

ENERGY ACCESS AND AFFORDABILITY

VOLUNTARY ACTION PLAN FOR LATIN AMERICA AND THE CARIBBEAN

A joint report from the Inter-American Development Bank (IDB)
and the Latin American Energy Organization (OLADE)
to the G20 Energy Transitions Working Group (ETWG)

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Preface

This report was produced by the Inter-American Development Bank (IDB) and the Latin American Energy Organization (OLADE) at the request of Argentina's G20 Presidency 2018, as a key input for the activities of the Energy Transitions Working Group (ETWG).

The G20 (Group of the Twenty) was created in 2008, in response to a severe international financial crisis, and its members currently account for 85% of the global economy, 75% of world trade and two-thirds of the global population.

Argentina took over the G20 Presidency on 1 December 2017, and its term ends on 30 November 2018. The motto of Argentina's G20 Presidency is "Building consensus for fair and sustainable development", and focuses on three key themes: the future of work, infrastructure for development, and sustainable food future. (For an overview of Argentina's G20 Presidency vision and priorities, see https://g20.org/sites/default/files/media/energy_communique.pdf).

Within this framework, Argentina defined eight priority areas for G20 collaboration under its Presidency, one of which is "Energy transitions towards cleaner, more flexible and transparent systems". Under this motto, the ETWG developed most of its activities between December 2017 and June 2018, resulting in collective energy policy recommendations contained in the Bariloche Energy Ministers' Communiqué (see https://g20.org/sites/default/files/media/energy_communique.pdf).

Additionally, Argentina prepared five substantive technical documents, with the invaluable support of several international organisations. The present report is one of these outputs and should be considered an "Argentine Presidency deliverable", given that its contents were discussed and enriched by the ETWG but not submitted to formal approval by the Energy Ministers, for which reason it does not necessarily reflect the G20 membership's national or collective views.

Executive Summary¹

The G20 Vision

- This Voluntary Action Plan supports the vision of the Argentine G20 Presidency to “promote fair and sustainable development” by stressing the need to join efforts to facilitate universal energy access.

The LAC Regional Context

- The Latin America and Caribbean (LAC) region enjoys high electricity access rates, with a regional average of 97%, except Haiti whose access rate is only 30%. Consequently, the focus is not only on covering the ‘last mile’, but also on leveraging access to promote productive uses that generate incomes and support social development; this requires a service that is reliable, of high quality, resilient and affordable.
- Access to clean cooking is significantly lower, 86% on average, and remains a challenge across many of the region’s countries, including four countries that have access rates below 50%.
- Access in LAC needs to also be extended to cover the issue of providing households with adequate access to residential heat, a challenge facing many living in the region’s colder areas.
- Many fuels have a role to play in promoting access, including notably natural gas that can be used effectively for electricity generation and to provide clean cooking and residential heat.

Getting and Maintaining Universal Electricity Access

- Country-tailored programmes to increase access are needed given the different challenges faced by different LAC countries, including notably several poorer middle-income countries that would benefit from international financial support and Haiti, a least developed country that faces serious governance and institutional barriers.
- The public and private sectors both have important roles to play in this effort. Further innovation is also needed, not only in technologies, but also in business models and other practices.
- Many of the region’s countries, including in the Caribbean, have achieved high levels of access but face major repeated disruptions in service as a result of hurricanes and other natural disasters; these countries require effective programmes to enhance the resiliency of their systems, including notably the ability to restore access (“access recovery”).

Promoting Stronger Economic and Social Development from Electricity Access

- The challenge is not simply to provide electricity access, but also to provide a quality reliable sufficient service to customers.
- With its high access rate, the focus in LAC is to enable households to leverage off electricity services to generate income growth and social development. This typically requires a bundle of related support services, including capacity building for newly connected households to assist them in developing businesses and reaping health, education and other social benefits.

¹ This document has been produced by IDB and OLADE, at the request - and under the close guidance - of Argentina’s G20 Presidency 2018. Its contents have been discussed and enriched by the representatives of the G20 membership, but do not necessarily reflect their national or collective views.

- Energy efficiency programmes can help households magnify the energy service benefits of electricity access; facilitating the acquisition of energy efficient appliances and equipment allows the newly connected to generate more energy services and to enhance affordability of supply.

Expanding Access to Clean Cooking and Residential Heat

- Many countries in the LAC region continue to face a major access deficit on clean cooking. Redoubling efforts is needed across the region, including in developing better adapted technologies and delivery models, and stronger institutional frameworks. While universal electricity access is mostly within reach, universal access to clean cooking remains a difficult goal.
- Providing households with adequate access to residential heat, notably through the increased availability of modern fuels, is a challenge for many countries in the LAC region where high altitudes and high latitudes generate wintry conditions for many poorer households.

Several Key Factors are Common to Enhancing Access to Electricity, Clean Cooking and Residential Heat

- There are various supportive factors that affect the various access poles. These include: (a) capacity building amongst government, private sector and household stakeholders; (b) supporting effective consultation in the design and implementation of programmes; and (c) improving data collection, analysis and transparency.
- Promoting gender equality within access efforts is important to promote programme success and sustainability, and to generate significant and multi-faceted benefits.
- The region's island states face a specific set of challenges in gaining and maintaining access (including vulnerability to extreme weather events, small markets and high energy costs) that require tailored strategies.

Improving the Affordability of Energy across the Economy

- While LAC enjoys high electricity access rates, it is a region where many beyond the poorest households face economic stresses, and where many economies face high energy costs. Working to reduce energy costs, for example by developing new energy resources and developing more efficient market structures and business models, can benefit not just the poor, but also other households, businesses, public sector consumers and the economy generally.

Voluntary Actions

- a) Support Haiti, together with its development partners, to craft and deploy a strengthened programme to expand access, with an initial focus on electricity. The governance challenges facing the sector are some of the difficult and intractable challenges that merit particular attention, as well as expanding the suite of energy providers (including through isolated and off-grid solutions).
- b) Explore ways to increase international financing for access (including from public and private sources), in particular for those lower middle-income and less developed countries that have more limited domestic financial resources. Actions would include exchanging experiences in strengthening

investment and governance frameworks and promoting sustainable market conditions to mobilise financing.

- c) Explore and assess with the G20 membership the proposal from the People's Republic of China to establish a "G20 Energy Access Cooperation Center" (EACC) as a platform to promote G20 country action to achieve universal access, and how the EACC would relate to other existing entities currently promoting access.
- d) Support and monitor programmes to: (i) improve the sustainability of access and the resilience of related energy systems, including the robustness of systems in confronting extreme weather events and the effectiveness of access recovery programmes (including for island states), and (ii) promote synergies and cooperation in disaster-impacted areas.
- e) Explore ways to support gender equality across the energy access value-chains, not only in clean cooking, but also in electricity and residential heat (including: production, delivery and use; programme design and implementation; and business development, operations and maintenance).
- f) Prioritise efforts to expand clean cooking, in particular given the relatively larger number of households lacking this access and its important gender dimensions, and exchange experiences on successful political and institutional efforts to prioritise increased access to clean cooking.
- g) Promote greater innovation in the key areas of technology, institutional practices, and business and delivery models.
- h) Strengthen the understanding of the role of natural gas in promoting access to residential heating and the potential for greater use for clean cooking, as well as regarding its established role in electricity generation.
- i) Exchange experiences about: promoting productive uses, expanding access in rural areas, strengthening data collection and analysis, deploying mini-grid and other off-grid solutions, expanding access for residential heat, improving clean energy technologies in island states, and access monitoring and evaluation programmes.

A. The Vision

1. **Building consensus for fair and sustainable development.** The Government of Argentina has put forward a people-centred vision under its G20 Presidency to promote fair and sustainable development, which is set out in its “Overview of Argentina’s G20 Presidency 2018” (referred to herein as the “Argentina G20 Overview”). As part of its programme to promote cleaner and more flexible energy systems, the Presidency is supporting efforts to promote increased access and improved affordability of energy in the Latin American and Caribbean region (LAC).² Increasing access and improving affordability will help to promote many of the priorities of the Argentine G20 Presidency, as described throughout this voluntary action plan. Unleashing people’s potential is one of the priority areas of the Argentine G20 Presidency: to “ensure that everyone has a chance to develop their full potential so as to benefit from the new technological era” requires that all have access to the modern energy that underpins this era; universal energy access is a pre-requisite. A second priority is mobilising private resources to reduce the infrastructure deficit; this is needed not only for large-scale power facilities to strengthen national economies, it is also important to help to fund the household-level and micro-generation facilities (including off-grid solar, micro wind and micro-hydro) that are key to reaching some of the households that currently lack access. The Argentina G20 Overview also looks to build on the legacies of previous G20 presidencies. This proposed energy access and affordability voluntary action plan combines the lessons from prior G20 initiatives and the value-added of the Argentine perspective, experience and technical expertise (together with those of the Inter-American Development Bank (IDB) and of the *Organización Latinoamericana de Energía* (OLADE), among others) to address the needs and specific context of the LAC region, but also with a view towards broader global applicability.
2. **LAC access and affordability document structure.** As noted in the inaugural G20 voluntary action plan (2015), access to modern energy is a key enabler for poverty eradication, social inclusion, health, education, productive economic activity, gender empowerment and all-round improvements in quality of life. This document sets out a set of voluntary actions to increase access in LAC; it is structured as follows: this section A sets out the vision of the Argentine Presidency for the G20 as it relates to improving access and affordability in the LAC region; section B sets out the background and context; section C describes the issues relating to getting to and maintaining universal electricity access; section D describes actions to use access to promote stronger economic and social development; section E addresses access to clean cooking and residential heat; section F sets out various factors that are common to the several forms of energy access and which can increase the effectiveness and impact of access efforts; section G discusses ways to lower energy costs generally across the economy and thereby enhance energy affordability for all across the economy; and section H sets out voluntary actions.

² The LAC region includes the Caribbean, Central America, South America and Mexico (North America). The data set out in this plan is based on statistics prepared by OLADE for the LAC countries listed in Annex 1. Similar relevant data is published by various other organisations engaged in the universal access effort, including the United Nations.

B. The Background and Context

1. **Expanding the G20 suite of energy access voluntary action plans.** The G20 has identified providing universal energy access as one of the key areas where the G20 countries will target their efforts. In 2015 under the Turkish Presidency, the G20 adopted a first phase on access that targeted Sub-Saharan Africa. In 2016 under the Chinese Presidency, a second phase was adopted for the Asia-Pacific region. This voluntary action plan is a third phase which is targeting the LAC region under the 2018 Argentine Presidency.
2. **Access in LAC.** The LAC region on average enjoys high electricity access levels and relatively high economic and Human Development Index (UN) outcomes for a developing country region. However, these aggregated figures overlay a region with a great deal of variety that requires differentiated approaches. The LAC region is characterised by a high degree of urbanisation (about 80%) and a high degree of inequality. Notwithstanding the high level of urbanisation, about 90% of the population without access to electricity live in rural areas. Moreover, while extending access can help to reduce inequality, poverty issues facing the connected poor (including energy poverty) will remain an important challenge for LAC. Access to clean cooking is a major challenge with large numbers lacking access to clean cooking relative to electricity, in particular in certain sub-regions. This will require its own set of actions that differs from that needed to achieve universal electricity access in the region. There are additional energy access dimensions that are relevant for the LAC region, including access to modern energy sources for residential heat and to natural gas, two areas where there are opportunities for expansion.
 - a) **Access to electricity.** LAC has a rate of access to electricity of about 97%; this figure improved from 89% over the past 15 years. It has about 21 million people without access to electricity, which represents less than 2% of the world's 1.1 billion lacking access. As a region, it is in the final legs ('the last mile') of the effort to achieve universal electricity access, but providing access to the remaining 3% remains a complex task that requires combining regulatory, technological, environmental, financing and economic factors, among others. The challenge of achieving universal access to electricity varies for different countries (see Annex 1 for key country data). Most of LAC's countries have access rates above 90%. About 13% of people without access to electricity in LAC live in the region's three large G20 economies (Argentina, Brazil and Mexico); there are in total about 2.7 million people without access to electricity in these LAC G20 countries notwithstanding national access rates nearing 100%. Another key set of countries has rates that fall below the 95% range, with relatively smaller economies and lower income per capita from which to draw funds to expand investments; these include most of the Central American countries and Bolivia, Suriname and Guyana. Haiti has an access rate of only 30%, the lowest in the region and one that is closer to the rates that are found in poorer developing countries around the world; similarly, it faces many of the same challenges of least developed countries and presents a special set of challenges in the region. Finally, the small island states of the Caribbean typically enjoy high access rates, relatively high income per capita levels, but are small economies that are vulnerable to repeated extreme weather events which disrupt their economies and their electricity access.
 - b) **Access to clean cooking.** LAC has an 86% access rate to clean fuels and technologies for cooking (over 10 percentage points lower than electricity access); this figure improved from 79% over the past 15 years. The region has about 88 million people without access to clean cooking, which

represents less than 3% of the world's 2.8 billion without access. Although most countries of the region have over 90% access rates, in four countries, more than 50% of the population lack access to clean fuels and technologies for cooking (namely, Guatemala, Honduras and Nicaragua, as well as Haiti where over 90% of the population lacks access). Moving away from traditional biomass to more modern energy sources as part of clean cooking can generate important benefits. However, the clean cooking challenge remains an area where the region's gains have been relatively modest. Various factors, such as increased attention and perseverance, greater innovation, and overcoming various barriers -- such as high (non-competitive) costs, lack of expertise and limited access to well-adapted technologies and logistical constraints -- will be required for the region to make significant inroads in this area.

