experts dispatched.		
Japan	Policy and regulatory environment	Support efforts to help governments at the country-level strengthen their policy and regulatory environment.	10. Mozambique: Electricity Development Advisor (Technical Cooperation Project, 2019-2021).	Ongoing			
USA	Policy and regulatory environment	Support efforts to help governments at the country-level strengthen their policy and regulatory environment.	Department of Energy's Clean Energy Solutions Center (CESC) helps governments design and adopt policies and programs that support the deployment of clean energy technologies. CESC offers no-cost technical assistance on clean energy policy issues. Through an interactive online portal, governments and technical institute representing them requests for assistance. Since its launch in 2011, the CESC has helped a number of countries in Africa advance energy-related policy challenges. With funding from USAID's Power Africa initiative, CESC provided technical assistance to the government of Togo's Regulatory	A bankable regulatory framework both for mini- grids and for solar home systems to attract greater private sector investment to the sector in Togo	Power Africa adheres to a model that includes supporting African governments, utilities, and regulators to develop laws and practices that attract private investment and growth.	Togo, All SSA	<a href="https://cleanenergysolutions.org">https://cleanenergysolutions.org</a>

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			Authority for the Electricity Sector (ARSE), on the development of a regulatory and legal framework to support off-grid electrification in the country. The Government of Togo is interested in developing a bankable regulatory framework both for mini-grids and for solar home systems to attract greater private sector investment to the sector. A range of options were reviewed, including the PAYGO model for solar home systems, which relies on available funding in lieu of financing.				
China	Technology development, dissemination, and deployment	Support the African country-led processes to develop SEforALL Action Agendas.	Cooperation on power infrastructure projects, including >6000MW Hydro projects, >500MW wind projects, >1000MW solar projects and 20 off-grid and mini-grid projects	Increase power capacity of more than 7500MW, which provided electricity for millions of people	Collaboration on power infrastructure projects is the most direct approach that assisted these countries in increasing access to electricity to millions of people.	Sudan	
USA	Technology development, dissemination, and deployment	Support the African country-led processes to develop SEforALL Action Agendas.	Weldy Lamont project in Senegal--In March 2017, the United States Trade and Development Agency (USTDA) funded a specialized training program to support plans by Senegal's Ministry of Energy to invest in far-reaching electricity infrastructure improvements. In 2018, USTDA also hosted Senegalese energy officials on a Smart Grid Reverse Trade Mission to connect Senegalese decision-makers with innovative U.S. industry and small businesses. This included a visit to the Illinois headquarters of Weldy-Lamont, which specializes in electrical power and control equipment and engineering expertise. In March 2020, the Board of Directors of the	Electricity to approximately 330,000 Senegalese in more than 400 villages	Power Africa adheres to a model that includes (1) leveraging public-private partnerships to accelerate and maximize development impact, while minimizing the cost to American taxpayers and African governments; and (2) supporting the private sector's work at all stages of power project development, removing obstacles that cause projects to derail.	Senegal	<a href="https://ustda.gov/blog_post/senegal-success-story-supporting-energy-access-through-american-technology/">https://ustda.gov/blog_post/senegal-success-story-supporting-energy-access-through-american-technology/</a>  <a href="https://www.exim.gov/news/exim-board-approves-915-million-export-">https://www.exim.gov/news/exim-board-approves-915-million-export-</a>



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			Export-Import Bank of the United States (EXIM) unanimously approved approximately \$91.5 million in loan guarantee financing that supports Weldy Lamont and other U.S. exporters in the design engineering and construction services to bring electricity to approximately 330,000 Senegalese in more than 400 villages. The proposed project will consist of low-voltage power lines along existing roads to rural villages, with more remote villages to be served by the establishment of a mini-grid of stand-alone solar units and limited low-voltage lines. The completed project will reduce the need for community-based diesel generation of electricity and will connect hundreds of villages to the grid. In addition to EXIM and USTDA, other federal agencies involved in promoting the selection of Weldy-Lamont for the project include the U.S. Departments of State and Commerce, and the U.S. Agency for International Development.				<a href="#">financing-for-renewable-energy-rural-electrification</a>
China	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	Establishment of China-Africa Fund for industrial cooperation and other funds, which have provided millions of dollars for investment and financing of energy projects		Many countries and multilateral institutions	More than 20 African Countries	
Japan	Investment and financing	Support the technology development, dissemination, and	1. Kenya: Olkaria V Olkaria V Geothermal Power Plant (Yen Loan): This project has constructed a geothermal power plant	Completed. The 1st unit (70 MW each) came online	Geothermal power generation accounts for 46% of total power generation in the		<a href="https://www.jica.go.jp/kenya/english/office/">https://www.jica.go.jp/kenya/english/office/</a>

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		deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	(140MW), steam fields, power transmission lines (approximately five km in length) and related facilities at the Olkaria geothermal area. (Loan agreement signed 2016)	in June 2019. The 2nd unit (70 MW each) came online in Oct 2019.	Republic of Kenya. More than 80% of geothermal power generation uses turbines by Japanese companies.		<a href="https://www.jica.go.jp/english/topics/160309.html">e/topics/160309.html</a>
Japan	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	2. Kenya: KenGen Olkaria I unit 1, 2, and 3 Geothermal Power Plant Rehabilitation Project (Yen Loan): The project will rehabilitate units 1–3 (15 megawatts each) of the existing Olkaria I Geothermal Power Plant to approximately 17 megawatts each in the Olkaria geothermal field. Upon completion of the project, the plant will be upgraded from the current 45MW to 51MW (Loan agreement signed 2018)	Ongoing. In April 2019, KenGen published a tender notice for the procurement of plant design, supply and installation of units 1, 2, 3 of the Olkaria I geothermal power plant.			<a href="https://www.jica.go.jp/english/news/press/2017/180316_01.html">https://www.jica.go.jp/english/news/press/2017/180316_01.html</a>
Japan	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	3. Ethiopia: Project for Installation of Geothermal Wellhead Power System (Grant aid): The project will install a small-scale mobile geothermal power plant (rated capacity: 5 MW) in Aluto-Langano, Oromia Regional State, where geothermal development is progressing, to achieve an early supply of geothermal electricity. It is expected that this will contribute to expanded and diversified power sources in Ethiopia. (Grant agreement signed 2017).	Ongoing			<a href="https://www.jica.go.jp/english/news/press/2017/171207_01.html">https://www.jica.go.jp/english/news/press/2017/171207_01.html</a>
Japan	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	4. Uganda: Kampala Metropolitan Transmission System Improvement (Yen Loan): new construction/rehabilitation of 220kv line and 132kv line substations (a total of 1,135 MVA newly added capacity), intracity transmission lines (220kv, 132kv. Total of 48km).	Ongoing			<a href="https://www.jica.go.jp/english/news/press/2018/180427_03.html">https://www.jica.go.jp/english/news/press/2018/180427_03.html</a>

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Japan	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	5. Malawi: Extension of Tedzani Electricity Hydropower Station (Grant aid: Grant agreement signed 2015): The project will increase the power supply capacity of the Tedzani hydropower station by a maximum of 20 megawatts, solving the power shortage over a wide area, including the capital of Lilongwe and the commercial city Blantyre.	Ongoing			<a href="https://www.jica.go.jp/english/news/press/2014/150318_01.html">https://www.jica.go.jp/english/news/press/2014/150318_01.html</a>
Japan	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	6. Mozambique: Project for Reinforcement of Transmission Network in Nacala Corridor (Grant aid: agreement signed 2015): This project will construct a new substation in Nampula Province in northern Mozambique, improving and stabilizing the capacity to supply power to the northern part of the country, where the power demand is rising. Through this project, a substation will be constructed, increasing the capacity of the facilities in the target region from 16 to 56 MVA.	Completed	For remote monitoring, SCADA (Supervisory Control and Data Acquisition system) was introduced. Necessary staff training was also implemented through the Project.		<a href="https://www.jica.go.jp/english/news/press/2015/150420_01.html">https://www.jica.go.jp/english/news/press/2015/150420_01.html</a>
Japan	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	7. Ghana: The Project for Reinforcement of Power Supply to Accra Central (Grant aid: agreement signed 2015): The Project includes 3 sets of 161/34.5 kV transformers with total capacity of 375MVA (biggest in the country); different sets of 161kV gas insulated switchgears (1st GIS in Ghana); 1 set of 33kV GIS; SCADA system; 161kV transmission lines from Avenor to Graphic Road substation and the construction of 2-story building to house the control room and other offices. After the completion of this	Completed	There were several challenges, including the construction of the facilities in a confined space and dealing with negative effects such as power outages and traffic disruptions during construction. In this project, these challenges were fully considered and addressed during the design and the construction stage. The impact to the power outages and		<a href="https://www.jica.go.jp/ghana/english/office/topics/press_151208.html">https://www.jica.go.jp/ghana/english/office/topics/press_151208.html</a>

