POWER AFRICA

A U.S. GOVERNMENT-LED PARTNERSHIP

ANNUAL REPORT
SEPTEMBER 2016

CONTENTS

A Mobisol employee in Rwanda demonstrates the company's solar-powered electricity system. Photo: Rachel Couch.

President Obama speaks to Power Africa's progress at the White House Summit on Global Development, July 2016. Photo: Ellie Van Houtte/USAID.

EXECUTIVE SUMMARY

In June 2013, President Obama launched Power Africa with the ambitious goal of doubling access to electricity in sub-Saharan Africa.

Power Africa is a U.S. Government-led initiative, coordinated by the U.S. Agency for International Development (USAID), that comprises 12 U.S. Government agencies, and a diverse coalition of more than 130 public and private sector partners, including bilateral and multilateral partners, as well as international organizations, civil society organizations, and private sector companies. In its first three years, Power Africa has built the foundation of an innovative development model that focuses on supporting "first-of-their-kind" transactions that create pathways for future transactions to move forward. Power Africa also prioritizes unlocking and accelerating transactions by removing barriers and building a more investment-friendly enabling environment. Through this model, Power Africa is leading a major international effort to develop new power generation capacity and connect millions of households and businesses to on-grid and off-grid power across sub-Saharan Africa.

The Power Africa Roadmap, released in January 2016, lays out our strategy for doubling access to power across sub-Saharan Africa by adding 60 million new electricity connections, as well as increasing installed generation capacity by 30,000 MW by 2030.[1] The Roadmap outlines Power Africa's three strategic pillars: Generation, Connections, and Unlocking Energy Sector Potential. These three pillars help our partners to accelerate energy transactions by working with African governments to create the policy, legal, and regulatory frameworks needed to attract private sector investment in the

[1] For more information, the Power Africa Roadmap is available online in both English and French. https://www.usaid.gov/powerafrica/roadmap

energy sector. Alongside the Roadmap, Power Africa also launched the Power Africa Tracking Tool (PATT), an online and mobile application that allows users to easily track power sector development and transactions across the continent. Through the PATT, much of this transaction data is being made publicly available for the first time, increasing transparency and better informing investors on opportunities.

In February 2016, the Electrify Africa Act of 2015 passed by unanimous consent in both chambers, a testament to the bipartisan and bicameral leadership in Congress in advancing solutions to pressing development issues. The legislation states that it is the policy of the United States to promote first-time access to power for at least 50 million people and to encourage the installation of at least 20,000 additional MW of electrical power in sub-Saharan Africa by 2020. On February 8, 2016, President Obama signed the Electrify Africa Act of 2015 (S.2152) into law, institutionalizing the work of Power Africa through legislation and signaling to the global community that expanding electricity access in sub-Saharan Africa is a long-term foreign policy priority of the U.S. Government.

The Electrify Africa Act, whose goals are broadly consistent with Power Africa, validates the work and approach that Power Africa has already undertaken to address energy poverty, and ensures that the transformative progress we are making will continue beyond this Administration. In August 2016, Power Africa released the Electrify Africa Act Report, which complements the Power Africa Roadmap and entails a comprehensive multiyear strategy for how the United States intends to achieve the goals of addressing sub-Saharan Africa's energy crisis in areas such as increasing and improving power generation, transmission, and distribution; increasing first-time access to electricity; reforming policy, regulatory, and power sector governance; and increasing affordability and non-discriminatory access to power. [2]

After three years of operation, Power Africa has helped facilitate the financial close of private sector power transactions that are expected to generate over 4,600 MW. Power Africa is currently tracking approximately 60,000 MW of generation projects across the continent, which we recognize is just a subset of all generation projects proposed or underway. Based on the realities of capital projects, our experience in sub-Saharan Africa, and the best available information we have today, we expect that between 18,000 – 21,000 MW of the 60,000 MW we are tracking will reach financial close and are expected to be online by 2030. In the past year, Power Africa grew the number of its field-based transaction advisors in sub-Saharan Africa to over 40 experts who are helping the private sector and governments prioritize, coordinate, and expedite the steps necessary for the implementation of these power projects. Our transaction advisors are also working with our partners to help us identify new viable projects to fill the gap of 9,000 – 12,000 MW to reach our 30,000 MW goal.

After three years of operation, Power Africa has helped facilitate the financial close of private sector power transactions that are expected to generate over 4,600 MW.