- c) **Access to residential heat: reaching beyond electricity and clean cooking.** Many of LAC's population live in cold areas during the winter, notably in villages, towns and cities located at higher elevations and in the south of the region (for example, the temperature in Santiago Chile drops to 0°C in the winter; in Argentina, the populations of southern Patagonia face extremely low temperatures). Adequate residential heat is very important for these households. Therefore, while the access focus is on electricity and clean cooking stoves, another important form of energy access for the LAC region (as well as for other G20 countries, such as China) is for heating homes. Providing access to modern forms of residential heating (e.g., replacing inefficient wood burning with modern energy sources such as electricity, solar heating and natural gas) is a major challenge for cold areas in the LAC region, and consequently is an important part of the region's energy access effort. Residential heating access also falls within broader efforts within the region to improve '*climatización*', which also includes space cooling (with its attendant potential to increase worker productivity and other benefits).
3. **A role for multiple energy sources, including gas in addition to solar, wind, hydropower and others.** Providing electricity to all in LAC involves a variety of technologies. In addition to solar and wind, which are increasing rapidly, and hydropower which has traditionally provided a sizable portion of power generation in many LAC countries, gas has an important role to play in providing the different forms of access.
 - a) **Gas: a valuable fuel across the access spectrum.** Gas in its various forms contributes to the access agenda in a variety of ways. Natural gas is an important source for power generation and thereby an important fuel in the electricity access effort; it is also a source for clean cooking and for residential heat, in particular in areas with high population densities. Access rates in most countries are relatively low, but there is room for growth in the region (see discussion in Annex 2). Liquefied petroleum gas (LPG) is also an important source of energy for clean cooking. Biogas can provide an important source of renewable-based energy. Gas is a fuel that supports LAC's various energy access agendas (electricity, clean cooking and residential heat) while also supporting economic growth and the low-carbon energy transition. It is the only fossil fuel whose consumption increases across various low-carbon scenarios.
 - b) **Towards a better understanding of household access to natural gas:** Different countries of LAC have natural gas markets with varying levels of maturity and diverse goals regarding its expansion. For example, in Argentina and Colombia, about 60% of their respective populations have access to gas (representing about 27 million people in each country), while other countries have

rates that are well-below 10%, let alone zero. This reflects varying factors, such as diverse climate contexts, different availability of gas (e.g., national resources versus imports), and distinct government strategies. Argentina, for example, is looking to significantly expand access to natural gas (and with that, to tap into the variety of attendant benefits it has identified) and is in parallel moving to exploit more fully the resources in its large domestic Vaca Muerta formation. Natural gas is an important part of the solution in climate change mitigation efforts. Given the important role that natural gas can play in providing access, it is useful to understand and analyse more fully the current situation and its potential. Policymakers, the private sector and other stakeholders can benefit from a better understanding of this fuel, including (i) the current levels of household access to natural gas, and the extent to which it is used for cooking and/or for residential heating, and (ii) the plans to expand this access, the potential for future expansion and the possible benefits from this expansion. Some of the dynamics surrounding the access to natural gas dynamic are set out in Annex 2.

4. **Moving beyond basic access to stronger economic and social development.** Given its overall high electricity access rate, the region is focused simultaneously on achieving universal access and on augmenting the impact of that access on economic and social development. For the LAC region, an important objective is to provide access to electricity that can be leveraged into income-generating activities and improvements in social conditions. This requires looking at the access effort within a context of broader economic and social support actions.
5. **Gender equality and access in the LAC context.** One of the areas that merits particular attention for the LAC region is the issue of gender equality. Although the lack of access to energy for productive uses affects both women and men, due to traditional gender roles, the responsibilities for finding household energy sources and coping with energy poverty fall mainly on women, particularly in rural areas. Moreover, the frequently time-consuming nature of finding and managing household energy can often interfere with the ability of women to pursue other potentially productive activities, such as education and employment. As noted above, clean cooking access rates are relatively low, which disproportionately affects women (and is one of the reasons why programmes such as India's Pradhan Mantri Ujjwala Yojana targets the distribution of LPG connectors to women). Another gender equality dimension relates to energy sector employment. As the IDB reports, women are estimated to represent less than 20% of workers in the energy sector, with even lower percentages among management. In addition, they are generally absent from the decision-making process regarding the design, execution and monitoring of energy projects. Promoting gender equality can help to improve both the effectiveness of energy access efforts and to enhance the resulting economic and social benefits for all.
6. **Energy affordability for all.** The LAC region faces a variety of economic and social development challenges, including great inequality (notably relative to the world's other regions), high unemployment and large portions of the populations under economic stress. Although the LAC region enjoys a 97% electricity access rate, energy expenditures are significant for many, not only the poor. Much of affordability discussion has tended to focus on the poor and other vulnerable populations and the issues of price subsidies and targeted support for the poorest, including the use of conditional cash transfers and other mechanisms such as social tariffs . . . but affordability also extends to the cost of energy for other parts of the economy, including businesses, the government and the middle class. Energy has been fuelling economic and social development across the G20 countries. From OECD countries to large emerging economies (such as China, India, Brazil and Argentina) to poorer developing countries, economic growth has historically been accompanied by increasing domestic energy consumption.

Lowering the cost of energy to G20 economies and to their consumers can help to support greater economic and social development. As the LAC region works to promote its development, it is exploring ways to lower the cost of the energy production and use that is central to these efforts. While LAC already enjoys high electrification rates, the issue of accessing increasingly affordable energy sources is key to the region's development objectives; consequently, this action plan looks beyond the issue of achieving access to the means to improve the affordability of energy for all consumers across the economy.

C. Getting to and Maintaining Universal Electricity Access

1. There are many challenges and opportunities that LAC faces in achieving universal electricity access. One of the specific concerns for LAC is that once access has been provided, there are challenges in maintaining that access. Hurricanes (e.g., faced by the Caribbean region, including Puerto Rico) and other natural disasters, such as earthquakes (e.g., in Andean countries) and floods (e.g., in Central America), generate a need for resilient systems.

Country/context-specific approaches for the countries of the LAC region

2. **The last mile: a targeted approach for many LAC countries – not a menu but a country-specific a la carte approach.** Given the relatively low level of outstanding access issues in the region, a strategy that takes a pragmatic targeted approach by setting out area-specific implementation plans might be most effective, especially as compared to more generalised policies and principles. Moreover, various access programmes have highlighted the challenges of providing access to that last group of households. This is the issue that presents itself for many countries in the region; reaching what are, for example, often remote rural households, or pockets in more urban and peri-urban areas is a challenge. In many of LAC's countries (such as the G20 members, etc.), the major hurdle is less about financing and more about execution.
 - a) **The last mile: opportunities in LAC's G20 countries.** The G20 countries of the LAC region (Argentina, Brazil and Mexico) account for about 2.7 million of the region's population without access to electricity, notwithstanding national access rates nearing 100%. Brazil and Mexico, which account for nearly half of the region's population themselves, have about 2.2 million people without access. Brazil's success with *Luz para Todos* has provided a useful blueprint for other countries. Connecting the last households presents important challenges, even for large economies such as LAC's G20 members.
 - b) **LAC's poorer middle-income countries.** LAC's poorer middle-income countries face a combination of large numbers to connect and constrained budgetary resources. For example, Guatemala (1.2 million) and Honduras (2.0 million) have undertaken successful programmes to increase access (see Annex 3), but face challenges in mobilising funds given relatively limited domestic resources. Foreign financial assistance is an important complement. Guatemala and Honduras, as poorer middle-income countries that have developed successful access programmes may provide some useful lessons for similar countries in other parts of the world.

- c) **Haiti exceptionalism: many miles to universal access in a least-developed country context.** In Haiti, the challenge is fundamentally different than for the other countries of the LAC region. With an access rate in the order of 30% representing over 7.6 million people without access to electricity, and burdened by major poverty, governance and development issues, Haiti's challenge is not to cover the last mile, but rather a more traditional least-developed country access effort. Some of the challenges facing Haiti are described in Annex 3.
 - d) **High access rates in LAC's Small Island States.** Numerous LAC region countries are small island states and nearly all of them enjoy high levels of access. The challenges surround less the goal of achieving universal access, but rather 'maintaining and restoring' that access (see discussion below on 'access recovery') and leveraging off access to generate economic and social development. Actions to enhance access in small island states are presented in more detail further below under section F.
3. **Urban vs Rural contexts.** As noted above, LAC has an urbanisation rate of about 80%, the highest for any region in the world. It is estimated that there are about 2 million people without access to electricity who live in urban and peri-urban areas; providing access to these households, typically in poorer underserved areas, presents important challenges that require targeted government action. By comparison, about 90% of the population without access live in rural areas and constitutes a key dimension in access efforts (see, for example, LAC country illustration set out in Annex 3). These rural households often present the greatest challenges, not only in terms of obtaining physical access, but also in prompting productive uses (see discussion further below).
4. **A role for grid and off-grid solutions.** Grid extension (in urban and rural areas) and off-grid solutions (notably for the 90% of households without access in rural areas) each have a significant role to play in the access effort. This includes off-grid renewables that rely on local resources (such as solar, wind and hydro) rather than transported fuels. The IDB conducted a high-level analysis which estimated that about 60% of the electricity access deficit in the LAC region could be resolved with urban and rural grid extensions and the remainder via off-grid solutions. About 30% of the off-grid solutions would be in the form of mini-grids and the rest would consist of individual household systems. As reflected in the sizable portion of access to be provided by off-grid solutions, the 'last mile' concept often involves powering remote households through off-grid solutions rather than physically extending a line (for example, as illustrated by Argentina's successful Rural Renewable Energy Development Programme, "PERMER"). The public sector can help to promote private investment in smaller off-grid and household systems through various policy de-risking instruments, including strengthening the financial sector (such as supporting mobile phone payment platforms and improving consumer credit data), promoting skilled labour training, and carrying out public awareness campaigns about off-grid systems. In many instances, providing off-grid solutions that are designed with technical specifications that anticipate potential subsequent grid connection can provide both a short-term and long-term electricity supply solution.

Cross-cutting themes towards providing universal access: financing, innovation and the private sector

5. **Financing access: mobilising international, national and local community resources.** Mobilising the financial capital required to pay for connections and supply remains an important challenge for many countries of the region, notwithstanding the important GDP growth that the region has seen over the last

decade. The extent of the need for external financial support (including from the donor community) depends on the country, with a significant need required in the region's poorer middle-income countries and Haiti. Countries also have important national resources which can be mobilised, not only in the region's G20 countries but also in other LAC countries. In fact, the countries of the region (except perhaps only Haiti) have primarily financed their electricity access expansion programmes from national resources. Part of the issue involves finding effective ways for the national (and local governments), as well as utilities, to mobilise additional financing and to deploy these resources efficiently. Moreover, local communities, the prospective users and tariff payers, are an additional important source of funding for access. Whether it is through mechanisms that raise funding upfront, or vehicles to mobilise funding for initial capital costs that are repaid through subsequent tariff payments, local communities ultimately have a critical role to play in funding the provision of access to their communities. Programmes that bundle access with other services (such as capacity building, etc.) can help communities transform access into productive uses and related income generation that can be particularly useful.

6. **A role for the private and public sectors not just in financing, but also in execution.** Public and private sector entities have important roles to play in the access agenda, from providing financing, to assisting in the design of programmes, to carrying out the critical on-the-ground actions that establish and thereafter support electrification (including for both grid and off-grid solutions).
 - a) **The traditional central role of the public sector.** In the LAC region, much of the large-scale electrification programmes to date have been carried out with significant public-sector execution. For example, state-owned utilities have at times been assigned the primary responsibility for carrying out access programmes (e.g., Eletrobras in Brazil, and *Comisión Federal de Electricidad* in Mexico). The choice of approach will vary by country depending on a variety of factors, including government strategic preferences.
 - b) **A key role for the private sector and for Public-Private Partnerships.** The financial requirements to provide universal access are large, and private financing has a vital role to play. As described in the Argentina G20 Overview (under "Infrastructure for development"), mobilising private resources to reduce the infrastructure deficit will be important. The private sector also has an important role in execution, for example in building and operating the grid and related facilities. The private sector has a role to play not only in financing larger-scale infrastructure, but also to deliver access at the household and community levels. Frequently it is private sector operators that provide the installation and maintenance services needed for the solar and other small off-grid systems that provide the "last mile of" access. In other cases, the distribution company managing the grid is a private sector company. Whether access is provided through grid extension, distributed mini-grids, or household units, the private sector has an important role to play in funding and executing access programmes. Often, the most effective financing and implementation approach is through public-private partnerships (see, for example, the role of Peru's private-sector distribution companies in partnership with the government, as described in Annex 3).
 - c) **Further regulatory actions are required to nurture private sector action and to manage public sector delivery.** In certain contexts, the public sector has largely exited the electricity supply sector and the private sector is now responsible. Ensuring that adequate incentives are put in place to encourage private sector-provided access is needed. This may take the form of appropriate regulatory incentives. Alternatively, the public sector can contract the private sector to do so or enter

into other arrangements. Moreover, regulations are also useful to promote stronger delivery by public sector delivery agents (notably, state-owned enterprises). In those areas where the public sector is the energy provider, strong regulations governing their activities can enhance the quality of supply.

7. **Facilitating electricity access through further innovation.** More innovation across several dimensions – notably in technologies, practices and business models -- will facilitate achieving universal access and will improve the impact and sustainability of that impact.
 - a) **Technological innovation.** Encouraging technological innovation can help to promote the achievement of universal access in two distinct but inter-related ways. First, technological innovation can help to reduce the costs of providing electricity access, notably by driving down the cost of off-grid solutions (for example, solar PV). Second, technological solutions can also help to facilitate the physical connection, supply and management of systems (for example, improvements in battery capacity that increase availability of supply, or the development of high-capacity lighter and smaller batteries that are easier to transport, install and maintain, notably in remote areas). In promoting innovation, it is important to bear in mind the opportunities and challenges set out in the Argentina G20 Overview's prioritisation to 'unleashing people's potential': the interaction of technology and people must be managed to generate the best benefits for populations.
 - b) **Facilitating access through innovation in practices and business models.** There are also important other ways in which innovation can strengthen the access effort. An example of this includes the greater use of geospatial mapping and data for planning access expansion that takes into account actual household locations, distances, etc. Improved data can generate benefits across the entire access value-chain as described further below. The strength and appropriateness of the selected business model will also influence the success and failure of access extension and sustainability efforts. For example, refining the models for private sector participation, in particular in rural areas, can help to address the significant challenges of providing and maintaining access to these poor and remote households ('solar kiosks' in which small-scale providers offer community-level solar-generated electricity to rural households is an example of business model innovative action). Another area where business model innovation may help is in enhancing the role of the private sector in supporting recovery after extreme weather events.
8. **Enhancing access through regional integration: providing trans-border access.** At times, remote regions of a particular country may be closer to sources of supply in a neighbouring country. Examples abound in the LAC region because of its mountainous terrain in many areas. Promoting collaborative methods to encourage 'cross-border' supply to remote regions to provide access is useful. The regional SIEPAC transmission line in Central America is a good illustration of how regional integration can support the access agenda.