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			project, it is expected to reduce technical losses equivalent to saving about 21MW of power; ensure stable and reliable power supply to Accra Area, ensure voltage (low voltage) improvement, increase coverage capacity and reduce pressure/load on Achimota & Mallam BSPs to improve efficiency.		traffic were able to minimize and the construction of the facilities completed successfully.		
Japan	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	8. Nigeria: Project for Emergency Improvement of Electricity Supply Facilities in Abuja (Grant aid: agreement signed in 2016): This project will upgrade two substations in Abuja and neighboring Nasarawa State, which will stabilize the power supply in the regions served by those substations. This project is expected to provide a stable power supply to approximately 7,000 households. The project includes two sets of 132/33kV transformers (60MVA each), one set of 132kV GIS, etc.	Completed. Commissioned in April 2018.	The installation of power capacitors and switchgears necessary for maintenance, operation and protection of the power capacitors in the premises of the existing 132/33kV Apo and 132/33kV Keffi Transmission Substations.		<a href="https://www.jica.go.jp/nigeria/english/office/topics/180412.html">https://www.jica.go.jp/nigeria/english/office/topics/180412.html</a>
Japan	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	9. Rwanda: Project for Improvement of Substations and Distribution Network (Phase 2) (Grant aid: agreement signed 2016): The project will construct and expand the electric power substations and associated power transmission and distribution facilities in Kigali, the capital city, to stabilize the power supply with higher efficiency. The Project includes two sets of 110/15kV transformers (20MVA each), 110 kV transmission lines (2.2km), 15kV distribution line (7.5km), etc.	Completed	The contribution of the project is to avoid the risk of a large-scale power outage, enable a stable supply of power, reduce power loss, and improve the electrification rate in Kigali, having a positive impact not only on the economy but also on related activities in education, welfare and health care.		<a href="https://www.jica.go.jp/english/news/press/2015/160308_02.html">https://www.jica.go.jp/english/news/press/2015/160308_02.html</a>

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Japan	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	10. Mozambique: Project for Emergency Rehabilitation of Transmission Network (Grant aid: agreement signed 2017): The project is expected to increase the total capacity of the transformer at the Influence Substation by approximately 1.4 times, reducing power outages. Components include: Capacity expansion of the Influence Substation in Maputo: A 275-kilovolt switchgear, a 275/66/11 kilovolt, 250MVA transformer, a 66-kilovolt switchgear, others. Capacity expansion in Maputo at the power distribution level: a 66/33-kilovolt, 20MVA mobile substation.	Ongoing		<a href="https://www.jica.go.jp/english/news/press/2017/170825_01.html">https://www.jica.go.jp/english/news/press/2017/170825_01.html</a>
Japan	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	11. Senegal: Project for Urgent Rehabilitation and Strengthening of Energy Distribution Network in Dakar Region (Grant aid: agreement signed 2018): The project will rehabilitate and strengthen a SOCOCIM switching station located in the eastern part of Dakar Region, converting it to a substation. The project will also improve the power distribution network in the surrounding region to stabilize the supply of electricity to the eastern part of Dakar Region, particularly in the new developing areas of Dakar. By converting the current SOCOCIM switching station to a substation, it is expected that the project will make it possible to supply 204 gigawatt hours of power to the eastern part of Dakar Region per year by 2023. This should reduce the	Ongoing		<a href="https://www.jica.go.jp/english/news/press/2017/180209_01.html">https://www.jica.go.jp/english/news/press/2017/180209_01.html</a>

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			power outages and is expected to facilitate economic activities in the target region. Components include two sets of 90/30kV transformers (40 MVA each).				
Japan	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	12. Rwanda: Project for Improvement of Substations and Distribution Network Phase 3 (Grant aid: agreement signed 2018): The project will improve and expand the Gasogi substation and incidental transmission and distribution facilities located in Kigali, the capital city, to stabilize the Kigali power supply with higher efficiency. Components include: Two sets of 110 /15 kV transformers (15 MVA each), two sets of switchgears (110 kV), 15 kV distribution lines (approximately 20 km).	Ongoing			<a href="https://www.jica.go.jp/english/news/press/2018/180920_02.html">https://www.jica.go.jp/english/news/press/2018/180920_02.html</a>
Japan	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	13. Nigeria: Project for Emergency Rehabilitation and Reinforcement of Lagos Transmission Substations (Grant aid: agreement signed 2018): The project will rehabilitate and reinforce the Apapa Road substation in Lagos State. The Apapa Road Substation, the project target, supplies power to households, as well as to harbor facilities and industrial areas nearby, including the Lagos Port Complex, which is the largest harbor in the country, handling approximately 40 percent of the total volume of imports into Nigeria. The project is expected to reduce the amount of power outage time at power service locations by at least 800 hours per year. Components	Ongoing			<a href="https://www.jica.go.jp/english/news/press/2018/181126_01.html">https://www.jica.go.jp/english/news/press/2018/181126_01.html</a>



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			include: two sets of 132/33 kV transformers (60 MVA each), one set of 132 kV gas-insulated switchgear (GIS), substation building (1,076 m2), etc.				
Japan	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	14. Kenya: The Project for Strengthening of Operation and Maintenance Capacity of Olkaria Geothermal Power Stations Using IoT Technology (Technical Cooperation Project, 2020-2024).	Ongoing			
Japan	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	15. Mozambique: Project for Improvement of Energy Loss Reduction on Distribution Network (Technical Cooperation Project, 2020-2023).	Ongoing			
Japan	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	16. Nigeria: Basic Data Collection Survey for the Power Distribution (Data Collection, 2020-2021).	Ongoing			
USA	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	Power Africa Transaction Advisors--Power Africa has more than 70 transaction advisors (TA's) working across sub-Saharan Africa to provide unbiased and free expertise to qualifying project developers and public sector entities.	Power Africa's TA's have used their in-depth knowledge of power sector project development and financing to	Power Africa adheres to an innovative model that includes (1) leveraging public-private partnerships to accelerate and maximize development impact, while minimizing the cost to American taxpayers and	All SSA	

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				help bring more than 60 transactions to financial close across the continent, ranging in size from five MW to more than 900 MW and covering a wide range of technologies.	African governments; (2) supporting the private sector's work at all stages of power project development, removing obstacles that cause projects to derail, and (3) supporting African governments, utilities, and regulators to develop laws and practices that attract private investment and growth.		
USA	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	The World Bank and International Finance Corporation Scaling Solar Program--The Republic of Zambia was the first country in sub-Saharan Africa to participate in the World Bank/ International Finance Corporation (IFC) Scaling Solar program, an initiative to unlock private-sector investment for solar power in emerging markets. USAID provided \$2 million to IFC to support Scaling Solar Zambia, and the Overseas Private Investment Corporation (OPIC) provided a \$13 million loan to the Bangweulu project, developed in consortium by First Solar and Neoen. USAID also helped the Zambia Electricity Supply Corporation modernize its systems to bring renewables onto the national grid and supported a competitive procurement process that resulted in one of the most-affordable solar tariffs in Africa, at just \$0.06/kWh and \$0.078/kWh. The Bangweulu and Ngonye projects are generating more than 88 MW of new renewable electricity in Zambia	88 MW of new renewable electricity	Power Africa adheres to a model that includes (1) leveraging public-private partnerships to accelerate and maximize development impact, while minimizing the cost to American taxpayers and African governments; and (2) supporting the private sector's work at all stages of power project development, removing obstacles that cause projects to derail.	Zambia	<a href="https://www.scalingsolar.org/active-engagements/zambia/">https://www.scalingsolar.org/active-engagements/zambia/</a>