This year, the U.S. Government Agencies participating in Power Africa continued to grow their respective African energy portfolios. The Millennium Challenge Corporation (MCC) now has five ongoing power-focused compacts or threshold programs in sub-Saharan Africa in Malawi, Benin, Ghana, Sierra Leone, and Liberia (with Sierra Leone, Benin, and Liberia, totaling an investment of $680 million, added within the past year). The Overseas Private Investment Corporation (OPIC), the U.S. Government's finance institution, has committed more than $1.7 billion in debt financing and insurance in support of 19 Power Africa projects, already exceeding an original $1.5 billion

[2] For additional details, please refer to the Electrify Africa Report submitted by Power Africa to Congress in August 2016. https://www.usaid.gov/open/electrify-africa/2016

commitment. These OPIC commitments have mobilized more than $3 billion in additional investment to support Power Africa projects in sub-Saharan Africa. These projects are expected to create almost 1,500 MW of new generation capacity.

In the past year, the U.S. Trade and Development Agency (USTDA) funded 13 Power Africa activities that are expected to generate over 300 MW of renewable energy and catalyze nearly $800 million in financing upon implementation. The funding of these grants brings USTDA's total number of grants under Power Africa to 43, leveraging a potential $6.8 billion in financing. These projects will help develop more than 860 MW of new generation, powering an estimated 1.7 million homes and businesses and impacting approximately 8.6 million people.

Under the Power Africa Off-Grid Challenge, a public-private partnership between General Electric (GE), USAID, and the U.S. African Development Foundation (USADF), Power Africa grew its support for African companies and organizations that are providing renewable, off-grid solutions for local communities in sub-Saharan Africa. In 2016, USADF funded an additional 10 grants of up to $100,000 each, bringing the total number of grants to 50, totaling an investment of $5 million to African owned and managed energy companies in nine countries from 2013 to 2016. USADF is currently in the process of funding 21 additional grants and six expansion grants for an additional $2.4 million through FY 2018.

To further improve sub-Saharan Africa's investment climate, the U.S. Department of Commerce (DOC) Commercial Law Development Program (CLDP), supported by Power Africa and the African Development Bank's (AfDB) African Legal Support Facility (ALSF) released its second practitioner's guide, titled "Understanding Power Project Financing." This reference handbook, along with CLDP's first publication, "Understanding Power Purchase Agreements," are the product of consultations with public and private sector stakeholders from Africa, the United States, and Europe. Both books take a detailed and neutral approach to understanding the terms, balancing of interests, and structure of power projects. To date, ALSF

To date, Power Africa's more than 130 private and public sector partners have committed more than $52 billion, including more than $40 billion in commitments from private sector partners alone. We continue to mobilize and organize international efforts to electrify Africa in partnership with African governments committed to making the necessary reforms to attract private sector investment, and to substantially develop and manage their energy sectors. Over the past three years, we have witnessed an unprecedented groundswell of support from other countries and multilateral actors, who have collectively committed to invest more than $12 billion in energy deals in sub-Saharan Africa in support of Power Africa's goals. To date, Power Africa has forged strategic development partnerships with the World Bank Group and African Development Bank, as well as with the Governments of Sweden, the European Union (EU), the United Kingdom, Norway, Canada and Japan. Power Africa has also partnered with the United Nation's Sustainable Energy for All (SE4ALL) initiative, the African Union's New Partnership for Africa's Development (NEPAD), the International Renewable Energy Agency (IRENA), the Development Bank of Southern Africa (DBSA), and the Industrial Development Corporation of South Africa (IDC).

Powerhive – 100% solar off-grid microgrid in Western Kenya.

has also provided direct support to the development of power projects in over 10 African countries with activities including government advisory services on project agreements, drafting model agreements, and trainings on the development of public-private partnerships.

Over the past year, we have seen great progress in the commercial viability of both household rooftop systems and grid-scale solar power projects in sub-Saharan Africa. For example, in Nigeria, the Nigerian Bulk Trader signed power purchasing agreements (PPA) on 14 Solar independent power projects (IPP) in July 2016. These solar IPPs, totaling 1,125 MW of generation capacity, are expected to attract more than $1.5 billion of combined domestic and foreign direct investment. The signing of these PPAs was an historic moment for utility-scale solar in Africa and for the Power Africa team in Nigeria that provided significant technical and legal advisory support to this effort.