Maintaining access in the face of financial, operational and climatic challenges

9. Many countries of the LAC region face varied and repeated challenges to maintaining access, that is "to keep the lights on." These include extreme weather events (such as hurricanes and flooding). In addition, ensuring the ongoing financial viability of delivery models as well as ensuring ongoing maintenance to keep electricity generators functioning (including off-grid renewable sources) are important challenges for the region in maintaining the electricity access that was so carefully acquired.

10. **Ensuring financial, operational and maintenance sustainability of delivery models.** One of the challenges that has emerged is the adoption of delivery models that provide for initial access, but face challenges in ensuring that customers can continue to enjoy access to that electricity in the face of financial burdens, and operational and maintenance requirements. It is important to ensure that the conditions under which the access is provided (which may involve some support financial arrangements for poorer customers) are structured such that thereafter, customers are able to continue to afford the cost of electricity. Similar challenges exist on the maintenance and operations sides. This is particularly true for off-grid solutions. Whether it is stand-alone solar PV systems or mini-grid systems, ongoing maintenance and operational support is needed so that once the initial access is provided, it can be sustained over subsequent years.

11. **“Taking responsibility on climate action”: the adaptation challenge facing access.** As set out in the Argentina G20 Overview, “the presidency’s priorities will revolve around promoting adaptation to climate change and extreme weather events.” This represents a major challenge for the LAC region with the following two resilience-related dimensions: (a) enhancing the ability of systems to withstand extreme natural events (i.e., robustness), and (b) speeding recovery of the delivery system. Countries have introduced regulatory measures to address these challenges, including ones that promote investments in resilience and encourage companies (private or public) to develop action plans to ensure prompt recovery.
 - a) **Building robustness to climate events.** The LAC region has historically faced repeated natural disasters, notably hurricanes, as well as earthquakes, etc. The Caribbean and Central American regions have often faced hurricanes that knock-out electricity supply (in essence, the ‘catastrophic failure of electricity delivery systems’). This affects Caribbean countries that otherwise have higher access rates. Building the ability of the system to withstand climate events (namely, system robustness) is needed in the LAC region. In this regard, it is critically important to plan ahead to build a resilient electricity system. For example, strengthening the redundancy of systems, as well as the use of decentralised generation systems, can help build robustness. Regulations can have an important catalytic role to play in this effort.

 - b) **Overcoming the climate ‘recovery’ challenge (‘access recovery’).** It is important to acknowledge that notwithstanding efforts at enhancing the robustness of LAC’s electricity systems, catastrophic loss of delivery capacity is likely to affect the region in the future, and so planning for recovery is important. The LAC region has historically faced many natural disasters, notably hurricanes. 2017 was a particularly difficult year. For example, following Hurricane Irma, even Puerto Rico saw its virtual 100% access rate dramatically reduced for an extended period. Other Caribbean countries faced similar reductions in access rates in 2017 from hurricanes. In previous years, many LAC countries faced similar ‘loss of access’ events, notably earthquakes that hit Central America, the Southern Cone and the Caribbean. Building a stronger framework to enable countries to rapidly restore access is important. This includes strengthening cross-country cooperative structures that enable countries to assist each other in access recovery efforts. This is a challenge that is also relevant for other regions.

12. **Enhancing access through regional integration.** Expanding regional integration can help to promote access in various ways. For example, strengthening the regional supply backbone can help to improve

security of supply in the face of extreme weather events by enabling countries to quickly access generation sources in unaffected areas so as to speed access recovery. Finding the right balance between enhancing domestic sources and strengthening flexibility and ease of access to foreign sources can help to enhance security of supply. Regional integration is also an important tool to improve market efficiencies (for example, by creating larger and more diverse electricity supply and demand markets) and can help to lower costs. The above-mentioned SIEPAC transmission line in Central America illustrates these potentials.

D. Moving Beyond Basic Electricity Access to Promoting Stronger Economic and Social Development

1. As the LAC region nears universal electricity access, with over 600 million connected people, the issue of how populations can use that access better to generate growth and promote economic and social development becomes more salient, including employment benefits.
2. **How much access: from basic to adequate supply.** As the LAC region moves to an access rate of 97% and above, the issue of the quantity of electricity supply embedded in that access becomes more visible. For some, only minimal access to electricity has been provided (e.g., 4-8 hours), including in the form of household off-grid PV panels. The need remains to 'upgrade' the quantity of access for many of LAC's 'connected'. [See Global Tracking Framework for a discussion of tiers of access.] Given the region's near universal level of access, the issue has clearly moved from a binary approach (yes or no on electricity supply) to one of adequate access.
3. **Reliability of access (quality of supply).** Economic and social development is supported by reliable supply upon which customers (including households and businesses) can rely. Strengthening transmission and distribution systems, as well as protecting generation capacity, are keys to ensuring reliable supply. There are also less visible challenges; for example, for many areas that newly receive access, notably poorer ones, non-technical losses are undermining the quality of service and even the safety for customers.
4. **Magnifying the impact of access through energy efficiency.** Providing consumers with more energy efficient appliances and equipment enables them to generate more energy services from any level of supply, thereby increasing the impact of obtaining access. Moreover, as electricity access can lead to more productive uses by micro-businesses and others, more energy efficient motors, etc., can help to increase the economic impact of access. Developing financing models and standards that enable households to access more energy efficient products can help to enhance the economic impact of electricity access.
5. **Energy Poverty and the relevance of social (lifeline) tariffs.** As the LAC region moves closer to universal access, the challenge of energy poverty rises in visibility. Addressing this challenge requires creating a framework in which households can acquire more than basic/sustenance levels of energy services. Provision of targeted support for the poorest such as the use of conditional cash transfers is often a 'preferred' tool to address energy poverty; other mechanisms also exist to increase the availability of energy services for the poor. One example of these other mechanisms is social (lifeline) tariffs. Other ones are government-subsidised energy efficiency programmes that improve insulation in homes,

education programmes regarding energy use, and lighting and appliance efficiency programmes, all of which serve to reduce the amount of energy that needs to be procured by poor families to produce the desired output in energy services.

6. **Productive Uses: From basic access to income-generating activity.** The Global Tracking Framework and other reports present a tiered system to describe differing level of access (e.g., based on number of hours of availability and the reliability of supply). This classification system is particularly relevant for the LAC region which enjoys a relatively strong capacity to provide more than basic access to its populations. In fact, given in part the high level of access already in place, many of the populations that do not currently have access are located sufficiently close to economic activity centres that they can transform access into productive uses but this requires targeted attention. Designing access programmes to work with other services, such as capacity building in technical trades, etc., can help to position households to transform access to electricity into income-generating activities.
7. **The employment ‘bump’ from access programmes.** Creating jobs is integral to the Argentine effort to unleash people’s potential. As described in the Argentina G20 Overview, “we need to create the conditions for more and better jobs.” Access expansion helps to promote employment in two notable ways: first, building and maintaining an expanded electricity system (including providing off-grid solutions) requires workers. Second, the productive uses provided by access can also generate further economic growth and employment, particularly in newly electrified areas.
8. **Leveraging access to promote social development.** Access not only provides an important input to generate productive uses, it also provides a variety of possible health, environmental, education and other social benefits. Programmes can be designed to generate important human development and other benefits that leverage off access.

E. Expanding Access to Clean Cooking and Residential Heat

1. It is estimated that about 88 million people in LAC do not have access to clean cooking, with many concentrated in Central America and Haiti. Expanding access to clean cooking will require a strong political commitment, and also government persistence and policy perseverance. Many of LAC’s households lack access to clean and modern forms of heating as well, although there has been less data collection on this issue. Increasing access of LAC households to modern clean residential heat is an additional element of the LAC’s region’s efforts to provide all energy for all.
2. **Many more miles to travel on clean cooking: mobilising and sustaining commitment.** Different countries provide different challenges and opportunities. Several of the Central American countries and Haiti have access rates to clean fuels and technologies for cooking that are below 50%. These countries merit special attention. Moreover, over 30% of the population in Guyana, Paraguay and Peru lack access to modern energy for cooking, as does 20% of the population in Bolivia. Programmes that are adapted to the specificities of these various countries are needed to make substantial improvements in raising access rates. LPG has been a major fuel choice in this effort. Electricity also has a role to play, (in particular as a low-carbon source over the longer run as electricity systems decarbonise), as does natural gas (for example, in areas that have high population density or where other large-scale users, such as industry, can help to support the infrastructure costs and depending on the country’s energy

transition strategy). One common theme is the positive impact of a sustained prioritisation by government and other stakeholders of policies and programmes to increase access to clean cooking.

3. **More Capacity building about clean cooking.** The clean cooking access challenge requires a set of specialised skills that differ from electricity access (including knowledge of cooking practices and preferences). Specialised capacity building is required that targets not only government policy makers and implementers, but also private delivery agents and households.
4. **Redoubling efforts across the clean cooking spectrum.** Many of the challenges surrounding the clean cooking area are known but remain difficult to overcome. Further efforts are needed to overcome them, including in the following areas.
 - a) **Better adapted technologies and delivery models.** This remains one of the biggest challenges, namely how to provide cooking in a manner that responds to the needs of households and that takes into account varying local practices and preferences. Further testing and exchange of experience is important.
 - b) **Innovation in technologies and delivery models.** As a corollary of the above challenge, promoting innovation remains important, in particular in designing technologies and adoption programmes that are effective on the ground. This includes in the delivery of modern fuels to be used in clean cooking (notably gas in its different forms). Moreover, promoting efficient and sustainable use of traditional biomass sources remains an important phase (often an interim one) in transitioning to clean cooking.
 - c) **LPG market development.** LPG continues to remain a preferred option for many countries in providing access to clean cooking. Strengthening this market can help to improve the availability of LPG and to lower its costs.
 - d) **More and better data.** This will be required to support improvements in the design and implementation of programmes and in supporting needed further innovation. The diffuse nature of clean cooking use often requires time intensive surveys, but these are needed. Innovation can also help in facilitating data collection.
 - e) **Cross-ministerial leadership and cooperation.** Clean cooking often touches on the activities of different ministries, such as energy, forestry and environment, rural development and social services. Promoting cooperation across ministries and agencies, while also designating a clear champion, can support stronger government action.
5. **Modern fuels for residential heat.** Energy access in LAC extends beyond electricity and clean cooking to heat for homes, notably in the colder parts of the region. Natural gas and other fuel sources have their roles to play in this regard. Consequently, this LAC access plan not only looks at the issues of electricity and clean cooking, but also at residential heat. Biomass is often used to provide heating (in particular in poorer regions), which presents pollution, health, sustainability and other concerns; moreover, it is often inadequate, in particular in homes that lack adequate insulation. While sustainable biomass systems may at times be appropriate, modern fuels can help to address the afore-mentioned disadvantages, as can, for example, solar heating technologies. The residential heat challenge is one that faces poorer countries, but also some of the region's wealthier countries (such as Argentina and

Chile) whose southern and mountain populations face cold weather conditions. Efforts to provide modern fuels for residential heat can benefit from a collaborative framework: (i) for exchanging and disseminating lessons learned in developing and strengthening policy and delivery models, and (ii) for mobilising additional financing (from both public and private sources).

6. **Biomass: The traditional source that needs to change.** Biomass is a prevalent source of energy for many of the poor in the LAC region and its use presents important health, environmental and other challenges. Enabling households to substitute biomass with LPG and other modern cooking and heating fuels is central to the LAC access effort. At the same time, biogas and other sustainable and efficient uses of biomass also have a role to play as part of a sustainable energy transition (e.g., including in connection with biogas generation in remote areas). While the general trend will be to shift from biomass use, efforts should continue to support and expand innovative sustainable uses.

F. Increasing Impact Across the Several Access Value-Chains

1. There are several cross-cutting issues that affect all of the three distinct forms of energy access (namely, electricity, clean cooking and residential heat).
2. **Capacity building across the access-to-development value-chain.** There is a need to increase capacity, at the national and local levels and within governments, businesses, households and civil society, not only to design and implement access extension projects, but also to transform access into positive economic and social development more broadly (see, e.g., discussion above about bundling services to promote productive uses).
3. **Better, open and transparent data and indicators.** To achieve the universal access goal and to spur the economic and social development that access can provide will benefit from better data and better indicators to measure and monitor progress. Providing open access to data that is transparent is important to improve the quality and impact of data, and the resulting economic and development outcomes. Given the often-overlooked importance of this area, “Argentina will ... push forward ... energy data transparency” (as stated in the Argentina G20 Overview).
4. **Consultation across the access-to-development value chain.** Consultation with affected households, communities and other stakeholders, as well as with civil society, can work to significantly improve the quality of design and implementation, augment the positive impacts of access programmes and mitigate the negative ones. As explained in the Argentina G20 Overview: “Reaching Out...Global Solutions call for broader, stronger engagement. Building consensus for fair and sustainable development requires the commitment not only of governments but also of all sectors of society.” Reaching out is not only important for macro-level issues, but also for the more targeted efforts at the community and household levels to expand access and to transform that access into economic and social development.
5. **Cross-disciplinary innovation in technologies, design and delivery practices and business models.** Innovation in these areas will be important to support effective access expansion for all three energy poles, namely electricity, clean cooking and residential heat (see, for example, discussions about electricity and clean cooking). There are also potential opportunities for synergies across the different

access poles. For example, grouping off-grid electricity and clean cooking delivery services for remote populations can help to support deployment and maintenance activities.