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USA	Investment and financing	Support the technology development, dissemination, and deployment to increase affordable, reliable, viable, sustainable, and modern energy access.	The Kipeto Wind Farm--The Kipeto Wind Farm in Kenya reached financial close in November 2018, and General Electric finished the installation of 60 wind turbines in June 2020. Commercial operations/online status should happen in 2020. The 100 MW Power Africa-supported transaction received a variety of support from Power Africa's public-private partners, including OPIC/DFC providing \$233 million in debt financing, USAID Kenya providing technical assistance to Kenya's Energy Regulatory Commission (ERC), the Kenya Power and Lighting Company (KPLC) and the Kenya Electricity Generating Company (KenGen) on the integration of intermittent renewable energy sources into the grid, and also in the development of a new grid code with technical requirements for performance of intermittent sources of energy. Actis, a leading private equity fund based in the UK, is providing equity through its \$2.75 billion "AE4 Fund", which is comprised of 50% US funding. Other notable partners include the World Bank/IFC and African Infrastructure Investment Managers (AIIM).	100 MW of new renewable electricity	Power Africa adheres to a model that includes (1) leveraging public-private partnerships to accelerate and maximize development impact, while minimizing the cost to American taxpayers and African governments; (2) supporting the private sector's work at all stages of power project development, removing obstacles that cause projects to derail, and (3) supporting African governments, utilities, and regulators to develop laws and practices that attract private investment and growth.	Kenya	<a href="https://www.linkedin.com/company/kipeto-energy-plc/?originalSubdomain=ke">https://www.linkedin.com/company/kipeto-energy-plc/?originalSubdomain=ke</a>  <a href="https://medium.com/power-africa/the-long-road-bringing-kenyas-second-largest-wind-farm-to-financial-close-8cceb503f72">https://medium.com/power-africa/the-long-road-bringing-kenyas-second-largest-wind-farm-to-financial-close-8cceb503f72</a>
China	Capacity building	Support the Africa-focused Green Mini-Grid Market Development Program.	China-LAS clean energy training of renewable energy and power grid, China-Sudan Electric Power Cooperation Planning.	Around 20 energy government officials, engineers and researchers have participated in these activities.	Training activities and planning cooperation assisted these countries to strengthen their technology readiness and policy and regulatory environment for power grid and renewable energy development	Sudan, Somalia, Mauritania	

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USA	Capacity building	Support the Africa-focused Green Mini-Grid Market Development Program.	Understanding Natural Gas and LNG Options Handbook--The U.S. Department of Energy, in cooperation with Power Africa, and based on a series of workshops held with global and African experts and stakeholders, developed two editions of a handbook providing information and outlining processes for developing a natural gas energy infrastructure. Follow-on editions are planned.	A handbook providing guidance on developing natural gas infrastructure.	Involving a wide range of stakeholders-- especially local ones--from the beginning of the process increases impact.	All SSA	<a href="https://www.energy.gov/ia/articles/understanding-natural-gas-and-lng-options-handbook">https://www.energy.gov/ia/articles/understanding-natural-gas-and-lng-options-handbook</a>
USA	Capacity building	Support the Africa-focused Green Mini-Grid Market Development Program.	Geothermal Technical Training and Modeling--The U.S. Department of Energy shared geothermal data management systems and best practices related to reservoir management with technical experts at Kenya's Electricity Generating Company (KenGen) in order to allow for greater transparency and broader data availability that will reduce investment risk in that sector.	Improvements to data management and availability, facilitating further development of Kenya's geothermal resource.	Technical cooperation can increase the pace of energy development while increasing local capacity to manage that development.	Kenya	
USA	Capacity building	Support the Africa-focused Green Mini-Grid Market Development Program.	Commercial Law Development Program--The U.S. Department of Commerce's Commercial Law Development Program (CLDP), in coordination with the African Development Bank's African Legal Support Facility (ALSF), regularly brings together world-class experts to draft handbooks known as Power Africa's "Understanding" series. Available on Power Africa's website, titles of the handbooks include Understanding Power Purchase Agreements, Understanding Power Project Financing, Understanding Natural Gas and LNG Options, and Understanding Power Project Procurement. To complement its	Four handbooks that bring together and apply world class expertise to critical and salient power sector issues in sub-Saharan Africa	Power Africa adheres to a model that includes (1) leveraging public-private partnerships to accelerate and maximize development impact, while minimizing the cost to American taxpayers and African governments; (2) supporting the private sector's work at all stages of power project development, removing obstacles that cause projects to derail, and (3) supporting African governments, utilities,	All SSA	<a href="https://www.usaid.gov/po-werafrica/newsroom/resources-library">https://www.usaid.gov/po-werafrica/newsroom/resources-library</a>

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			handbooks, CLDP also implements capacity building workshops and follow-on technical assistance to drive impactful reforms in countries across sub-Saharan Africa.		and regulators to develop laws and practices that attract private investment and growth.		
Japan	Regional integration	Develop and implement financial approaches to enhance capital flows to energy access investments across the value chain according to national circumstances and priorities.	1. Tanzania: Kenya-Tanzania Power Interconnection Project (Yen Loan): this project will construct a power transmission line (total of 414 km) connecting Isinya, located in Kenya's southern Kajiado County, with Singida, located in Tanzania's central Singida Region, and provide related substations. JICA will finance lot 2 between Dodoma and Singida. Loan agreement signed 2016.	Ongoing		AfDB	<a href="https://www.jica.go.jp/english/news/press/2015/160115_01.html">https://www.jica.go.jp/english/news/press/2015/160115_01.html</a>
USA	Regional integration	Develop and implement financial approaches to enhance capital flows to energy access investments across the value chain according to national circumstances and priorities.	Power Africa Transmission Roadmap to 2030, a Practical Approach to Unlocking Electricity Trade--The Power Africa Transmission Roadmap was developed to help unlock electricity trade in the region. While Power Africa's efforts are focused on both national and regional transmission, the primary purpose of the Transmission Roadmap is to highlight cross-boundary trade opportunities that can be exploited for broader regional electricity access and economic benefit. The Transmission Roadmap therefore has two main objectives. First, it aims to enhance cooperation between major stakeholders by identifying transmission projects that are critical to cross-border electricity trade and highlighting bottlenecks/risks of delay (this focus would	Power Africa-led strategy to create enabling environments that will accelerate deals, build institutional capacity, ensure the effective execution of projects, and create the conditions to make transmission projects operational and sustainable in	Power Africa adheres to a model that includes (1) leveraging public-private partnerships to accelerate and maximize development impact, while minimizing the cost to American taxpayers and African governments; (2) supporting the private sector's work at all stages of power project development, removing obstacles that cause projects to derail, and (3) supporting African governments, utilities, and regulators to develop laws and practices that attract private investment and growth.	All SSA	<a href="https://www.usaid.gov/sites/default/files/documents/1860/PA_Transmission_Roadmap_508.pdf">https://www.usaid.gov/sites/default/files/documents/1860/PA_Transmission_Roadmap_508.pdf</a>

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			also include domestic projects with the potential to support regional trade, e.g., by connecting new generation capacity to cross-border lines). Second, it aims to support priority projects by highlighting the contributions development partners can make to their completion, to complement government-led initiatives.	sub- Saharan Africa			
USA	Regional integration	Develop and implement financial approaches to enhance capital flows to energy access investments across the value chain according to national circumstances and priorities.	Building Transmission Infrastructure in East Africa--Power Africa and its partners have helped more than 2,300 km of transmission infrastructure reach financial close. In 2018, Power Africa partnered with the Republic of Korea (ROK), who committed to invest \$1 billion in transmission-related infrastructure and to build at least 1,000 km of transmission lines in sub-Saharan Africa. To date, the ROK has invested a total of \$215 million in projects in the United Republic of Tanzania and the Federal Democratic Republic of Ethiopia that will result in 422 km of new transmission lines, as well as the construction and/or expansion of seven substations by 2023.	2,300 km of transmission infrastructure	Power Africa adheres to a model that includes (1) leveraging public-private partnerships to accelerate and maximize development impact, while minimizing the cost to American taxpayers and African governments; (2) supporting the private sector's work at all stages of power project development, removing obstacles that cause projects to derail, and (3) supporting African governments, utilities, and regulators to develop laws and practices that attract private investment and growth.	East Africa, All SSA	<a href="https://www.usaid.gov/sites/default/files/documents/1860/power_africa_annual_report_2019.pdf">https://www.usaid.gov/sites/default/files/documents/1860/power_africa_annual_report_2019.pdf</a>