Despite significant progress to-date, challenges to expanding access to energy persist in sub-Saharan Africa. Power Africa partners have faced a host of external obstacles this year, including a deterioration of macroeconomic and political conditions. Falling commodity prices hurt African trade in 2016 and lower economic growth is expected as a result in the short-term. Lower global gas prices have posed financial challenges for countries seeking to take advantage of their own vast gas resources. Unpredictable and depreciated currencies, along with credit agency "downgrades" for investment in certain countries, left many investors sitting on the sidelines, waiting for the currency issues to stabilize before moving forward on particular deals.

While there is no quick fix to solving Africa's energy challenges, Power Africa is committed to working together with African leaders and a growing coalition of international partners to build a sustainable energy sector and unlock the continent's vast energy potential. Power Africa, along with its many partners, is on an upward trajectory and continues to build a pipeline of viable projects that, over the coming years, will accelerate electrification of the African continent in order to reduce poverty and promote economic growth.

The Lake Turkana Wind Power Project in Kenya.

CHAPTER 1
GETTING TO 30,000 MEGAWATTS (MW)

The first pillar of the Power Africa Roadmap aims to increase generation in sub-Saharan Africa by more than 30,000 MW by 2030 by facilitating the identification and completion of viable power transactions across the continent.

Power Africa prioritizes support for transactions rooted in countries' national power strategies, particularly those using cleaner energy resources such as solar, wind, biomass, geothermal, and natural gas. Power Africa's transaction assistance focuses on supporting developers, investors, host-country governments, and African-owned enterprises in all stages of project development to remove barriers and advance projects toward completion.

MAXIMIZING VALUE FROM EXISTING TRANSACTIONS

Maximizing the value of existing transactions entails ramping up Power Africa's technical assistance for both early- and late-stage transactions currently being tracked by Power Africa, and helping as many financially and technically viable energy deals as possible reach financial close and commissioning.

Some highlights over the past year of Power Africa's efforts to maximize existing transactions include:

Power Africa support for the Liberia Mt. Coffee Hydropower Project Rehabilitation: The $257 million MCC Liberia Compact, which entered into force on January 20, 2016, seeks to address two binding constraints to economic growth in Liberia: lack of access to reliable and affordable electricity and inadequate road infrastructure. The compact includes funding for the rehabilitation of the Mt. Coffee Hydroelectric Plant, development of a training center for technicians in the electricity sector, and support for the

creation of an independent electricity regulator. In addition to supplying lower-cost, renewable electricity in Liberia, the Mt. Coffee Rehabilitation project is upgrading the power generation system with newer hydropower technology, and contributing to greater reliability and adequacy of electricity in Liberia starting in 2017. The Government of Norway is also providing financing for the plant.

Power Africa helping to unlock $1.5 billion worth of investment in Nigeria: Power Africa facilitated a milestone achievement with the signing of 14 independent power purchase agreements that authorize private firms to develop 1,125 MW of new solar power generation capacity in nine Nigerian states. The projects are expected to attract $1.5 billion of combined domestic and foreign direct investment. The signing of these PPAs in July 2016 was an historic moment for utility-scale solar in Africa, and depended heavily on the project management and legal advisory support services from the Power Africa team in Nigeria. Moving forward, Power Africa is meeting with developers to define the strategy, time line, and specific support needed to bring these projects to financial close.

OPIC support for Senergy Solar Plant in Senegal: This year, OPIC provided just over $2 million in reinsurance coverage to support the development, ownership, and operation of the 30 MW Senergy solar photovoltaic (PV) farm in Santhiou Mekhe, approximately 150 km north of Dakar, Senegal. This plant is expected to deliver 20 MW of power to the national grid via a newly constructed transmission line. The project aligns with the Senegalese government's objective to achieve 20 percent renewable energy by 2020, and is expected to enhance local employment opportunities in a rural area.

OPIC and IFC support for the Cap des Biches Power Plant in Senegal: In June 2016, the Cap de Biches power plant was commissioned, bringing 53 MW of thermal generation capacity online, and the project developer, ContourGlobal, already has plans to expand the project to a total of 86 MW. Power Africa helped bring this project to completion through an innovative financing agreement by working with ContourGlobal, the Government of Senegal and Senegal's national electricity utility. Moving forward, OPIC has committed to provide up to $91 million in financing and $25 million in political risk insurance to ContourGlobal to support the 33 MW expansion, while IFC is providing a cross currency swap. This project will provide efficient and reliable electricity to the Senegalese grid by increasing generation capacity and helping address Senegal's electricity shortages.