6. **Choosing the appropriate technology from a menu of options that includes solar, wind, hydropower, gas and others.** The choice of technologies will depend on a suite of considerations, including the type of access (electricity, clean cooking or residential heat), the particular country circumstances, government choices, available resources and technologies, environmental and social issues, as well as a recognition of cross-border and global externalities (including impacts on climate change). For example, a range of renewables can provide important benefits, including geothermal which is available to various LAC countries given their specific geological conditions. Other countries are endowed with different sets of natural resources to exploit to support universal access efforts consistent with cost, sustainability and other considerations.
7. **Natural Gas: an important fuel for the LAC region.** Virtually all energy production and use projections point to the increased use of natural gas (see, for example, the 2017 energy projections of the United States Department of Energy's Energy Information Administration and of the International Energy Agency). There are numerous reasons for this increase, including recent drops in production prices, as well as overall trends towards lower-carbon and lower pollutant fossil fuels. In the LAC context, natural gas has important potentials to support sound and sustainable economic development in the region, including by helping to meet LAC's three energy access needs, namely to electricity, to clean cooking and to residential heating.
8. **Special challenges and opportunities facing LAC's Small Island States.** There are many small island states in the LAC region, most of which are characterised by high levels of access, mid- to high-levels of income per capita, heavy dependence on fuel imports, and vulnerability to hurricanes. These countries face numerous challenges and opportunities, some of which are also relevant for remote and rural areas.
 - a) Access enhancement actions should be designed to address the specificities of small island states, such as the challenge of 'restoring access' described above and mitigating high fuel costs and price volatility associated with fuel imports.
 - b) Renewable energy sources, including for mini-grid and household systems, can enhance resilience and help to speed recovery from extreme weather events. Moreover, renewable energy sources are typically locally produced (e.g., wind and solar) and so can enhance energy independence.
 - c) Island states tend to face relatively high electricity costs (often about USD\$0.30/kWh) which present affordability issues. Improving the cost-effectiveness of electricity delivery systems, including improving operational and organisational efficiencies, identifying low-cost fuel options, supporting technological innovations and strengthening contracting practices could potentially help to reduce electricity costs.
 - d) Strategies to allow countries to overcome the challenges of small market size, including potential coordinated procurement and other cost-sharing actions, can help to strengthen affordability and financial sustainability.

- e) LNG (e.g., through the use of smaller regasification plants) can potentially help to diversify energy supply (provided that it can be provided in a cost-effective manner).
- f) There may be opportunities for integration of energy markets across islands (including potentially electricity interconnectors).

9. **Gender equality dimensions.** The issue of gender equality related to energy access has multiple facets and cuts across the access effort, including: (a) the three access poles (electricity, clean cooking and residential heat), (b) the energy value chain (including production, delivery and use; related operations and maintenance and business activities; and productive uses;); and (c) the policy/institutional development and deployment processes (including project and policy design, implementation and execution, and monitoring and evaluation). As set out in the Argentina G20 Overview, gender equality across the spectrum of access-related activities (including programme design and implementation) must be integrated into the access agenda and programmes. Promoting gender equality across these various facets of the universal access agenda includes the following actions.

- a) Access programmes and projects to promote the use of modern fuels for cooking and residential heating should address gender-differentiated needs and promote new habits/behaviours and technologies.
- b) Greater engagement of women in the design of access programmes can create ones that are better adapted to the needs of women energy users that dominate the clean cooking area and are also very active in the use of electricity and residential heat. This also applies to monitoring and evaluation and subsequent programme redesign efforts that are key to improving the effectiveness of programmes over time.
- c) Promoting greater gender equality in electricity operations and maintenance and other business activities, as well as in the modern fuel clean cooking and residential heat value-chains, can generate employment and other related benefits for women and their households, as well as generate potential benefits for energy customers (e.g., with respect to the sale of products and the provision of maintenance services to women and other consumers).
- d) Consistent with the benefits of stronger data and analysis described above in paragraph F.3 (“Better, open and transparent data and indicators”), the collection of sex-disaggregated data and the development of related indicators and knowledge products can enhance the analysis of access efforts and their impacts.
- e) Greater attention to productive uses opportunities for women can help to enhance household incomes, including the numerous poorer families with women heads of household.
- f) Programmes to strengthen the technical, productive/economic and organisational capabilities of women can enhance programme implementation. This includes in rural areas where women often play a central role in managing energy use at the household level, as well as in its production and delivery (notably with respect to the current use of biomass resources).

- g) Expand opportunities for women in energy businesses, including off-grid and household renewable systems, as well centralised grid-based utilities. As OLADE reports, numerous gender studies have shown that gender diversity is linked to improvements in companies' performance; this evidence suggests that reducing gender disparities and improving women's participation in the labour market may increase operational efficiencies that ultimately result in greater value for basic services companies. Some efforts to encourage the participation of women in this regard have included: the organisation of women's committees, training regarding Board of Director and other corporate functions and the promotion of women to integrate these functions, the formation of specific work commissions, entrepreneurship training, the development of gender and diversity workshops with the participation of both sexes in order to catalyse involvement, and incentives for women's participation as partners in business and project management and administrative organisation.
- h) While there are various common elements to the gender equality context of different LAC countries, initiatives should be structured to be adapted to country and even more local factors, including social, economic and cultural specificities.
- i) Increase the knowledge and capacity, and the state of the art with regard to gender equality dimensions of the various engaged stakeholders, including governments, civil society, businesses, households and development organisations. To this end, increase the exchanges of experience and lessons learned with regard to the design, implementation and evaluation of access programmes as they relate to gender equality dimensions.

G. Improving Energy Affordability for All ... Across the Economy

1. Much of affordability discussion has tended to focus on the poor and the issues of price subsidies. . . but affordability extends to the cost of energy for all parts of the economy, including also businesses and other consumers. The LAC region faces a variety of economic and social development challenges, including great inequality (notably relative to the world's other regions), high unemployment and large portions of the populations under economic stress. For example, it has been estimated by the Center for Global Development that about 200 million people in the LAC region live on between \$4 and \$10 per person per day (2005 PPP); while they do not constitute the extreme poor, they face many struggles in maintaining their standards of living and in their efforts to achieve middle class status. Moreover, household expenditures on energy are important, including in Caribbean countries that face high costs of electricity supply (as noted above, often above USD0.30/kWh). So, while the LAC region enjoys a 97% electricity access rate, energy expenditures are significant for many households (over 8%). Moreover, business consumers, as well as other public-sector users, such as schools, hospitals and government buildings (which are large consumers of electricity and other energy sources), also would see benefits from being able to lower their expenditures on energy.
2. Lowering energy costs enhances affordability for households to acquire goods and services, for business to use energy to generate value-added, and for governments to deliver services at lower costs. Not only do lower energy costs increase disposable income for other uses, they also lower the production costs of goods across the economy and can increase competitiveness. Several areas of particular interest in this regard for the LAC region follow.

3. **Finding new low-cost energy resources.** The LAC region is endowed with many natural resources, including natural gas and hydro-electric generating capacity. Argentina, for example, enjoys the large and mostly-untapped gas resources in its Vaca Muerta formation; tapping into these resources in a sustainable and cost-effective manner could reduce the cost for Argentina's economy of using energy, for power generation, for residential heat, for industrial process, etc.
4. **Technological innovation is key to driving down costs.** Technological innovation (such as has been evidenced with tight gas) can reduce the cost of producing and using energy across the value chain. Increasing cooperation among countries can help to drive greater innovation and dissemination of new technologies. Moreover, as noted in the Argentina G20 Overview, it is important to manage well the development and deployment of technological change to unleash people's potential.
5. **Better market design.** More efficient markets can help to reduce transaction costs in producing and using energy. Better market design can help to create better conditions for the private sector to deliver energy at lower costs, in part through improved competition and efficiencies.
6. **Better data and digitalisation.** Increasing attention is being paid to the benefits of better data and its use, including through digitalisation. The area of digitalisation is receiving particular attention this year under the Argentine G20 Presidency, as it did last year under the German G20 Presidency; it has potential applications to the access agenda as well (including for data collection).
7. **Increased international cooperation and trade, including regional integration.** Promoting stronger international cooperation, including through electricity pools and other cooperative arrangements, can also help to reduce the cost of providing energy. Greater regional integration of electricity systems in particular can help to reduce costs, while also expanding fuel choices (including to hydropower) and improving security of supply.
8. **Energy efficiency can reduce the cost of use.** While much attention is paid to unit costs of energy, less is often paid to the quantity of energy required which is a key factor that drives the cost of energy use. Energy efficiency can enhance the affordability of energy by reducing the number of units needed to produce goods and to deliver services.
9. **Relevance for spectrum of G20 countries.** The special focus in this voluntary action plan on the vital role that enhanced affordability can play, not just in poverty alleviation efforts, but also in promoting economic growth across all sectors of the economy through notably cost reduction efforts is relevant for all developing countries that project increased domestic energy consumption to fuel their growth. Affordability of energy for all economic actors is also relevant for developed countries that are already large consumers of energy to support their economies.

H. Access and Affordability in the LAC Region: Proposed Voluntary Action Plan

1. G20 countries have been taking various actions to promote access. Moreover, the countries of the LAC region, including those outside the G20 group, have undertaken many efforts to expand access in their

countries, which has produced valuable lessons of relevance for ongoing efforts in the LAC region and in other regions as well.

2. **Progress on implementation of the G20 Sub-Saharan Africa and Asia/Pacific energy access Voluntary Action Plans.** G20 countries have been taking a variety of actions to implement these action plans and to otherwise support the goal of achieving universal access. A summary of key actions is set out in Annex 4. As noted by various G20 countries, there is an over-arching global dimension to the universal access effort which merits a coordinated global effort that addresses the needs of developing countries across regions (with a focus on those countries that face the greatest challenges).
3. **LAC's experience and context: useful lessons for other regions.** The LAC region's (i) experience in achieving near universal access in electricity within a developing countries context and in advancing the other forms of energy access, and (ii) efforts to transform access into sustainable economic and social benefits for its populations and economies, provide useful inputs for other regions addressing their own access challenges. LAC countries have a rich and varied experience in promoting access. Some examples are provided in Annex 3.
4. **G20 Voluntary Actions to promote access and affordability in the LAC region.** This Voluntary Action Plan sets out voluntary actions that the members of the G20 have endorsed as useful to promote energy access in the LAC region, as well to increase the affordability of energy for LAC economies. The G20 members also recognise that the analysis and actions set out in this voluntary action plan may be relevant to some extent to other regions.
5. Recognising the LAC context as set out in Section B ("The Background and Context") above, the G20 members: (i) endorse the applicability of the approaches to increasing electricity access set out in Section C ("Getting to and maintaining universal electricity access"), and to clean cooking and residential heat set out in Section E ("Expanding access to clean cooking and residential heat"), and the cross-cutting issues common to these three forms of energy access set out in Section F ("Increasing impact across the several access value-chains"), and (ii) also recognise that the approach in any particular country will need to be adapted to the particular country context, including government policy preferences.
6. The G20 supports efforts to enhance the positive economic and social development impacts of providing access, as set out in Section D ("Moving beyond basic electricity access to promoting stronger economic and social development").
7. The G20 supports expanding its discussions to include improving the affordability of energy for all consumers, as set out in Section G ("Enhancing energy affordability for all ... across the economy").
8. The following more specific voluntary actions are encouraged:
 - a) Support Haiti, together with its development partners, to craft and deploy a strengthened programme to expand access, with an initial focus on electricity. The governance challenges facing the sector are some of the difficult and intractable challenges that merit particular attention, as well as expanding the suite of energy providers (including through isolated and off-grid solutions).

- b) Explore ways to increase international financing for access (including from public and private sources), in particular for those lower middle-income and less developed countries that have more limited domestic financial resources. Actions would include exchanging experiences in strengthening investment and governance frameworks and promoting sustainable market conditions to mobilise financing.
- c) Explore and assess with the G20 membership the proposal from the People's Republic of China to establish a "G20 Energy Access Cooperation Center" (EACC) as a platform to promote G20 country action to achieve universal access, and how the EACC would relate to other existing entities currently promoting access.
- d) Enhance the exchange of information regarding lessons learned in promoting access in rural areas; this includes (i) supporting multi-stakeholder participation, including communities; (ii) complementary productive uses programmes that enhance financial sustainability; (iii) strengthening cross-ministerial participation; and (iv) strengthened analytic and choice frameworks to optimise the selection of grid vs off-grid approaches and generation type.
- e) Support and monitor programmes to: (i) improve the sustainability of access and the resilience of related energy systems, including the robustness of systems in confronting extreme weather events and the effectiveness of access recovery programmes (including for island states), and (ii) promote synergies and cooperation in disaster-impacted areas.
- f) Explore ways to support gender equality across the energy access value-chains, not only in clean cooking, but also in electricity and residential heat (including: production, delivery and use; programme design and implementation; and business development, operations and maintenance).
- g) Explore programmes (including sharing experiences) to improve better data collection, transparency and analysis (including, for example, geospatial data).
- h) Exchange experiences about programmes and policies to promote productive uses, which is a major focus of the access effort in the LAC region.
- i) Improve exchanges regarding the applicability and use of mini-grid and other off-grid solutions and ways to improve their costs and sustainability.
- j) Exchange experiences about improved clean energy technologies, including for heating and lighting in island states and remote areas
- k) Prioritise efforts to expand clean cooking, in particular given the relatively larger number of households lacking this access and its important gender dimensions, and exchange experiences on successful political and institutional efforts to prioritise increased access to clean cooking.
- l) Expand efforts to identify and analyse the residential heating access challenge in the LAC region, including promoting greater data gathering and analysis and drawing on experiences from other G20 areas.

- m) Promote greater innovation in the key areas of technology, institutional practices, and business and delivery models.
- n) Strengthen the understanding of the role of natural gas in promoting access to residential heating and the potential for greater use for clean cooking, as well as regarding its established role in electricity generation.
- o) Share experiences in implementing monitoring and evaluation programmes, and the lessons learned from the analyses.