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G20 Member Country	Joint actions of G20 countries with Asia-Pacific Countries	Summary of the collaboration	Progress and outcomes identified	Good practices and lessons learned	Countries collaborated with	Link
China	Enhance Capacity for Investment and Financing	Cooperation on investment and financing of energy projects.	Establishment of Asian Infrastructure Investment Bank, Silk Road Fund and other financial institutions, which have provided billions of dollars for investment and financing of energy projects.		Many countries and multilateral institutions	
Singapore	Enhance Capacity for Investment and Financing	<p>Energy infrastructure investments are key to advancing the energy access progress in the region.</p> <p>Since 2017, Singapore has been working with the IEA to build capacity of policy makers in Asia Pacific across a range of energy issues under our Singapore-IEA Regional Training Hub initiative.</p> <p>In 2018, under Singapore's ASEAN Chairmanship, we worked with the IEA to co-develop a Capacity Building Roadmap on Energy Investments and Financing for ASEAN.</p>	<p>Held the inaugural Singapore-IEA Clean Energy Investment and Financing Training Programme on 28-30 Aug 2018, under the Singapore-IEA Regional Training Hub Initiative. This was the first activity under the Capacity Building Roadmap on Energy Investments and Financing for ASEAN. Energy infrastructure investments was a key focus of the training. The IEA also developed a toolkit as an outcome of the training.</p> <p>As the second activity under the Capacity Building Roadmap, Singapore and the World Bank Group co-organised the Workshop on Optimising Investment Framework on 28 May 2019.</p>	<p>Incentive regulation and conducive policies are important to facilitate the development of sustainable energy. For example, on renewables, while feed-in tariffs were the most successful mechanism thus far, they were not affordable for many governments.</p> <p>Some of the key elements of bankable energy projects included good risk allocation in project documents, conducive financial arrangements, favourable operation environment and the availability of legal recourse. Governments can also leverage on a range of risk mitigation instruments, including project-based guarantees, policy-based guarantees and risk sharing facilities.</p>	All Asia-Pacific Region	<a href="https://www.ema.gov.sg/media_release.aspx?news_id=20180827NrNa2Xw1CeWV">https://www.ema.gov.sg/media_release.aspx?news_id=20180827NrNa2Xw1CeWV</a>

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Singapore	Enhance Capacity for Investment and Financing	Infrastructure Asia is a government entity set up to support Asia's social and economic growth through economic development.  Infrastructure Asia worked with the World Bank Group to launch a regional infrastructure capability development programme in June 2020.	Ongoing	Ongoing	All Asia-Pacific Region	<a href="https://www.worldbank.org/en/news/press-release/2020/06/01/infrastructure-asia-singapore-management-university-and-the-world-bank-group-launch-curated-program-to-build-capabilities-of-regional-government-officials-in-infrastructure-development">https://www.worldbank.org/en/news/press-release/2020/06/01/infrastructure-asia-singapore-management-university-and-the-world-bank-group-launch-curated-program-to-build-capabilities-of-regional-government-officials-in-infrastructure-development</a>
China	Develop and Apply New Technology	Cooperation on power infrastructure projects, including >10000MW Hydro projects, >1000MW wind projects, >3000MW solar projects and 11 off-grid and mini-grid projects.	Increase power capacity of more than 14000MW, which provided electricity for millions of people,	Collaboration on power infrastructure projects is the most direct approaches that assisted these countries in increasing access to electricity to millions of people.	Laos, Myanmar, Pakistan, Kazakhstan, Mongolia, Vietnam, Bangladesh, Cambodia, Nepal, Indonesia	
China	Provide Targeted Support for Developing countries and their Capacity Development	Conduct bilateral energy cooperation planning and study.	<ul style="list-style-type: none"> <li>– China-Mongolia Energy Cooperation Plan</li> <li>– China-Vietnam Energy Cooperation Study</li> <li>– China-Philippines Energy Cooperation Plan</li> <li>– Power planning of Laos</li> <li>– China Pakistan energy Planning</li> </ul>	Collaboration on energy planning assisted these countries in strengthening their capacity of integrated energy planning, which facilitated the enhancement of power supply and energy access in these countries.	Mongolia, Vietnam, Philippines, Pakistan	
Japan	Provide Targeted Support for Developing	1. Tonga: The Project for Installation of Wind Power Generation System.	Completed. The Project reduced fuel consumption, while the introduction of renewable energy resources, which results to remove	The Project introduced the wind power generation system, which enables maintenance on the ground and largely reduce maintenance		



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	countries and their Capacity Development		the obstacle and foster the access to affordable and sustainable power.	cost and stop time for windmills. This system is resilient to natural disasters by protecting windmills from typhoons.		
Japan	Provide Targeted Support for Developing countries and their Capacity Development	1. The Pacific Island Countries: The Project for Introduction of Hybrid Power Generation System in the Pacific Island Countries.	Ongoing. The Project aims to reduce fuel consumption, while the introduction of renewable energy resources, which results to remove the obstacle and foster the access to affordable and sustainable power.	Focusing on the training for the utilities staff, how to operate, maintenance and manage introduced system, because the technical comprehension of the system is recognized as the critical function to deploy and prevent the new system, which consequents the stable local power supply and access.	Additional seven other island countries in the region; Cook islands, Nauru, Palau, PNG, Samoa, Solomon, Tonga, are going to be invited to the regional training three times by 2022 to spread the effect and sharing the knowledge collaborating with the other projects, region and donors such as PNG Power Electrification Partnership with USAID, New Zealand and Australia.	<a href="https://www.jica.go.jp/english/news/field/2018/20180507_01.html">https://www.jica.go.jp/english/news/field/2018/20180507_01.html</a>
Japan	Voluntary financial support	1. Marshal Islands: The Project for the Installation of Solar Electricity Generation System in Ebeye Island.	Ongoing			<a href="https://www.jica.go.jp/english/news/press/2017/171207_02.html">https://www.jica.go.jp/english/news/press/2017/171207_02.html</a>
China	Promotion of capacity development	Capacity building with different countries, inc. Lancang-Mekong power interconnection training, Lancang-Mekong energy access training, ASEAN Clean Energy Capacity Building 2017, 2018, 2019. China-LAS clean energy training of renewable energy and power grid.	Around 10 capacity building and training activities in the areas of power grid, solar, wind, hydro, energy access, clean cooking, etc. In the past three years, over 100 energy government officials, engineers and researchers have participated in these activities.	Capacity building assisted these countries in strengthening their technology readiness and policy and regulatory environment for power grid and renewable energy development, including enabling policies, energy planning, solutions like grid extension, power plants construction and off-grid solutions.	ASEAN countries, LAS countries. In total, more than 30 countries.	



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China	Promotion of regional connectivity	Construction of regional connection projects.	China provides over billions of kWh of electricity for Vietnam over grid connection project.	Regional power connection is a good approach to bridge the gap of power supply.		
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2018 Voluntary Collaboration Action Plan for Latin America and the Caribbean

G20 Member Country	Areas of collaboration of G20 countries with the LAC region	Summary of the collaboration	Progress and outcomes identified	Good practices and lessons learned	Countries collaborated with	Link
USA	Support Haiti, together with its development partners, to craft and deploy a strengthened programme to expand access, with an initial focus on electricity	Reverse Trade Missions on LNG and Energy Resilience (led by U.S. Trade and Development Agency).	Met with delegates from Haiti to discuss exports of US LNG and micro-grids.	Overview of US LNG export market and DOE National Laboratories tools and frameworks for developing micro-grids.	Haiti	
China	Increase international financing for access (including from public and private sources)	Renewable energy infrastructure project investment collaboration, support the country to actively develop photovoltaic, hydropower and other renewable energy sources based on its own energy resource endowment, enhance energy infrastructure.	Chinese companies have invested more than 1200MW renewable energy projects such as photo-voltaics and wind power in Mexico. In Peru and Chile, Chinese companies also have investments in renewable energy projects.	Collaboration on renewable project investment help these countries to strengthen their power supply capacity with low climate impact.	Mexico, Peru, Chile	
Japan	Increase international financing for access (including from public and private sources)	1. Guyana: Project for the Introduction of Renewable Energy and the Improvement of Power System. Contents: Grant Aid for transmission line (293 km), PV, BEM.	Ongoing			<a href="https://www.jica.go.jp/english/news/press/2018/180_629_01.html">https://www.jica.go.jp/english/news/press/2018/180_629_01.html</a>
Japan	Increase international financing for access (including from public and private sources)	2. Cuba: Project for the Improvement of Power Supply in the Isle of Youth Contents: Grant Aid for Storage battery, EMS, etc.	Ongoing			<a href="https://www.jica.go.jp/english/news/press/2018/190_327_01.html">https://www.jica.go.jp/english/news/press/2018/190_327_01.html</a>
USA	Increase international financing for access (including from public and private sources)	Growth in Americas/America Crece	Supporting investment in infrastructure. Collaborate with private sector to support U.S. investment in energy infrastructure.	Collaboration is ongoing.	All LAC	<a href="https://www.state.gov/growth-in-the-americas/">https://www.state.gov/growth-in-the-americas/</a>