OPIC partnering with Standard Bank and Wells Fargo on landmark $333 million facility: In September 2015, OPIC committed $250 million in financing to Standard Bank for an innovative power and infrastructure facility, at least $150 million of which is dedicated to power projects in Africa. The facility will leverage the South African bank's experience, knowledge and presence on the continent to originate critical infrastructure transactions. Standard Bank added $33 million from its own balance sheet and Wells Fargo contributed $50 million to the facility as well, making it the largest deal Wells Fargo has done in Africa.

ADVANCING NEW DEAL FLOW

This year Power Africa took a significant leap forward in developing a robust portfolio of new energy projects in the early stages of development. Energy projects are extremely vulnerable in the earlier stages, and transaction support for early-stage projects is integral for attracting the necessary financing from the investment community. Power Africa's early-stage support for energy solutions typically includes feasibility and grid impact studies, social and environmental impact studies, project appraisal and costing, engineering designs, facilitating public-private partnerships, and other project preparation activities.

In the past year, Power Africa's most prominent efforts in advancing new deal flow include:

Power Africa providing project preparation assistance to clean energy projects to help them reach bankability: USTDA has expanded its Africa portfolio by over 300 percent since the launch of Power Africa, supporting 43 projects in 8 countries. Together, these projects have the potential to provide over 860 MW of electricity to up to 1.7 million households, or 8.5 million people, and mobilize

over $6.8 billion in private and public financing. Recent USTDA projects to expand early-stage support and ensure more projects reach bankability include a 20 MW biomass plant being developed by Village Corps Ghana Limited. USTDA's grant will help determine the feasibility and establish the design of what will be the first bamboo biomass plant in Africa and one that could be replicated across many African countries with native bamboo.

Power Africa and the European Union expanding electricity access to rural communities across sub-Saharan Africa: The European Union's Electrification Financing Initiative (ElectriFI) is a fund that targets private sector companies with renewable energy solutions for underserved communities in sub-Saharan Africa. Starting with €75 million in European Union funds, Power Africa provided an additional $10 million in support this year, which will help more companies access critical early-stage capital, and leverage private sector investment to expand the rural electrification sector. ElectriFI's ingenuity is in the fund's flexibility – providing a diverse suite of financing instruments to meet developers' needs, such as quasi-equity instruments, subordinated debt, working capital facilities and guarantees. ElectriFI's initial call for applications has proved the demand for capital, as it was oversubscribed with some 300 applications and requests for more than $800 million in financing. ElectriFI is an example of Power Africa taking new, bold steps with our partners to help the most promising projects overcome barriers, such as access to early stage finance, in order to meet our ambitious generation and connections goals.

Power Africa providing debt and credit enhancement tools to advance cleaner energy projects across sub-Saharan Africa through USAID's Development Credit Authority (DCA): Over the last year, DCA has provided risk coverage, on a pari-passu basis, for approximately $143 million in loans to power projects including: (1) a $75 million pan-African "Beyond the Grid facility" for loans to off-grid producers, manufacturers, and distributors across sub-Saharan Africa; (2) an $8 million, 7-year co-guarantee loan with the Swedish International Development Cooperation Agency (Sida) to support loans to the agriculture value chain and the purchase of renewable energy technologies in Zambia; and (3) a $60 million loan guarantee to the Zambia utility company, ZESCO, to support capital expenditures to upgrade distribution infrastructure and add new grid connections in the Lusaka area. These three loan guarantees increased DCA's total Power Africa portfolio to approximately $272 million.

The U.S.-Africa Clean Energy Finance Initiative (ACEF) continuing to enable new, renewable power projects: ACEF, an innovative financing program designed to catalyze much-needed private sector investment in renewable energy projects, has now committed funds for 32 renewable energy projects in 10 African countries. Already, nine ACEF-supported projects have secured full debt financing, ultimately receiving the required financing through OPIC and other sources. The U.S. Department of State has committed $30 million in funding to ACEF, and ACEF is implemented by USTDA in coordination with OPIC.

INCREASING EFFICIENCY OF EXISTING GENERATION

Power Africa is working with committed African countries to build their capacity to attract private investment by improving technical and commercial efficiency of energy systems through support for infrastructure investment and maintenance, improved metering and bill collection, demand-side management, and consumer education.