List of Annexes

- Annex 1: LAC energy access data (electricity-1a, and clean cooking-1b).
- Annex 2: LAC household access to natural gas: Another source of modern energy to promote economic and social development
- Annex 3: LAC energy access illustrations: Some successes (Ecuador, Guatemala, Honduras, Nicaragua and Peru) and the challenge in Haiti
- Annex 4: Implementation of the G20 Sub-Saharan Africa and Asia-Pacific Energy Access Voluntary Action Plans

Annex 1-a

LAC Electricity Access Data – Country and Regional Levels

2016: (a) Population without access to electricity and (b) % of coverage by LAC country

Country	# 1000's w/out	% with
Argentina	529	98.8
Barbados	1	99.8
Belize	26	93.0
Bolivia	1,308	88.0
Brazil	414	99.8
Chile	51	99.7
Colombia	1,479	97.0
Costa Rica	34	99.3
Cuba	46	99.6
Dominican Republic	312	97.1
Ecuador	452	97.2
El Salvador	253	96.0
Grenada	2	98.1
Guatemala	1,289	92.1
Guyana	91	88.2
Haiti	7,623	30.0
Honduras	2,036	75.1
Jamaica	56	98.0
Mexico	1,793	98.6
Nicaragua	609	90.1
Panama	303	92.4
Paraguay	64	99.1
Peru	1,557	95.1
Suriname	53	90.3
Trinidad & Tobago	27	98.0
Uruguay	10	99.7
Venezuela	340	98.9
LAC	20,758	96.7
Central America	4,549	90.1
Caribbean	8,21	78.9
Andean Region	5,137	96.3
Southern Cone	1,069	99.6

Source: OLADE, <http://sielac.olade.org/>

Annex 1-b

LAC Clean Cooking Access Data – Country Levels

2016 % Population without access to clean fuels and technologies for cooking by LAC country

Country	% w / out	Country	% w / out
Argentina	0	Guyana	39
Barbados	0	Haiti	91
Belize	13	Honduras	52
Bolivia	21	Jamaica	7
Brazil	7	Mexico	14
Chile	3	Nicaragua	51
Colombia	9	Panama	14
Costa Rica	4	Paraguay	36
Cuba	13	Peru	32
Dominican Republic	8	Suriname	9
Ecuador	2	Trinidad & Tobago	0
El Salvador	17	Uruguay	1
Grenada	0	Venezuela	3
Guatemala	64	LAC	14

Source: Data estimated by OLADE for year 2016

Annex 2

LAC Household Access to Natural Gas

Natural gas is a valuable fuel across the energy access spectrum, while also supporting economic and sustainability objectives. It contributes in its various forms to the access agenda in a variety of ways. Natural gas is used extensively and increasingly for power generation, and thereby is an important fuel in the electricity access effort. Natural gas also supports economic growth in various ways that extend beyond power generation, including for petrochemical and other industrial production, and in the transport, residential and commercial sectors. Moreover, it is often a significant element in national strategies to reduce greenhouse gas emissions (notably from the power sector), and it is the only fossil fuel whose consumption increases across various low-carbon scenarios. Natural gas is also a potential fuel choice for clean cooking and residential heat.

As a consequence, natural gas is a fuel that supports the LAC region's various energy access agendas (electricity, clean cooking and residential heat) while also supporting economic growth and the low-carbon energy transition. Given this important role that natural gas can play in the LAC region, it is worthwhile to analyse in greater depth key aspects of this fuel as they relate to energy access.

Different countries of the LAC region have natural gas markets that have different levels of maturity, as well as different goals regarding its expansion. The following 10 countries/sub-regions of LAC can be classified under the following two generic categories: (a) 'mature' markets: Argentina, Brazil, Chile, Colombia and Mexico; and (b) 'emerging' markets: Bolivia, Ecuador, Peru, Uruguay and Central America. Penetration rates of natural gas differ across these countries and have been changing over time within them. For example, in Argentina and Colombia, about 60% of their respective populations have access to natural gas, while other countries have rates that are well-below 10%, let alone zero (see Table 1 for a sampling of many of the region's active countries in this regard, namely Argentina, Bolivia, Brazil, Chile, Colombia, Mexico, Peru and Uruguay).

Table 1: Percentage of the population with access to natural gas

Country	2015	2016
Argentina	62	62
Bolivia	18	20
Brazil	6	6
Chile	11	10
Colombia	55	57
Mexico	4	4
Peru	4	4
Uruguay	3	4

Source: Data estimated by OLADE

The number of people connected to natural gas has been increasing within the region (see table 2). For example, Argentina provided access to nearly 400,000 more people between 2015 and 2016 and has the highest penetration rate in the region. Colombia made a significant push over the same period, adding 1.6 million people (with nearly 28 million people connected in total, the highest number in the region as of 2016). Bolivia added an additional 260,000 over the same period, and though this figure is smaller in absolute terms than Argentina or Colombia, it corresponded to a relatively larger 10% increase in its penetration rate (see table 1).

Table 2: Population with access to natural gas (1000 inhabitants)

Country	2015	2016
Argentina	26,779	27,168
Bolivia	1,941	2,201
Brazil	11,369	12,129
Chile	2,026	1,895
Colombia	26,298	27,947
Mexico	4,987	4,419
Peru	1,243	1,554
Uruguay	116	156

Source: Data estimated by OLADE

Much of the coverage in natural gas has been in urban areas (see Table 3), with rates that are typically higher than the national rates (compare to Table 1). This reflects in part the fact that gas pipeline distribution networks are generally more cost effective with the larger and denser populations present in urban areas. As noted in the main text regarding the use of natural gas for clean cooking (and similarly residential heat), higher and denser population areas are by their nature better equipped to carry the attendant infrastructure costs of building a retail gas distribution network. Alternatively, the presence of a large industrial gas client can provide an important complementary source of demand, and by extension funding, for a gas distribution network that can then provide clean cooking and residential heat to households. Analysing potential industrial, commercial and household demand is an important element in evaluating proposal for the creation or extension of gas pipeline distribution networks.

Table 3: Percentage of the urban population with access to natural gas

Country	2015	2016
Argentina	67	68
Bolivia	26	29
Brazil	6	7
Chile	13	12
Colombia	55	57
Mexico	5	4
Peru	5	6
Uruguay	4	5

Source: Data estimated by OLADE

Given the potentially important role that natural gas can play in expanding access in the LAC region to the key forms of energy household use addressed in this Voluntary Action Plan (namely electricity, clean cooking and residential heat), as well as the significant contribution of this fuel to continued sustainable economic growth (notably within the transition to a lower carbon future), the region would benefit from increased policy, market and analytic attention being paid to understanding how to promote the sound, sustainable and cost-effective development of this fuel and its use. For example, policymakers, the private sector and other stakeholders can benefit from a better understanding of this fuel as it relates to household use, including (i) the current levels of household access to natural gas, and the extent to which it is used for cooking and/or for residential heating; (ii) the potential demand for natural gas for clean cooking and residential heat (including potentially the use of geospatial mapping tools); (iii) the proximity (or even colocation) between residential and commercial points of demand, as well as the relationship to industrial demand; and (iv) the state of the art and innovations in gas distribution network design, installation and operations, and related regulatory and policy frameworks. Exchanging information about and promoting innovation across the “natural gas to household consumer” value-chain can help the region to best exploit the potential benefits to energy access of natural gas.

Annex 3

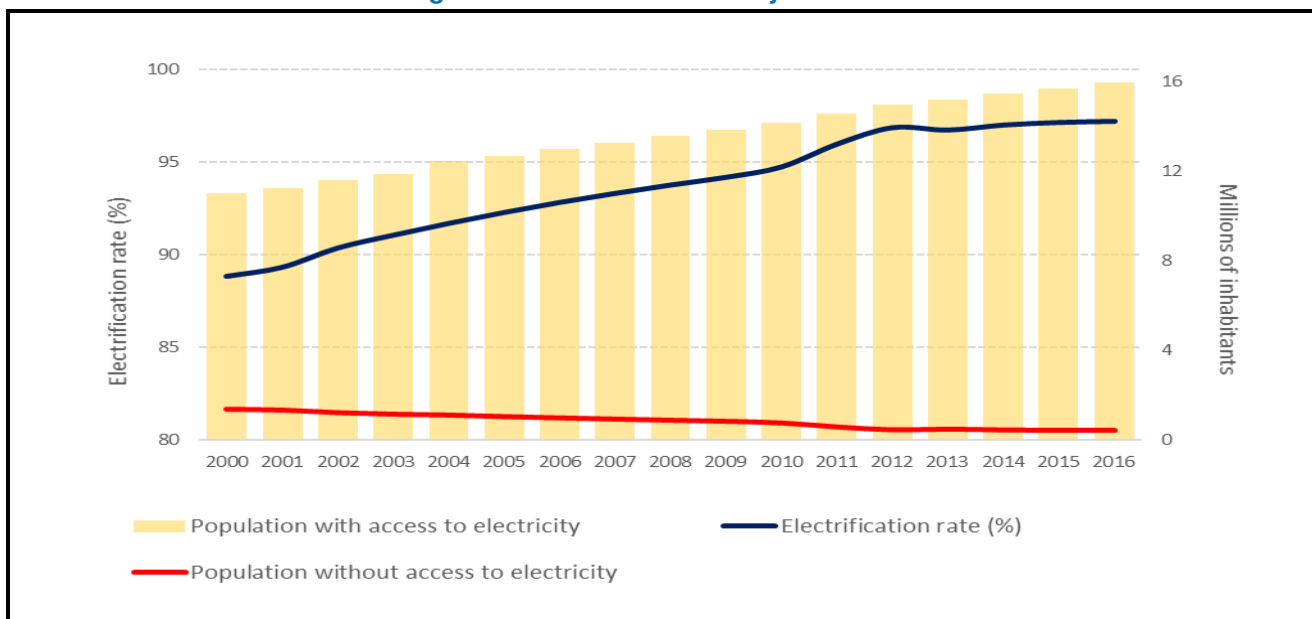
LAC Energy Access Illustrations

This annex reviews the experience of five Latin American countries that have seen significant progress in increasing electricity access since 2000, namely Ecuador, Guatemala, Honduras, Nicaragua and Peru. Additionally, this annex sets out the challenges in Haiti, the country with the lowest rate in the region, and some potential approaches to improve access in the country.

Ecuador

In 2000, Ecuador had an electricity coverage rate of 89%, which increased to 93% by 2006 (Figure 1). The Government of Ecuador began implementation of the Energy Master Plan 2005-2025, with related investments in coverage expansion of about US\$372 million; this allowed more than a million people to be connected to electricity service in ten years, especially in rural and peri-urban areas. Following upon these efforts, Ecuador electrical coverage rate increased further to 97% in 2016.

Figure 1: Access to electricity in Ecuador



Source: OLADE, sielAC, <http://sielac.olade.org/>

In Ecuador, the Ministry of Electricity and Renewable Energies (MEER) is responsible for rural electrification programmes. These programmes prioritise the country's most isolated and poorest areas. The Ministry is also in charge of the above-mentioned Energy Master Plan, which is being supported by the IDB. As one of its more important tools, MEER manages the "Rural Electrification Fund" (FERUM, by its Spanish acronym) which seeks to: i) improve electricity service coverage; ii) improve electricity service in rural and peri-urban areas; iii)

promote the use of renewable energy technologies; and iv) promote the use of energy as a source of productive and social development.

MEER is also implementing the “National Efficient Cooking Programme” (PNCE), which seeks to foster the use of more efficient induction cookstoves (EICs) to replace Liquid Petroleum Gas (LPG) stoves. The programme’s current target is to introduce 2.5 million EICs through year 2023. The PNCE provides incentives to users who decide to use EICs, including: (i) financing for EICs and electrical equipment for water heating; (ii) up to of 80 kilowatt-hour (kWh) at zero cost per month for cooking and an additional 20 kWh per month if water heating equipment is also used till 2024. The financing of EICs is backed by the Efficient Cooking Fund (FCE), managed by the Ministry of Economy and Finance. For users who lack access to electricity and cook with wood, the PNCE provides for the introduction of improved stoves. As of 2017, over 720,000 EICs had been installed, benefiting nearly 2.8 million Ecuadorians; 67% were produced locally.

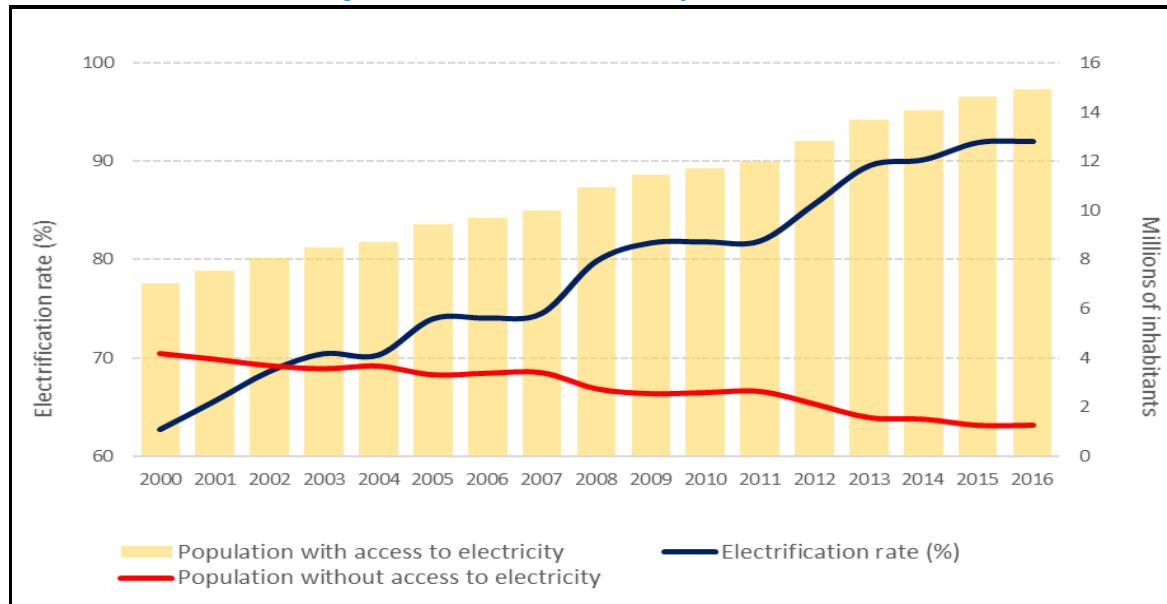
Guatemala

In 2000, Guatemala had an electrical coverage rate of 63%; it increased to 92% in 2016 (Figure 2). Electricity was provided to roughly 1.5 million Guatemalans during that period.