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China	Explore and assess with the G20 membership the proposal from the People's Republic of China to establish a "G20 Energy Access Cooperation Center" as a platform to promote G20 country action to achieve universal access	The proposal was welcome by many G20 members, while some members expressed their concerns.	Initiative on G20 Energy Access Cooperation Center was proposed by China and welcome by many G20 members, while some members expressed their concern of duplication of work. In the next year, China conducted a question-naire survey on the implementation of previous action plans, and the results indicated that implement-tation of action plans need more collaboration and actions.	More attention is needed for the implementation of the previous action plans.		
USA	Enhance the exchange of information regarding lessons learned in promoting access in rural areas	Energy and Climate Partnership of Americas (ECPA)	One of the ECPA pillars is energy poverty and looks at access.	During 2020 Fourth ECPA Ministerial, Energy Ministers shared best practices on their experience with energy access, among other topics.	All LAC	<a href="http://www.ecpamerica.s.o rg/">http://www.ecpamerica.s.o rg/</a>
China	Support and monitor programmes to improve the sustainability of access and the resilience of related energy systems and promote synergies and cooperation in disaster-impacted areas	Power grid infrastructure project investment collaboration, help solve the problem of long- distance transmission of power resources, alleviating regional power shortages, and optimizing the structure of the power transmission grid.	Chinese companies have successively invested in the construction of a number of large-scale power transmission projects such as the beautiful mountain ±800 kV UHV DC transmission first and second phase projects and the Trispiers hydropower transmission first and second phase projects.	Collaboration on power grid projects development help these countries to strengthen their optimize their grid structure and layout	Brazil	
USA	Support and monitor programmes to improve the sustainability of access and the resilience of related energy systems and promote synergies and cooperation in disaster-impacted areas	U.S.-Caribbean Resilience Partnership	DOE supports line of effort focused on energy resilience.	Ongoing collaboration with Caribbean on disaster prepared-ness and response activities.	Caribbean	

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USA	Support and monitor programmes to improve the sustainability of access and the resilience of related energy systems and promote synergies and cooperation in disaster-impacted areas	Advancing Caribbean Energy Resilience (ACER)	Held training on microgrids for powering critical infrastructure	Overview of Sandia National Laboratories Microgrid Design Toolkit.	Caribbean	
USA	Support and monitor programmes to improve the sustainability of access and the resilience of related energy systems and promote synergies and cooperation in disaster-impacted areas	Energy Transitions Initiative (ETI)	ETI includes tools and frameworks developed to support energy in islands and remote communities. ETI tools include the Island Energy Playbook and Island Energy Snapshots.	Sharing best practices and tools/frameworks developed under ETI with LAC region.	Caribbean, Asia-Pacific, All LAC	
USA	Support and monitor programmes to improve the sustainability of access and the resilience of related energy systems and promote synergies and cooperation in disaster-impacted areas	Energy and Climate Partnership of Americas (ECPA) Ministerial	2020 ECPA Ministerial focused on energy resilience and investment opportunities. Supported various programs leading up to Ministerial	Best practices from DOE programs to support energy resilience and investment opportunities.	All LAC	<a href="http://www.ecpamericas.org/Ministerial-Meetings/ECPA-2020-Ministerial.aspx">http://www.ecpamericas.org/Ministerial-Meetings/ECPA-2020-Ministerial.aspx</a>
USA	Support gender equality across the energy access value-chains	Energy and Climate Partnership of Americas (ECPA) Ministerial Dialogue on Gender and Energy	DOE representative spoke on a panel about gender and energy along with representatives from LAC region at OAS.	OAS members and DOE shared insights on gender and energy programs in LAC region.	All LAC	
USA	Support gender equality across the energy access value-chains	Workforce Development in Energy – Closing the Gender Gap.	DOE in partnership with the Mexican Energy Business Council will hold a virtual workshop on gender and energy.	Collaboration is ongoing. Goal is to share strategies and experiences on gender and energy from industry and National Laboratories in the U.S. and Mexico.	Mexico	

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Argentina	Exchange experiences about programmes and policies to promote productive uses	Support to rural areas for the electrification of fences regarding cattle breeding was developed, which helped rural communities. The electrification was done with solar panels provided by a national program funded by the World Bank (PERMER).	Around 1,000 fences were electrified during 2019, reaching approximately 4,000 people within those communities. Despite the COVID- 19 pandemic, a total of 2,400 new fences are expected to be installed during 2020, reaching another 10,000 people benefited.	A tight collaboration with Agrarian Technology National Institute of Argentina (INTA) and with local communities allowed the developing of an ad-hoc technological solution. The Energy Ministry created a permanent Social, Environmental and Gender Equality board regarding this type of liaison with local communities.		
Japan	Exchange experiences about programmes and policies to promote productive uses	1. Cuba: Project on Electricity Sector Master Plan Study for Development of Renewable Energy. Purpose: Support to elaborate mid-term energy development master plan to increase utilization of renewable energy.	Ongoing			<a href="https://www.jica.go.jp/english/news/press/2019/20191129_21.html">https://www.jica.go.jp/english/news/press/2019/20191129_21.html</a>
Argentina	Improve exchanges regarding the applicability and use of mini-grid and other off-grid solutions and ways to improve their costs and sustainability	Nine new mini-grids, hydro-powered, will be installed in several provinces, allowing local communities to manage its usage and maintenance. Done with by a national program funded by the World Bank.	Nine mini-grids reaching 3,200+ people in several provinces, five under construction in 2020 and other four to be built during 2021.	Local communities will take control over the operation and maintenance of the hydro-powered mini grid, thus empowering their organization and autonomy with regard to national and local government. Additional funding will be required, though, for maintenance in the near future.		

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USA	Improve exchanges regarding the applicability and use of mini-grid and other off-grid solutions and ways to improve their costs and sustainability	Advancing Caribbean Energy Resilience (ACER)	Held training on micro-grids for powering critical infrastructure that included an exchange of best practices and ideas from throughout the region.	Overview of Sandia National Laboratories and National Renewable Energy Laboratory tools and frameworks on micro-grids and energy resilience.	Caribbean	
China	Exchange experiences about improved clean energy technologies, including for heating and lighting in island states and remote areas	Capacity building and experiences exchange.	Workshops and experiences exchange under China-Uruguay Renewable Energy Cooperation Action Plan.		Uruguay	
Japan	Exchange experiences about improved clean energy technologies, including for heating and lighting in island states and remote areas	1. Jamaica: Technical Cooperation to Promote Energy Efficiency in the Caribbean Countries Purpose: Human and institutional capacities are enhanced for the introduction of renewable energy and promotion of energy efficiency.	*R/Ds were signed in 2017, however, the project started in 2019. Progress: Completed baseline survey and started technical cooperation. Identified: Priority of measures for each target countries.			<a href="https://www.jica.go.jp/jam/jica/english/office/topics/1_70412.html">https://www.jica.go.jp/jam/jica/english/office/topics/1_70412.html</a>
USA	Exchange experiences about improved clean energy technologies, including for heating and lighting in island states and remote areas	Energy Transitions Initiative (ETI)	ETI includes tools and frameworks developed to support resilient energy in islands and remote communities.	Sharing best practices and tools/frameworks developed under ETI with LAC region.	Caribbean, Asia-Pacific, All LAC	
Japan	Promote greater innovation in the key areas of technology, institutional practices, and business and delivery models	1. El Salvador: The Project for Thermo-luminescence Techniques in Geothermal Exploration and Integrated Evaluation System of Geothermal Reservoir. Purpose: Develop methodology to find geothermal energy potential.	Ongoing			<a href="https://www.thinkgeothermal.com/japanese-jica-supports-el-salvadors-geothermal-development-efforts/">https://www.thinkgeothermal.com/japanese-jica-supports-el-salvadors-geothermal-development-efforts/</a>

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Japan	Promote greater innovation in the key areas of technology, institutional practices, and business and delivery models	2. Peru: Project for Capacity Strengthening for Geothermal Resource Assessment Purpose: developing accurate modeling for geothermal energy potential.	Ongoing			
USA	Promote greater innovation in the key areas of technology, institutional practices, and business and delivery models	Growth in Americas/America Crece	Supporting investment in infrastructure. Collaborate with private sector to support U.S. investment in energy infrastructure.	Collaboration is ongoing.	All LAC	<a href="https://www.state.gov/gro-wth-in-the-americas/">https://www.state.gov/gro-wth-in-the-americas/</a>
USA	Strengthen the understanding of the role of natural gas in promoting access to residential heating and the potential for greater use for clean cooking.	Exporting U.S. LNG and natural gas	Support understanding and export of natural gas to region for industrial, residential and transportation purposes through engagements with counterparts in region, trade missions, and speaking forums.	Collaboration is ongoing.	All LAC	



**I. Initiatives to address the data and financing gaps (utilizing innovative financing mechanisms) in Countries and Regions with the largest populations without access to energy.**

Ensuring access to sustainable energy for all and successfully transitioning approximately 3 billion people from traditional cookstoves to clean cooking will be a critical step in mitigating climate change and achieving SDG7. Similarly, an estimated 786 million people currently lack access to any form of electricity, with an additional billion people dependent on unreliable or intermittent power. While governments, businesses and NGOs recognize and express the importance of bringing energy access to underserved groups, action is lagging, and in some countries progress on energy is outpaced by population growth.

An increasing number of policymakers are using geospatial-based integrated energy planning as a way of gaining a more comprehensive and data-driven understanding of the technologies and spending required to achieve universal energy access, including the efforts needed for providing reliable power to health care facilities. Countries such as Ethiopia, India, Kenya, Myanmar, Nepal and Togo are considering their electrification strategies with an eye to taking advantage of all available technologies and leveraging the private sector's expertise to meet SDG 7. While this is an encouraging trend, the increasing use of geospatial least-cost modeling is also highlighting one of its key challenges: data gaps and quality.

Access to reliable, consistent, and robust data is a critical input for models that can be used by:

- Governments to aid planning, coordination and resource mobilization for universal energy access efforts that include provision of reliable electricity to health facilities;
- Utilities to prioritize grid extension to communities where it is most cost effective;
- Mini-grid developers to find suitable sites more quickly and reliably;
- Off-grid solar companies to identify attractive sales regions, cross-check customer information and better plan distribution channels;
- Clean cooking companies to develop business models for clean cooking solutions; and
- Investment communities to fund and finance solutions based on risk profiles of certain markets and technologies.

A global energy access data platform, underpinned by data standards, could bring significant value to the energy access sector. The platform would aggregate global, national, and (hyper)local data, as well as focus on supply-side and demand-side factors. Using the appropriate least-cost models, with demand-side analysis on the basis of appropriate datasets can lead to a better allocation of limited resources (e.g., by reducing the risk associated with investing in new geographic areas). The development of this platform would go beyond measuring energy access as a binary indicator but would also look at different costs of technologies and rates of adoption (in particular for clean cooking). It would be a collective effort between data modelers, data aggregators, policy makers, and international institutions.

On the finance-side of the equation, a massive amount of capital expenditure is required to build the physical electricity and clean cooking infrastructure (both centralized and distributed) to deliver sustainable energy to all. According to the IEA's World Energy Outlook in 2019, approximately USD 40 billion each year will be required to achieve universal access to electricity and an addition USD 5 billion per year for clean cooking. Design choices around financing mechanisms for energy access have implications for risk allocation, efficiency/incorporation of technical expertise, and time to delivery. However, the prevailing,

current system for financing energy access projects in and for many high priority countries is not achieving the speed and scale required.

Traditional procurement mechanisms for projects that require up-front financing of inputs (e.g. minimum required subsidy tenders) are time intensive, and impose high administrative costs and burdens on governments, donors, and implementers, making it difficult to scale. Furthermore, in many high priority countries that already have heavy debt loads, various actors in the energy value chain are constrained in their ability to provide up-front resources and raise additional financing: governments have limited funds available for grid extension, utilities are not covering their operational and capital expenditures, and customers have limited ability to pay. In order to achieve SDG7, a paradigm shift in funding mechanisms is required.

**Innovative Financing.** Achieving SDG 7 requires a funding mechanism with scale, speed, and efficiency that traditional government procurement can't provide. Results-based financing (RBF) is a proven, viable alternative to procurement approaches to energy projects to deliver connections faster and more efficiently. By shifting the focus to outcomes rather than inputs, RBF incentives allows governments and donors to shift risk of delivery to the private sector, provide regulatory certainty to the industry about financial support to be provided, and aggregate financing and scale support across multiple countries.

External financial resources are available to help bridge the gap, but the current approach consists of individual donors supporting electrification through different mechanisms. These resources would be more impactful if directed in a more coordinated manner. In order to push the sector towards results-based approaches, there needs to be increased advocacy, advisory support in making the transition, and establishment of a financing mechanism that funding organizations can contribute to. While there are some programs using results-based financing, funds need to be disbursed more rapidly and verification processes need to be simplified. To this end a Universal Energy Facility (UEF) has been established between SEforALL, Shell Foundation, the Rockefeller Foundation, USAID, Good Energies, Carbon Trust, DFID Transforming Energy Access, and the Africa Minigrid Developers Association (AMDA). The UEF's mission is to significantly speed up and scale up access to energy across Africa by providing results-based financing for verified connections for electricity and solutions for clean cooking. Wave 1 of the UEF will focus on mini-grids, and the facility will expand in the next waves to include solar home systems and clean cooking solutions.

Crowdfunding is another innovative financing mechanism that has potential to accelerate electricity access rates in rural areas. The Islamic Development Bank (IsDB) is implementing a pilot project examining the most effective and efficient interventions to support the SMEs' working capital targeting the SHS market so these systems can be offered to rural households based on affordable leasing programs. In the pilot phase, the IsDB's intervention aims at tapping into the crowds' savings who are willing to invest in off-grid solutions purchased by SMEs. These investments are collected and managed by crowdfunded platforms with attractive returns that will eventually connect at least 50,000 people in less the 6 months span. Once the developmental objectives are achieved and verified, in partnership with UNDP (by end of 2020), the IsDB aims to further upscale its contribution, in partnership with European-based development partners, through establishing a sizable fund to further attract crowds' investments that are collected and managed by various and eligible crowdfunded platforms to speed up the electricity access rates in rural areas.



## II. The mobilization of a catalyst platform to avoid fragmented approaches and dramatically increase access to clean cooking in countries in Africa

To address the multi-dimensional challenges of achieving universal access to clean cooking solutions, the global community must embrace a common vision and approach to prove and scale the clean cooking market. This will require a recognition of the entire ecosystem of clean cooking stakeholders, including clean fuel production, infrastructure and distribution, differentiated market solutions for different customers and population densities, customer preferences, accessibility and affordability, clean cooking technologies, linking clean cooking to electrification plans, etc.

The concept of a Clean Cooking Market Catalyst Platform (CCMC) is not intended to create a new fund. Instead, it aims to be a global public good that addresses the current fragmentation of the clean cooking sector that will better articulate the multi-dimensional challenges of building market-based solutions around seven building blocks<sup>i</sup> (research, development & demonstration; standardized data and evidence; equity fund for existing companies; early stage equity challenge fund for the next generation of enterprises; results based financing—Clean Cooking Fund; debt facilities; integrated energy planning tool). The CCMC would provide integrated and streamlined support to developing countries, donors, consumers and the private sector, and could strengthen the coordination among current initiatives.

The platform will bring together a suite of existing and conceptual financial products and services across the development and finance continuum of clean cooking. Through a secretariat, the platform will draw upon existing solution providers and offerings, such as the Clean Cooking Alliance (CCA) and its Spark+ Africa Fund, as well as explore new products to fill gaps in the sector's ecosystem.

The CCMC framework intends to bring both the upstream support to countries on strategy, policies and regulations and implementation with the downstream support to SMEs, NGOs and consumers. With this value-chain approach, the CCMC aims to overcome fragmentation and provide a one-stop-shop for all stakeholders (SMEs, NGOs, consumer groups, policy makers) in countries to receive the support needed on accessing information and financing.

The platform would focus on voluntary engagement from a variety of stakeholders to explore the following seven catalytic building blocks for scaling the clean cooking sector:

- a. **Research, development and demonstration (RD&D)** fund, offering grants for research, development and early stage pilot demonstration of innovative clean fuels and emerging technologies. (USD 20 million). Currently, no such dedicated, multi-donor clean cooking ecosystem RD&D fund exists and would be able to complement the work being done by the UK-funded Modern Energy Cooking Services (MECS).
- b. **Standardized data and evidence** to confirm what's working: identifying those solutions that result in sustained consumer adoption – across technologies, delivery models and consumer behavior change efforts. (e.g., The SEforAll-Nexleaf “next generation” clean cooking data project). Also, to generate consistent data standards for the sector. (USD 20 million)
- c. **Support to overcome the “valley of death”** for the 15-20 existing companies that are languishing in the valley of death in order to demonstrate scalability and create confidence in the sector.