Article 3 of the General Electricity Law of 1996 provides that the Ministry of Energy and Mines is the government authority responsible for framing and coordinating the electricity sectoral programmes. Rural electrification projects are developed in coordination with the National Electrification Institute (INDE) and distribution companies through the Rural Electrification Plan (PER).³

³ <http://www.amm.org.gt/pdfs/AMM-ley-general-electricidad.pdf>

Figure 2: Access to electricity in Guatemala



Source: OLADE, sieLAC, <http://sielac.olade.org/>

Since the implementation of the Rural Electrification Plan was initiated in 1999, household electrification has progressed steadily thanks to the establishment of specific goals and a clearly defined financing system. The Regulatory Framework encourages power distribution companies to invest in power grids and requires them to expand their coverage if there is a potential user at a distance of 200 metres or less from the grid. Guatemala still has over 1.2 million people without access. In its efforts to reduce this number, Guatemala benefits from legal, regulatory and institutional frameworks, and related developed energy policies, that have been tested and demonstrated their capacity to successfully extend access to large numbers of households.⁴

Honduras

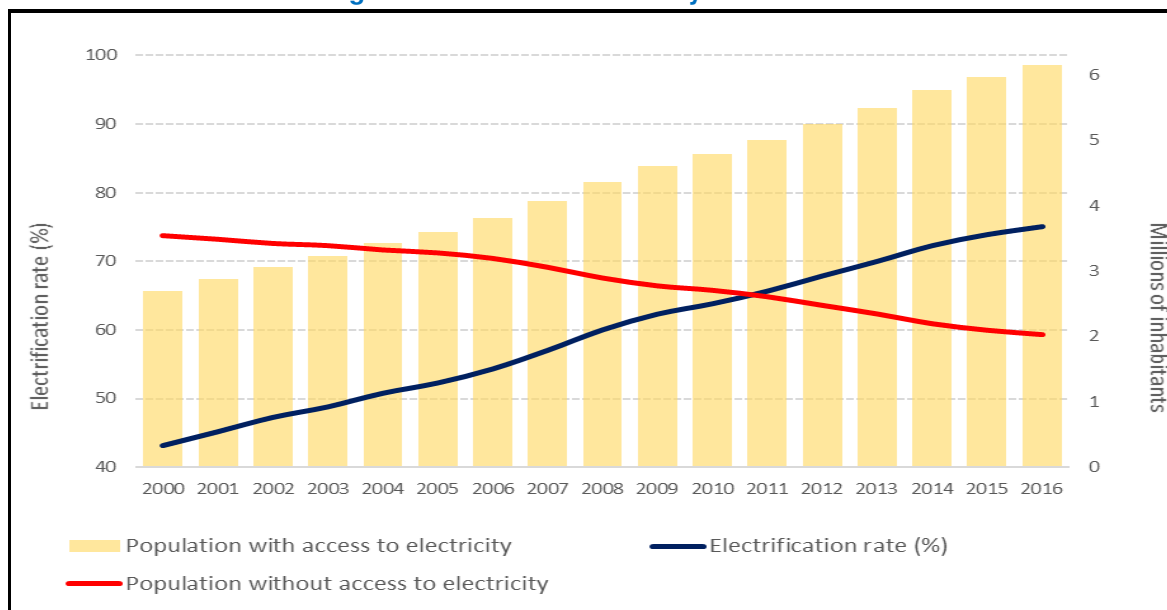
In 2000, Honduras had an electricity coverage rate of 43%; by 2016, it had increased to 75% as electricity was provided to nearly 1.5 million Hondurans (Figure 3). The National Rural and Social Electrification Programme (PLANES) is an integral part of the Government's strategy to reduce poverty and integrate the rural sectors into the economic and social development of the country. The National Electricity Company (ENEE)⁵ is the Government body responsible for rural electrification; ENEE also manages the Social Fund for Electricity Development (FOSODE), which was created by the 1994 Framework Law: General Law of the Electricity Industry.⁶ FOSODE finances and supervises the execution of rural electrification works which are funded by the Government and other internal and external sources of financing; it has an annual budget of approximately \$10 million.

⁴ <http://www.mem.gob.gt/energia/electrificacion-rural/informacion-general-er/>

⁵ <http://www.enee.hn/index.php/electrificacion-nacional/121-electrificacion-rural>

⁶ <http://www.enee.hn/noticias/Ley%20General%20de%20la%20Industria%20Electrica%20Honduras%20-%20Decreto%20404-2014.pdf>

Figure 3: Access to electricity in Honduras



Source: OLADE, sielAC, <http://sielac.olade.org/>

Honduras enjoys the support of various bilateral and multilateral development agencies and banks. Preparations for the PLANES began in 2002 with the assistance of the Canadian International Development Agency and within the framework of the Regional Electricity Project in the Central American Isthmus. The Rural Infrastructure Project (PIR)⁷ was created in 2000 and was funded mainly by the World Bank and the Central American Bank for Economic Integration (CABEI). CABEI also finances road infrastructure in rural areas, safe drinking water and basic sanitation, as well as rural electrification projects. The IDB supported a programme for the expansion and improvement of the rural electricity service that was initiated in 2005. The IDB also began in 2017 to fund the Rural Electrification Programme in Isolated Areas, which aims to support the development of rural areas in the country by providing decentralised renewable energy generation that is supplied by micro-grids. These programmes also encourage the participation of women in the construction, operation and supervision of projects; they also support the participation of companies with proven track-records in the construction, generation, distribution and marketing of electricity. In 2013, South Korea began to fund rural electrification projects in Honduras with the participation of several Korean companies.

Nicaragua

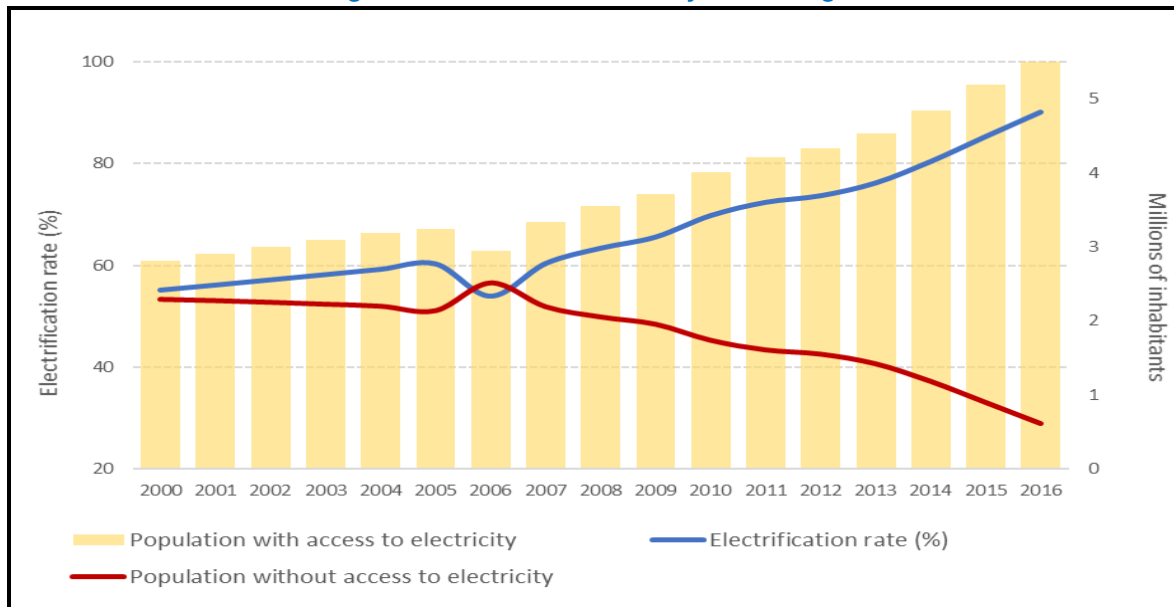
In 2006, the electricity coverage rate in the country was 54%; it increased to 90% in 2016 (Figure 4). During this period, electricity service was supplied to 432,350 additional households, representing 2.2 million people.

Article 29 of Law No. 290, that modifies the Electricity Industry Law, provides that the Ministry of Energy and Mines (MEM) is responsible for the strategic plan and public policies of the energy sector, including policies for electricity coverage and the corresponding financing and investment strategies. The distribution companies,

⁷ <http://projects.bancomundial.org/P090113/rural-electrification-project?lang=es>

DISNORTE and DISSUR, which cover 98% of the electricity market, are responsible for expanding the grid and eligible to receive total or partial government financing for electricity coverage projects that do not reach their minimum rate of return.

Figure 4: Access to electricity in Nicaragua



Source: OLADE, siELAC, <http://sielac.olade.org/>

In 2012, the Government began implementation of the National Programme for Sustainable Electrification and Renewable Energy (PNESER). Under this programme, MEM transferred to the transmission company ENATREL, the responsibility to build the distribution infrastructure for electricity coverage, with ownership to be transferred to the distribution companies, DISNORTE and DISSUR, upon completion. 175,000 households have been connected under the PNESER since 2013. PNESER and other smaller programmes have been executed in parallel allowing a significant expansion of the grid and a consequent increase in electricity coverage. As a result, MEM has set a new goal for its electricity coverage rate of 98% by 2020.

Peru

In 2000, Peru had an electricity coverage rate of 64%; it increased to 95% by 2016 as 7.8 million Peruvians obtained access (Figure 5).

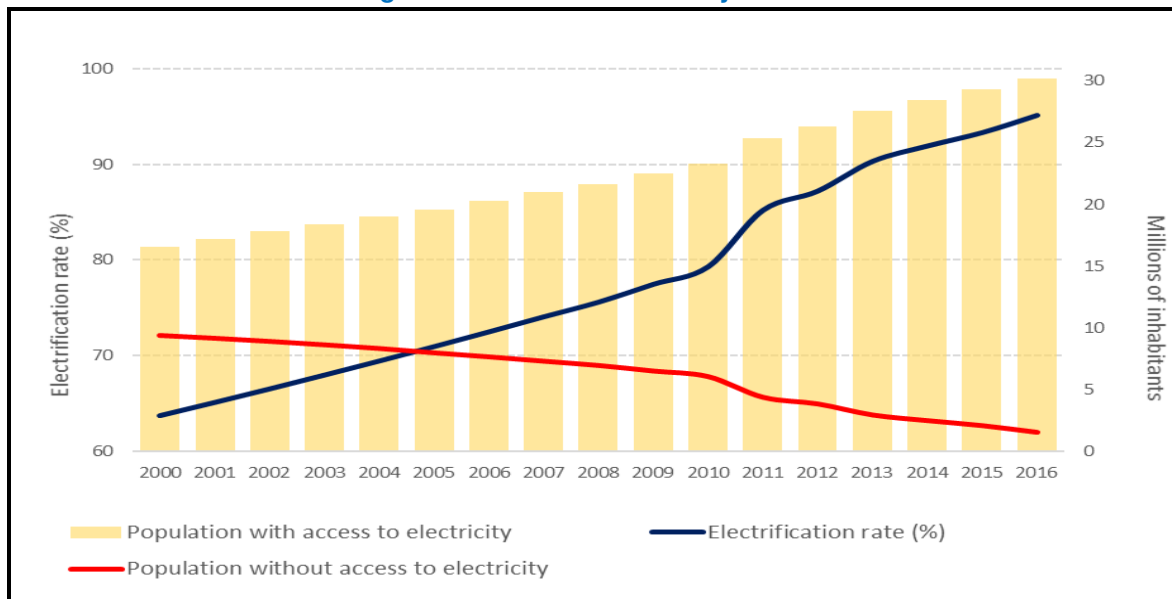
Pursuant to Law N° 28.749 “General Law of Rural Electrification,”⁸ the MEM’s General Office for Rural Electrification is responsible for rural electrification and is in charge of the annual development and update of the National Plan of Rural Electrification (PNER).⁹ Peru’s National Plan of Rural Electrification has supported the sustainable and efficient supply of rural electricity by ensuring that the distribution companies (including

⁸ <http://www2.osinerg.gob.pe/MarcoLegal/pdf/LEY.28749.pdf>

⁹ http://dger.minem.gob.pe/Proyectos_pner2016.aspx

private sector ones) prepare, implement and operate rural electrification sub-projects as part of their regular business transactions. This model based on participation of distribution companies served to strengthen the efficiency and sustainability of access expansion activities. The country's regulatory entity established fixed rates for solar photovoltaic systems and guaranteed that users of these systems would be eligible for the existing electricity cross-subsidies.

Figure 5: Access to electricity in Peru



Source: OLADE, sielAC, <http://sielac.olade.org/>

The strengths of the programme include: (i) the efficient use of project resources and the mobilisation of additional funding through the participation of the distribution companies, (ii) encouragement of productive electricity use in rural areas and (iii) support from distribution companies for the installation of off-grid photovoltaic systems for residential customers. The Plan received support from the World Bank, the Global Environment Facility and the European Community. Peru's goal is to reach universal coverage by 2021; the efforts and successes to date indicate that they are on the right track.

Haiti

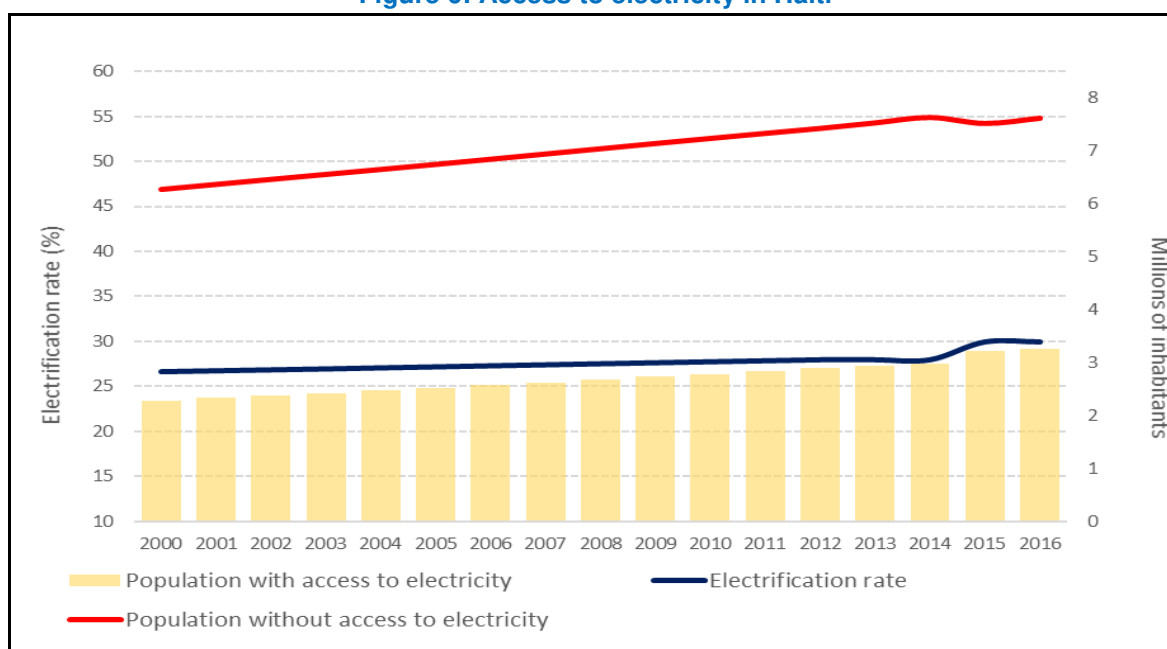
Haiti is the country with the lowest electrical coverage rate in the entire region. Nearly 70% of the population, namely around 7.6 million Haitians, do not have access to electricity. In the year 2000, Haiti had a coverage rate of 27% that increased to only 30% by 2016 (Figure 6). What are the factors that do not allow electrification for the country to improve? What strategies should be applied to improve electricity supply?

Haiti had a population of 10.9 million in 2016. The country has one of the lowest electrical coverage rates and poor quality of electricity service, even though electricity prices are among the highest in the world.¹⁰ A

¹⁰ OLADE, Comprehensive Planning for Electric Power Supply in Haiti, 2015

combination of weak governance and management along with a general lack of transparency at many levels are the main causes of the electricity company's poor financial and commercial state, and related struggles in expanding electricity coverage. Another major contributing factor to the low access rate is the devastating impact of the earthquake of January 10th, 2010. The hurricanes that came before and after also caused serious damage. The system suffers from technical capacities, poor operating conditions, and capacity and governance constraints. Similarly, efforts to expand access, whether through the national utility or through alternative delivery systems, have been hampered by similar problems. Moreover, the use of firewood as fuel is a major problem since this resource is scarce in Haiti as a result of major deforestation.

Figure 6: Access to electricity in Haiti



Source: OLADE, sieLAC, <http://sielac.olade.org/>

Many international donors have been present in the country with the intention to improve conditions not only in the electricity sector, but also overall. However, the impact of these programmes has been limited. Efforts are being made to improve the legal, regulatory, policy and institutional frameworks for the electricity sector to modernise the system. These frameworks must provide stronger legal, judicial and financial safeguards to support actions to improve the financial and operational sustainability of the transmission and distribution grids, to improve financial and contractual transparency, as well as to encourage proactive management of maintenance programmes that are needed to reduce commercial losses.

Haiti needs to treat access to energy services as a priority. A robust stable, long-term infrastructure development plan that addresses the electricity needs of the entire country and establishes a long-term vision would be beneficial. Well-defined and properly implemented legal, regulatory, institutional and policy frameworks are needed to support funding and to strengthen operations. Strengthening sectoral governance and transparency is critical. National political commitment is equally vital.

Conclusions

When analysing the success factors that led to the achievement of higher electricity coverage rates over the last sixteen years in Ecuador, Guatemala, Honduras, Nicaragua and Peru, it is clear that one of the keys is strong government commitment. These countries also adopted well-defined policy, legal, regulatory and institutional frameworks that addressed electricity access, notably specifically for rural areas. Important aspects of these frameworks include: (a) defined institutional frameworks that allocated clear responsibilities and roles to different agencies; (b) well-defined goals (notably through their rural electrification plans) and (c) ongoing government commitment, all of which enabled them to extend access to communities that had lacked electricity. Another notable success factor was the support of international organisations. When state organisations, private entities and community organisations share the same goal to create access to affordable, safe and sustainable electricity for everyone, the projects succeed. The foundations exist for continued successes in extending electricity coverage, with the goal of universal electricity coverage in sight.

In contrast, Haiti lacks the strong and sound political, governance and financial infrastructure that is needed to significantly expand coverage. Several international organisations are currently working with the country to address these aspects; stronger international support and engagement, and more effective programme development and implementation are needed to support Haitian efforts. However, Haitian political will to create the appropriate governance context and to prioritise access expansion is vital; absent such will, success is unlikely. The international community can play a potentially important role in encouraging and supporting Haiti in creating this political will and the governance conditions for success.

Annex 4

Implementation of the G20 Sub-Saharan Africa and Asia-Pacific Energy Access Voluntary Action Plans

This annex describes implementation of the energy access Voluntary Action Plans for Sub-Saharan Africa prepared under the Turkish G20 Presidency in 2015 and for Asia and the Pacific prepared under the Chinese G20 Presidency in 2016. Accordingly, the following information regarding the Sub-Saharan Africa Plan was prepared by the G20 delegation for the Republic of Turkey,¹¹ and the information regarding the Asia and the Pacific Plan was prepared by the G20 delegation for the People's Republic of China, to which the Argentine Presidency 2018 wishes to express its acknowledgement.

A. “Voluntary Collaboration on Energy Access for Sub-Saharan Africa”

1. Overview of the Plan

The Turkish G20 Presidency in 2015 chose energy as a special theme for the work of the G20 Energy Sector Working Group (ESWG). SE4All and the African Development Bank (AfDB) participated in the 3 ESWG meetings (Antalya, Istanbul and Izmir) in 2015 and contributed to the development of the G20 Energy Access Action Plan in Sub-Saharan Africa that was endorsed at the first G20 Energy Ministerial Meeting which was held on 2 October 2015 in Istanbul, preceded by a G20 Conference on Energy Access in Sub-Saharan Africa on the first of October 2015, with the participation of AfDB President.

The Plan was developed in as a collaborative effort under the leadership of the SE4All Global Facilitation Team and with the active involvement of the African Development Bank in its capacity as host of the SE4All Africa Hub.

The plan is a voluntary collaboration framework underlining the commitment of the G20 to work together and coordinate activities to ensure access to affordable, reliable, sustainable and modern energy for all, in line with the Sustainable Development Goal 7. The Action Plan focuses on Sub-Saharan Africa and electricity.

The Action Plan highlights a number of possible options that G20 members could embrace to support electricity access in sub-Saharan Africa with the recognition that determination of the energy mix of a country is a sovereign decision of the respective governments, including the usage of all available indigenous renewable and fossil energy resources.

The Action Plan is envisaged to be a multi-phase plan focusing on different regions and thematic issues as chosen by future G20 presidencies. The Plan is formulated to present the first phase which will focus on improving electricity access in Sub-Saharan Africa. In the Plan it is stated that future phases of the Action Plan may focus on different regions of the world and may emphasise additional areas as would be endorsed by the

¹¹ Input was also provided by Sustainable Energy for All.

ESWG through consultations. Accordingly, the Asia-Pacific region was chosen by the 2016 Chinese Presidency and Latin America and the Caribbean was chosen by the 2018 Argentine Presidency as the main focus areas.

In the Plan on Sub-Saharan Africa, it is also highlighted that universal access to energy cannot be achieved without both public and private sector investments. Involvement of both public and private sectors as well as voluntary and in-kind contributions of G20 members are vital for the implementation of the Plan.

The Action Plan identifies a series of actions for collaboration of G20 countries with Sub-Saharan African countries organised under six sections that address key barriers:

- a) **Strengthening of policy and regulatory environments:** Within the framework of this action, members may undertake to support efforts to help governments at the country-level to strengthen their domestic policy setting, energy sector planning, regulatory framework, regulatory institutions and the technical capacities of their power utilities and to improve sector governance in order to increase public and private investments in energy access according to their national circumstances and priorities. It encourages G20 countries to support the African country-led processes to develop SE4All Action Agendas as an umbrella framework for energy sector development at the national level.
- b) **Technology development and deployment:** Within the framework of this action, participating members may undertake to work together with relevant parties to support the development, dissemination, deployment and scale-up of innovative technologies and business models to increase affordable, reliable, viable, sustainable, and modern energy access according to national circumstances and priorities. The plan notes that G20 members could support the Africa-focused Green Mini-Grid Market Development Program, which the AfDB has just launched and is financed through the Sustainable Energy Fund for Africa (SEFA).
- c) **Investment and finance:** Within the framework of this action, G20 members can develop and implement financial approaches to enhance capital flows to energy access investments across the value chain according to national circumstances and priorities. The plan underlines that an additional \$36 billion in annual investments would be needed to achieve universal electrification by 2030.
- d) **Capacity building:** Within the framework of this action, members can undertake to actively support efforts to build the energy sector capacity necessary to underpin energy access efforts according to national circumstances and priorities. The plan envisages that participating members recognise the vital importance of capacity building and undertake to actively support efforts to build the energy sector capacity necessary to underpin energy access efforts according to national circumstances and priorities.
- e) **Regional integration:** Within the framework of this action, members can undertake to work together with energy policy makers, energy regulators, power pools, African and international institutions and other interested parties and organisations to encourage and support regional integration in the energy sector and the development of regional projects. The plan refers to the African Energy Leaders Group Programme for Infrastructure Development in Africa (PIDA) and also stresses the importance of

project preparation facilities with particular reference to the NEPAD Infrastructure Project Preparation Facility (NEPAD IPPF) hosted by the AfDB.

- f) **Coordination and collaboration:** Participating members undertake to work together with SE4All and other international organisations to enable the coordination and promotion of programmes and projects which aim to increase access to affordable, reliable, viable, sustainable, and modern energy services in sub-Saharan Africa. They undertake to ensure that their respective efforts are supportive of local ownership according to national circumstances and priorities. It notes the benefit of working with SE4All and the African institutions-led SE4All Africa Hub.

2. Recent actions

A selected list of the key mechanisms to achieve the Sub-Saharan access action are listed below with key achievements since 2015.

a. African Development Bank (AfDB)

i. Sustainable Energy Fund for Africa

The Sustainable Energy Fund for Africa (SEFA) is a multi-donor trust fund administered by the AfDB – anchored in a commitment of USD 60 million by the Governments of Denmark and the United States – to support small- and medium-scale Renewable Energy (RE) and Energy Efficiency (EE) projects in Africa. Financing options available through SEFA include project preparation grants, equity investments and enabling environment grants. Since operationalisation (data for 2017 not yet available), SEFA has dispersed USD 42 million across 32 projects (18 national and 6 multinational), resulting in an accumulated total of USD 1.3 billion in private sector investments, and the installation of 464 megawatts of installed capacity.

ii. Market Development Program for Green Mini-grids

Funded through SEFA, the Green Mini-grid Market Development Programme supports the scale-up of investments in commercially viable green mini-grid (GMG) projects through a broad range of interventions to improve the enabling environment. Since its launch in June 2015, the most notable achievements of the GMG Market Development Programme are:

- establishment of a Helpdesk that provides on-demand advisory and support services to subscribers;
- policy advisory services on the topic of GMG in both Mozambique and Rwanda; and
- mapping of the stakeholders in the GMG space conducted by the Alliance for Rural Electrification

iii. New Deal on Energy for Africa

The New Deal on Energy for Africa is a partnership-driven effort launched by the African Development Bank with the aspirational goal of achieving universal access to energy in Africa by 2025. Achievements of 2016 include: 526 megawatts of new installed renewable energy generation capacity, over 21,000 kilometres of new distribution lines, 641 kilometres of transmission lines, 7,800 public lighting units, over 680,000 new households and businesses receiving electricity, and 300,000 prepaid meters installed. Investments in the energy sector through the AfDB in 2016 had already leveraged over USD 1.4 billion in additional financing for sustainable energy sector development in Africa.

b. Africa Renewable Energy Initiative

The Africa Renewable Energy Initiative (AREI) is a transformative Africa-led effort to accelerate, scale-up and harness the continent's huge potential of renewable energy sources with a target to achieve at least 10 gigawatts (GW) of new and additional renewable energy generation capacity by 2020, and at least 300 GW by 2030. Key achievements since its launch at COP-21 in late 2015 include establishment of an Independent Delivery Unit (IDU), hosted by the AfDB, with EUR 7 million budget support from France and Germany.

c. Electrification Financing Initiative

The Electrification Financing Initiative (ElectriFI) is a flexible financial facility funded by the European Commission and managed by the Association of European Development Finance Institutions (EDFI). ElectriFI was created as a financing scheme to bridge the gaps in structuring and financing, stimulate the private sector, and mobilise financiers. In 2016, ElectriFI launched its first call for proposals for financial support, of which over 240 came from Africa alone. The successful projects represent the range of countries in Africa and included 100 Independent Power Producer proposals, 30 captive power projects, 52 mini-grids, 23 standalone system programmes or projects, and 30 classified as "other".

d. EU Energy Initiative Partnership Dialogue Facility

The EUEI PDF is a multi-donor facility that contributes to the achievement of the Sustainable Development Goals, with a particular focus on energy. As a flexible instrument of the European Union, the EUEI PDF hosts both the Africa-EU Energy Partnership and the Africa-EU Renewable Energy Cooperation Program; it is implemented by Germany's GIZ. (Note: April 2018 saw re-definition of EUEI PDF working modalities under a new name Global Energy Transformation Program, or "GET.pro")

i. Africa-EU Energy Partnership

The Africa-EU Energy Partnership (AEEP) is a long-term framework for strategic dialogue between Africa and the EU aimed at sharing knowledge, setting political priorities and developing joint programmes on the key energy issues and challenges in the 21st century. Major achievements since 2015 include a joint effort with the SEforALL Africa Hub, hosted by the AfDB, specifically targeted at improving coordination amongst donor initiatives and energy initiatives in the lead up to COP 21. This effort also included a Mapping of Energy Initiatives and Programmes in Africa that has been widely used and cited by the sector as a valuable resource for improving coordination, leveraging synergies and establishing partnerships.

ii. Africa – EU Renewable Energy Cooperation Program

The RECP supports private-sector investment in decentralised renewable energy projects with a focus on Sub-Saharan Africa. In the ongoing phase, it is funded by Germany, the European Commission, the Netherlands and Austria. Over the last two years, a pipeline of 40 projects worth EUR 1 billion have begun development, representing a broad mix of on-grid, commercial and industrial, mini-grid as well as off-grid solar projects. Five projects have been successfully linked with financiers.

e. Global Lighting and Energy Access Partnership

The Global Lighting and Energy Access Partnership (Global LEAP), launched by Clean Energy Ministerial governments and partners, works at the intersection of energy efficiency and energy access. Under the Efficiency for Access Coalition launched at COP-21, Global LEAP and partners work to accelerate clean

energy access through low-cost superefficient appliances. Under the coalition, UK's Department for International Development has launched a new GBP 18 million innovation programme to spur development of Low-Energy Inclusive Appliances (LEIA).