- d. **Early stage support** to jumpstart the next generation of enterprises, enabling a proof of concept of innovative business models or expansion to new geographies.
- e. **Results based financing clean cooking** vehicles, to incentivize governments and the private sector to expand the 'payment for performance' to include social, health and gender impacts, (e.g. the World Bank's Clean Cooking Fund).
- f. **Long-term debt support** to small and medium size enterprises active in the clean cooking value chain, supported by targeted technical assistance facilities, provided by existing debt providers (e.g. The Spark+ Africa Fund, a partnership between the Clean Cooking Alliance and Enabling Capital).
- g. **Integrated energy planning tools** to support governments in the design and integration of clean cooking programs into national development plans, recognizing the cross-sectoral (e.g., energy, health, environment) characteristics of clean cooking, and providing standards to accelerate implementation.

### III. **G20 challenge grants to high-impact countries that match efforts to develop and implement national clean cooking and universal integrated energy plans**

Putting in place the necessary roadmaps for least-cost solutions in both electrification and clean cooking will require rapid financial catalysts. The option of challenge grants will help to put the initial universal integrated energy plans in place but will require country counterpart contributions, commitments or other evidence of ownership to implement and maintain this universal integrated energy plan system as well as aligns subsequent financing to this integrated energy plan approach.

**Integrated Energy Planning:** Integrated energy planning uses a full-systems approach to make most effective use of resources, available electrification and clean cooking technologies, fuels and energy service provision models to deliver modern, reliable and affordable energy to all at a lower cost, and more rapidly. Based on geo-spatial modelling and least-cost analyses, plans can help governments and their partners focus attention on where it is needed the most, coordinating the activities of utilities, developers, SHS, and clean cookstove providers and providing baseline data to make their activities more efficient. (A critical target for these analyses would be the health care facilities that need access to reliable electricity.) Having a comprehensive and data-driven understanding of the technologies and spending required to achieve universal access will aid governments in raising the funds required to execute the plans and will stimulate private sector investment in energy access. While many countries are underway in developing integrated energy plans, only a handful have finalized and officially adopted these plans complemented by accompanying regulations and policies. None have included clean cooking and have focused on integrated electrification plans.

**Addressing Affordability to the Last Mile:** While off-grid, mini-grid and clean-cooking solutions are in many cases the least-cost approach to delivering energy access services (as opposed to extending the grid), they often need to "compete" with highly subsidized grid electricity, and rely on a customer base with very low affordability, and in many cases with seasonal or unreliable streams of income. While innovative funds and financing mechanisms

exist, they are nowhere near the scale needed to support the energy access sector at large. For example, in 2017, the finance dedicated to off-grid electrification accounted for only 1% of total finance flows in the studied countries<sup>ii</sup>. Government-led financial incentives can be very effective in supporting the private sector in addressing the electrification gap. For example, in Bangladesh, IDCOL achieved notable success in addressing the affordability for high-quality Solar Home Systems, and now have designed a subsidy for mini-grid development as well. The Government of Togo offers the first government-led SHS subsidy in Africa, which has resulted in the country surpassing its interim off-grid targets in 2019.

#### **IV. A capacity building initiative for north-south and south-south capacity building in High-Impact Countries and Regions**

As other financial, policy and regulatory inputs are introduced to increase the rate of energy access in high-impact countries, a potential bottleneck needs to be addressed, namely the capacity to make the ecosystem work. In-country capacity will need to increase in order to implement policies and strategies, engage with private sector stakeholders and developers, manage public-private partnership processes, ensure supply chains and operation and maintenance of decentralized systems across the country, and build the capacity of the financial sector to invest in new energy access projects.

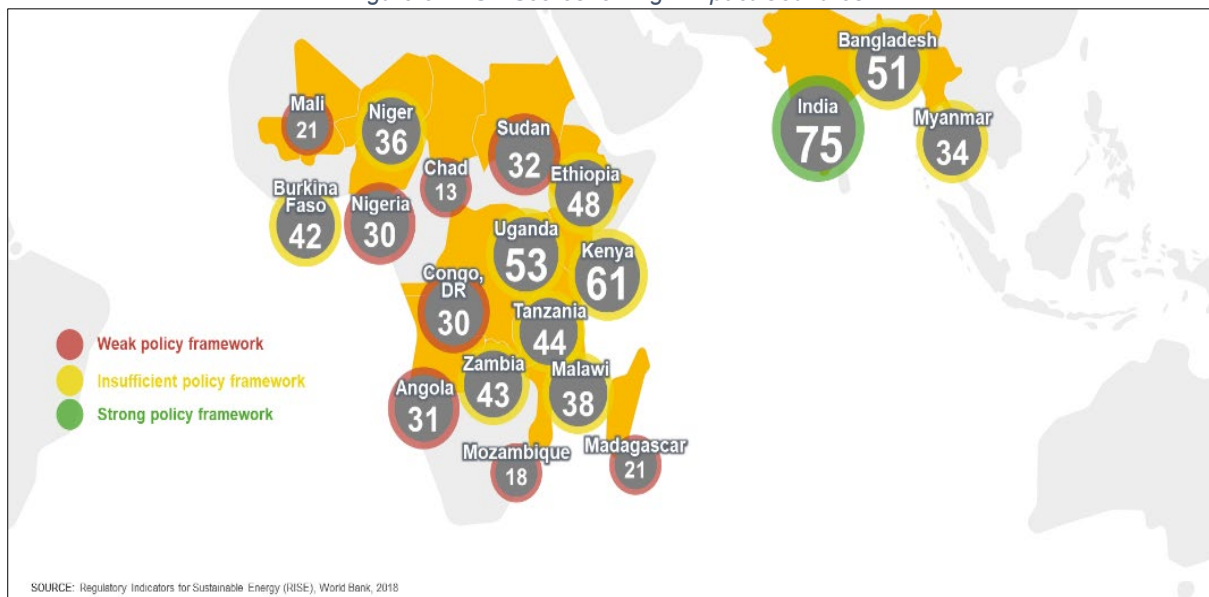
A capacity-building effort (including technical assistance, training, advisory, and lessons sharing) that can address a system-wide vision for capacity building gaps and needs will be a necessary element for massively scaling up energy access and making it work for the overall development needs of the country.<sup>iii</sup> This flexible, gap-filling mechanism should reach different decision-makers (both public and private sector) in different parts of the ecosystem (from policy making and regulatory, to financial products and billing and collection) to strengthen high-impact countries' capacity for making universal access to energy services sustainable. This approach would be different from the capacity-building and technical assistance currently provided on a project-by-project basis and would have the additional mandate of leveraging lessons from different countries and regions.

This capacity-building initiative could build from existing efforts as well as link local training institutes, universities, and other programs. Existing regional blocs (e.g., African Union or ASEAN) could also provide platforms to support this initiative.

**V. Support for institutions and enabling frameworks to accelerate energy access and clean cooking in critical off-track countries and Regions.**

More support is required for institutional development and the enabling environment. According to the World Bank’s Regulatory Indicators for Sustainable Energy (RISE), the world is only about halfway towards the adoption of advanced policy frameworks for sustainable energy. Although some countries have made notable improvements since 2010, most of the high-impact countries remain stifled, with insufficient or weak overall policy frameworks that threaten the country’s ability to achieve SDG7 (see Figure 5).