f. New Partnership for Africa's Development (NEPAD)

NEPAD is an implementing arm of the African Union. NEPAD hosts the Project for Infrastructure Development in Africa and manages the Africa Power Vision (APV), which articulates a long-term plan for increasing access to reliable and affordable energy. NEPAD also provides key support to the SEforALL Africa Hub in executing on priorities as outlined in Action Agendas and Investment Prospectuses

g. Project for Infrastructure Development in Africa (PIDA)

PIDA is a continent-wide programme to develop a vision, policies, strategies and a programme for the development of priority regional and continental infrastructure in transport, energy, trans-boundary water and information and communications technology. There has been notable progress on PIDA's Energy Priority Projects: two projects are operational (the Kaléta Hydropower Plant in Guinea and the Algeria-Tunisia section of the ELTAM Transmission Interconnector), another 50 projects are in the pipeline, and the PIDA project preparation facility has been established to support regional integration.

h. Power Africa

Power Africa, with its more than 140 public and private sector partners, has facilitated the financial close of 80 power sector transactions, valued at more than \$14.5 billion, that are generating or expected to generate more than 7,200 megawatts. It has supported private-sector companies and utilities in connecting a total of 10.6 million homes and businesses, which means approximately 53 million people (each household has five people on average) have gained access to electricity. Power Africa's pipeline includes more than 100 additional transactions and projects. Power Africa is among the largest public-private partnerships for development in history, having mobilised more than \$54 billion in commitments toward its goals.

i. Renewable Energy Solutions for Africa (RES4Africa)

Launched at the Stakeholder Forum of the Africa-EU Energy Partnership in 2015, RES4Africa seeks to replicate the widely successful RES4MED model in sub-Saharan Africa. As a private sector association of large energy companies and utilities from Europe, RES4Africa functions as a bridge between members and partners of emerging markets for an exchange of perspectives and expertise, with a focus on knowledge exchange and capacity building.

j. Sustainable Energy for All (SEforALL)

i. Global Team

SEforALL is a non-profit organisation, formed by the UN in 2011, working with governments, the private sector and civil society groups to accelerate faster, broader actions to ensure sustainable energy access for marginalised populations around the world. SEforALL's global team works jointly with its broad partnership base, accelerators and regional hubs (including the Africa Hub, hosted by the AfDB, see AfDB above) to support leaders and bring them together to mobilise new strategies and more financing that will generate faster, bigger impact for the sustainable energy movement. The inclusion of access to sustainable energy as an explicit Sustainable Development Goal (SDG 7), along with the focus on renewable energy enshrined in the Paris Climate Agreement, marked two landmark successes for SEforALL efforts in the years prior. Since 2015,

the work of SEforALL has focused on asking critical questions about where action is needed to deliver SDG 7 and the Paris Agreement, what progress is being made where, what challenges inhibit fast action, and what role SEforALL and its global platform of partners can play to unlock finance and action at scale.

- *Energising Finance Research Series*: This first-ever picture of finance commitments and disbursements for access to electricity and clean cooking tracks and analyses finance flows on energy access in Sub-Saharan Africa and Asia, offering wide-ranging recommendations to accelerate the flow and improve the composition and allocation of finance directed to energy access in the future.
- *Why Wait? Seizing the Energy Access Dividend*: This report explores the concept of an energy access dividend that assigns economic, social and environmental value to the time it takes for households, businesses and communities to obtain the benefits associated with electricity access. Such a dividend would allow decision-makers to quantify the benefits of delivering electricity access faster through decentralised electricity solutions rather than through more conventional, centralised grid-based approaches

SEforALL continues to work with key data partners and through the SEforALL Knowledge Hub at the World Bank to continue to provide up-to-date data on progress toward SDG7 through the SDG7 Tracking Framework, examine non-binary definitions of access via the Multi-tier Tracking Framework, and provide a snapshot of countries' policies related to the energy sector, via the Regulatory Indicators for Sustainable Energy (RISE).

ii. SEforALL Africa Hub

The Africa Hub is hosted by the AfDB in partnership with the African Union Commission, the NEPAD Planning and Coordination Agency (NPCA), and the United Nations Development Programme (UNDP). It promotes African ownership, inclusiveness and a comprehensive approach to the Initiative's implementation. Its main activities include provision of guidance for the SEforALL country action processes globally and in Africa, delivering technical assistance to partner countries, networking and communication, and mobilisation of financing. Progress on the support to member countries through the SEforALL Action Agenda and Investment Prospectus process are as follows: (a) Rapid Assessment and Gap Analysis: Undertaken in 25 Countries; (b) SEforALL Action Agendas: 20 completed and 9 currently under development; and (c) SEforALL Investment Prospectuses: 4 completed and 23 currently under development.

B. “Enhancing Energy Access in Asia and the Pacific: Key Challenges and G20 Voluntary Collaboration Action Plan”

In 2016, the G20 Energy Ministerial Meeting adopted the *Enhancing Energy Access in Asia and the Pacific: Key Challenges and G20 Voluntary Collaboration Action Plan* which proposed to extend the targeted areas for voluntary action regarding access by the G20 from the Sub-Saharan Africa region to the Asia-Pacific region. The access rate in the region in 2016, and the evolution since 2000, are presented in figure 1. Some of the key elements of progress on energy access in the Asia-Pacific region since 2016 are described below.

Figure 1: Electricity Access Rates of Major Countries in Asia Pacific Region from 2000-2016

	Rates of access					Population without access (million)	
	National				Urban	Rural	2016
	2000	2005	2010	2016	2016	2016	
Developing Asia	67%	74%	83%	89%	98%	81%	439
China	99%	99%	99%	100%	100%	100%	-
India	43%	58%	66%	82%	97%	74%	239
Indonesia	53%	56%	67%	91%	99%	82%	23
Other Southeast Asia	67%	76%	83%	89%	97%	82%	42
Brunei	99%	99%	100%	100%	100%	100%	-
Cambodia	16%	12%	23%	60%	97%	50%	6
Laos	20%	11%	63%	91%	99%	85%	<1
Malaysia	97%	98%	99%	99%	100%	97%	<1
Myanmar	5%	12%	49%	59%	79%	44%	22
Philippines	87%	82%	83%	90%	98%	83%	11
Singapore	100%	100%	100%	100%	100%	100%	-
Thailand	82%	99%	99%	100%	100%	100%	-
Viet Nam	76%	95%	97%	98%	100%	98%	2
Other Developing Asia	32%	40%	53%	73%	87%	65%	135
Bangladesh	20%	34%	47%	75%	90%	67%	41
DPR Korea	20%	23%	26%	27%	36%	11%	19
Mongolia	90%	65%	86%	91%	98%	73%	<1
Nepal	15%	35%	76%	77%	97%	72%	7
Pakistan	53%	56%	67%	74%	90%	63%	51
Sri Lanka	62%	68%	77%	100%	100%	100%	-
Other Asia	10%	14%	30%	63%	88%	51%	18

Source: IEA Energy Access Outlook 2017

1. China

Since the G20 Hangzhou Summit, China has done some remarkable work in enhancing energy access, including rural power grid upgrading and transformation, PV poverty alleviation projects, and pilot projects of clean heating supply with biomass (combined heat and power, “CHP”).

1.1 Rural power grid transformation

In 2016, China started a new round of power grid upgrading and transformation projects in rural areas focusing on the grid transformation of central villages, power access to motor-pumped wells and industrial power access to poverty-stricken villages. Over the past two years, the total investment on power grid upgrading and transformation of the concentrated areas with severe poverty amounted to CNY26.82 billion.

By 2017, more than 1.59 million motor-pumped wells in China had been energised, covering 150 million mu (10 million hectares) of farmland in 17 provinces (autonomous regions and municipalities); the task of providing industrial power access to 33,000 poverty-stricken villages in 23 provinces (autonomous regions and municipalities) has been mostly completed, which benefited 180 million rural people; the power grids of around

77,000 central villages in 30 provinces (autonomous regions and municipalities) across China have been upgraded and transformed.

1.2 PV Poverty alleviation

By the end of 2017, the installed capacity of PV poverty alleviation projects across China registered 7,898MW, benefiting about 800,000 poor families by increasing annual income by CNY3,000+ per household.

1.3 Utilisation of biomass

In January 2018, China started the programme of pilot projects of clean heating supply with biomass (CHP) in "100-county/town". The programme consists of 136 projects (total installed capacity of 3,800MW) in 20 provinces (autonomous regions and municipalities) including Hebei, Shanxi and Inner Mongolia. These projects will supply clean heat in 63 counties and towns, covering about 90 million square metres of heating areas and benefiting about 4 million residents.

2. Indonesia

In accordance with the *PLN Electricity Power Supply Business Plan of 2017-2026* (PLN: *Perusahaan Listrik Negara*, Indonesia's national power company), Indonesia plans to lift its rate of access to 97.4% in 2019 and further up to 99.7% in 2025. To attain these goals, Indonesia has developed a series of electrification plans to promote power development in the remote countryside and to gradually reduce the population without access. In 2015, Indonesia's power consumption per capita was 910kWh and the nationwide average rate of access was 88.3%¹²; in 2016, consumption per capita went up to 957kWh and the nationwide average rate of access increased to 91.16%¹³. In remote eastern areas, such as Papua Province, the rate of access was lifted to 47.78% from 45.9% in 2015. To further solve the problem of residents without power in the off-grid and remote island areas, in April 2017, the Indonesian President issued No.47 Circular that provides for solar illumination for the communities without access. In the meantime, to solve the financing problem, in 2016, PLN made a commitment to provide USD435 million to support the mobile power station project¹³.

3. The Philippines

In 2015, the rate of access in the Philippines was 88.77%, which increased to 90% in 2016 with an urban access rate of 98% and a rural access rate of 83%. The problem of energy access was more severe in off-grid areas, especially on a few remote islands, with the electrification rate at a mere 8.6%.¹⁴ In 2016, around 11 million people in the Philippines lacked access. The national plan is to fully solve the problem of electricity access by 2022.

The *2016-2020 Missionary Electrification Development Plan*, published by The Ministry of Energy of the Philippines, aims at improving the electrification level and energy consumption efficiency in the off-grid areas. At the same time, the Philippines actively attracts foreign capital to promote its domestic power construction.

¹² PLA, "Power in Indonesia, Investment and Taxation Guide", November 2016

¹³ PLA, "Power in Indonesia, Investment and Taxation Guide", November 2017

¹⁴ Department of Energy, "Efficient Implementation of Power Sector Reforms in the Philippines", 2017

4. India

India has made considerable progress in promoting energy access. Since 2000, 500 million Indians have gained access to electricity; the access rate in 2016 reached 82%, higher than that of 66% in 2010 and far higher than that of 43% in 2000. However, to date, 239 million people in India remain without power access.¹⁵

In the process of promoting power access, more than 99% of households gained access through grid extension, which was also the focus of the government's action plan. Moreover, the Indian government attached great importance to the development of renewable energy. The national renewable energy mini-grids plan issued in 2016, which aims to install 10,000 mini-and-small grids with a total installed capacity of 500MW, relies on renewable energy to improve energy access.

From February 12 to 13, 2018, the climate organisations, clean energy access organisations and Indian New and Renewable Energy Department convened the Indian Energy Accessibility Summit. The participants discussed the means to expand distributed renewable energy and electrification of rural grids.¹⁶

5. Nepal

In 2016, the recorded electrification rate in Nepal was 77%, which was much higher than the 15% rate in 2000. However, there are still 7 million people living without power access.

Thanks to the support of the International Fund for Agricultural Development (IFAD), the Economic and Social Commission for Asia and the Pacific implemented the project of Pro-Poor Public Private-Partnerships (5Ps) that offers more energy services to the rural people in the Asia-Pacific Region. The project was implemented in Nepal and Laos from 2011 to 2016. Its overall targets are to identify the pattern of private partnership for rural energy access and to improve the policy and legal environment for private sector investment. The 5Ps Closing Workshop for Widening Access to Energy Services¹⁷ was held in Kathmandu, Nepal on December 18 to 19, 2016.

6. Bangladesh

As of 2016, Bangladesh had the 8th largest population in the world. By the end of 2016, the nationwide rate of electricity access was 75%, with an urban rate of 90.4% and a rural rate of 66.7%. Over 40 million people are still living without electricity access.¹⁸ The Bangladesh government plans to achieve universal access by 2021.

By promoting household solar energy systems, Bangladesh endeavours to guarantee clean power supply in off-grid rural areas, which is one of the largest and fastest-growing plans for off-grid renewable energy in the

¹⁵ IEA, *Energy Access Outlook*, 2017

¹⁶ <https://www.theclimategroup.org/event/india-energy-access-summit>

¹⁷ <http://www.unescap.org/events/pro-poor-public-private-partnership-5p-widening-access-energy-services-closing-workshop>

¹⁸ IEA, *Energy Access Outlook*, 2017

world. Through 2017, the nation has installed solar energy systems for more than 4.5 million families in the off-grid rural areas, powering 13 million people¹⁹. 11 solar mini grids with an installed capacity of 2.19MW²⁰ have been installed or are in operation, and another 15 projects are under construction with a total capacity of 3.17MW.

7. Papua New Guinea

The present installed power generation capacity in Papua New Guinea is less than 600MW and the electrification rate is reported as only 15%. Its economic growth is hampered by a nationwide power shortage, especially in rural areas.

Papua New Guinea is endeavouring to build grid networks and develop renewable energy to promote energy access. In accordance with the *Papua New Guinea Development Strategic Plan, 2010-2030*, the objectives of power sector development in 2030 are to develop and build up a unified national power grid with better access and wider coverage; to build renewable energy projects like large-scale hydropower stations to replace coal-fired power with high carbon emissions; and to optimise the energy structure and reduce power generation cost in Papua New Guinea.

¹⁹ <http://www.sreda.gov.bd/index.php/site/page/c5ab-2cb1-00a8-0579-02a3-f64c-7db9-8a50-1d2b-5670>

²⁰ <http://www.sreda.gov.bd/index.php/site/page/8237-59ee-504b-dd46-c18b-d705-b93f-7d35-a046-1f95>