Figure 5: RISE Scores for High Impact Countries

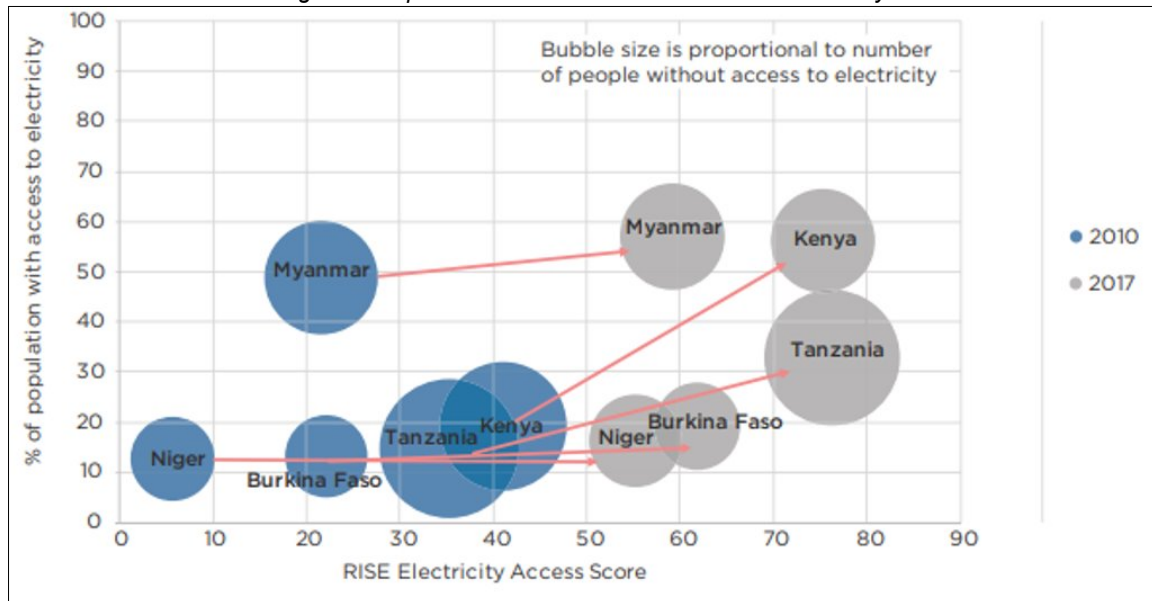


The good news, however, is that there are noteworthy successes and experiences from across the globe that show that reaching universal access is not insurmountable, and a focus on enabling policy and regulatory environments result in a substantial increase in energy access. Increasing experience and evidence shows that SDG7 will only be reached with a complementary mix of technologies, fuels and business models, which requires the involvement in a multitude of actors and stakeholders, compared to the traditional approach of a centrally planned and implemented energy system. As such, policy and regulatory frameworks are of utmost importance in order to leverage the potential of private sector and civil society to support the government to achieve universal energy access.

Figure 6 demonstrates the improvements in policy and regulatory frameworks (marked by an improvement in RISE score) and how this has resulted in increased electricity access across the 5 low-access countries with the largest RISE improvements between 2010 and 2017.



Figure 6: Improvements in RISE and Access to Electricity



SOURCE: ESMAP; Regulatory Indicators for Sustainable Energy, 2018

Experiences from across low-access countries have shown that governments have the following policy options/pathways to support the scale-up of access to both electricity and cooking, even in situations of scarce resources, by providing enabling frameworks for a multitude of actors and technologies to address the energy access gap.

**Enabling Policy and Regulatory Frameworks:** In order to leverage the full potential of the private sector to support governments in meeting the energy access challenge, clear and transparent regulatory frameworks specific to different access technologies are therefore required in order to ensure that a) private sector resources are targeting the right geographies and customers in line with the Integrated Energy Plan; b) the private sector is providing a minimum service standard and adhering to quality assurance requirements; and finally c) that investments are protected in order to allow the market to grow and the enterprise to scale up and reduce the cost to customer. Many times, the regulations restricting the scale-up of energy access technologies and business models are outside of the scope of the Ministry of Energy entirely, relating to issues of business and asset ownership laws, restrictions of the use of foreign currency, import duties and customs clearance delays. It is for this reason that Ministries of Finance must be coordinated with to ensure that all national laws and regulations affecting energy access are in line with the government's integrated energy plan and commitment to SDG7.

**Strong Institutions:** Integrated approaches to energy access require that many institutions, developed solely for the development, expansion and maintenance of a centralized electricity grid, are required to oversee new technologies, business models and actors in an unprecedented way. This shift to an integrated energy system requires enhanced capacities, expertise and resources to manage the multitude of actors involved in achieving SDG7. As such, a focus on supporting energy sector institutions (such as the energy system operator, national utility, regulator or rural electrification agency) with additional capacities (both in terms of human resources and funding) can help ensure that the enhanced regulations are implemented and monitored consistently and efficiently.

**BRAZIL: Light for All Program**

The Light for all Program is a government policy aimed to reduce poverty and hunger by using energy as a driving force for the economic and social development of rural communities.

Since 2003 the Program served more than 3,6 million families in rural areas reaching 99% of the country's demand. The attainment of universal access to energy with on grid connections, in rural areas, are planned to complete in 2022.

Light for all Program success factors

- Enough Energy Supply
- Integrated Transmission Network
- Strong electricity sector regulation
- Rural distribution management know-how from other programs
- Free electrical installation for low-income consumers in rural areas

*Table 1: Brazil universal access to electrification – rural areas*

Year	Families	
	Connected	Goals
2004	69.999	
2005	378.046	
2006	590.013	
2007	397.877	
2008	441.427	
2009	357.970	
2010	419.204	
2011	244.862	
2012	120.131	
2013	85.976	
2014	90.272	
2015	57.676	
2016	73.641	
2017	57.310	
2018	68.125	
2019	98.137	
2020	14.782	54.077
2021		79.091
2022		95.052

### **BRAZIL: More Light for the Amazon**

The National Program for Universal Access and Use of Electricity in the Legal Amazon “Mais Luz para a Amazônia” (More Light for the Amazon) was launched by the Brazilian President, Jair Messias Bolsonaro, on 5th February, 2020, with the purpose of providing electricity to the Brazilian population living in remote regions of the Legal Amazon.

Beyond that, the Program "More Light for the Amazon" aims to promote social and economic development of these communities, encouraging activities that increase family income and the sustainable use of the natural resources of the Amazon Forest, the integration of actions from the various spheres of the government and the consequent promotion of citizenship and the dignity of that population.

Population in Amazon remotes regions requires differentiated solution with the use of clean and sustainable energy generation technologies, which is strongly integrated with the productive processes characteristic of each community, considering the use of electricity as a vector of development.

With the “More Light for the Amazon”, Universal Access to Energy will be completed nationwide.

#### Program Main Features

- Families lacked access to energy: 72 thousand
- Budget: US\$ 680 million
- Deadline: 2027
- Technology: off grid solar generation

#### Program Challenges

- Solar system for productive activities
- Obtain funding to reduce grant

### INDIA: Pradhan Mantri Ujjwala Yojana

Pradhan Mantri Ujjwala Yojana (PMUY) was launched by the Prime Minister of India, Narendra Modi, on 1 May, 2016 to distribute 50 million LPG connections to women of Below Poverty Line (BPL) families. A budgetary allocation for the initiative was USD 1.1 billion.<sup>iv</sup> In 2018 the scope of the initiative was widened to include 80 million poor households.<sup>v</sup>

The PMUY program addressed a significant hurdle in access to LPG connections for poor households by providing them with credit-linked subsidized connections. The scheme involves the government subsidizing 50 percent of the cost of an LPG connection – including an LPG stove, hose, valve and the first full LPG cylinder (USD 23). The remainder of the cost can be paid by the household upfront or covered by a loan from the oil marketing company (OMCs) that worked with manufacturers to reduce the connection cost to a total of USD 46. Initially the idea was that beneficiaries would repay the loan using the subsidy provided via Direct Benefit Transfer for LPG (DBTL), i.e. pay the full market price until the loan was paid off.

The Comptroller and Auditor General (CAG) of India documented that a total of 70.2 million connections have been issued under the scheme against a target of 80 million by March 2020 (90%). Furthermore, the LPG coverage in the country has increased from 62% in May 2016 to 94% in March 2019.

The ambitious goal of providing access to LPG connections by poor families was largely successful and surpassed original expectations. The PMUY experience also surfaced an important secondary challenge of sustained usage facing the clean cooking sector and requiring longer term programs. The average annual refill consumption for PMUY beneficiaries has remained low, compared to non-PMUY consumers suggesting a lack of sustained usage of LPG by certain beneficiaries under the scheme. Moving forward, the CAG recommended that since the target of releasing connections has broadly been achieved, the scheme should now be focused towards sustained usage.

Year	LPG Coverage	Average annual refill (non-PMUY)	Average annual refill PMUY
2015 – 2016	61.9%	7.7	-
2016 – 2017	72.8%	7.5	3.9
2017 – 2018	80.9%	7.3	3.4
2018 - 2019	94.3%	6.7	3.0

Table 1: Details of LPG connections

<sup>i</sup> The concept of a Clean Cooking Market Catalyst Platform around seven building blocks was developed during the SEforALL Charrettes (2019) among 29 organizations working across the broad scope of the clean cooking challenge.

<sup>ii</sup> SEforALL and CPI (2019). *Understanding the Landscape 2019*. Vienna.

<sup>iii</sup> Any support to specific countries will be guided by individual G20 Member selection criteria.

<sup>iv</sup> <https://timesofindia.indiatimes.com/city/bhubaneswar/Scheme-for-LPG-to-BPL-families-to-be-launched-in-Odisha/articleshow/52625599.cms>

<sup>v</sup> <https://www.livemint.com/Politics/zrbl9l18aL1blgpyEY4nDN/Budget-2018-Ujjwala-scheme-to-cover-80-million-families-sa.html>