In the past year, some highlights of Power Africa's progress in increasing the efficiency of existing generation capacity include:

MCC funding the Nkula A Hydropower Plant Rehabilitation in Malawi: Andritz Hydro of Austria and Mota Engil of Portugal are currently completing their final designs and initiating procurement and manufacturing for the rehabilitation, upgrade, and modernization of the Nkula A hydropower plant. These efforts, funded by MCC, will increase the plant's generation capacity from 24 MW to up to 36 MW, and provide a new station control system, a new 66 kV switchyard, and new transformers. Construction is expected to commence in early 2017, with recommissioning anticipated in 2018.

Department of State and USAID unlocking gas delivery in Nigeria: Nigeria has an installed capacity of more than 12,000 MW, but can only generate about 5,000 MW. One of the biggest constraints is gas supply, with many power plants unable to run due to lack of gas. The U.S. Department of State and USAID are working with the Nigerian government to review and adjust current gas policies in order to help the Government of Nigeria structure policy and fiscal frameworks to incentivize increased production of associated and non-associated natural gas resources to strengthen the stability of natural gas supply for power generation.

USTDA sponsoring SparkMeter pilot in Port Harcourt, Nigeria: In Nigeria, U.S.-based SparkMeter is helping a newly privatized utility company, Port Harcourt Electricity Distribution Company (PHED), increase revenue collection with metering technology that can be used to analyze customer energy use and improve efficiencies in energy distribution. Reducing commercial losses is a key challenge to the survival of these distribution utilities, whose combined investment is estimated at $625 million over the next five years. Through USTDA, Power Africa is supporting a market trial of the efficacy of the metering technology in 1,000 households and businesses that receive power from PHED. This support includes an assessment of the demand for metering across Nigeria, as well as a financial analysis of prospects for a nationwide rollout of metering technology.

Power Africa's tools for advancing early- and late-stage projects are contributing to our power generational goals and, more importantly, establishing innovative business models that can be scaled up and replicated to increase operating efficiency and attract the necessary levels of private investment.

Njebwe Ernest reads a newspaper using a solar lantern. Photo: Irene Angwenyi.

A family in Byangabo, Rwanda using solar power electricity to charge their phones, watch television and light their home.

CHAPTER 2
GETTING TO 60 MILLION NEW CONNECTIONS

The second pillar of the Power Africa Roadmap aims to double electricity access in sub-Saharan Africa by adding 60 million new connections.

Populations in need of power range from dense urban settlements to remote rural villages, requiring a diverse set of electrification solutions. Achieving Power Africa's connection goals therefore requires an integrated approach that optimizes opportunities to scale both on- and off-grid approaches. Power Africa will achieve these goals by taking a two-pronged approach: (1) Supporting grid roll-out programs to enable 35-40 million new connections to central grids; and (2) Intensifying Beyond the Grid efforts to add 25-30 million new connections via off-grid and small-scale solutions, particularly rooftop solar and micro-grids.

Power Africa tracks direct connections: the number of new households and businesses expected to gain access to electricity through grid connections and off-grid solutions, such as micro-grids and solar home systems. Power Africa has also supported off-grid projects expected to yield approximately 2.5 million new home and business connections – which are expected to provide access to more than 10 million people. To date, over 1.2 million of those connections have been made, delivering power to an estimated 6 million people. The off-grid market is growing rapidly and Power Africa's Beyond the Grid partners have additionally connected nearly 1 million households and businesses.

SCALE GRID ROLL-OUT PROGRAMS

Large-scale grid roll-out programs are highly complex. To be successful, governments and utilities need the capacity and financial resources to manage the full project delivery value chain. To date, many governments and utilities in sub-Saharan Africa are still in the early stages of developing these capabilities, or have focused heavily on only a few links in the value chain. Power Africa currently supports grid roll-out capacity building, primarily through planning, regulatory, and financing support, but is expanding its support to include other aspects of the value chain such as procurement and project management.

Some highlights of Power Africa's progress in grid roll-out over the last year include:

Power Africa's support for Zambia ZESCO Fully Disbursed: In May 2016, Power Africa realized its first USAID Development Credit Authority guaranteed loan to achieve 100 percent utilization. Power Africa guaranteed a $60 million loan from Standard Chartered Bank, a Power Africa partner, to the Zambian national utility company, ZESCO. This loan provided ZESCO with the financing needed to implement a plan to strengthen dilapidated electricity infrastructure, which is expected to result in the addition of over 200,000 new electricity connections to the national grid.

Export-Import Bank (EXIM) support for rural grid extension in Ghana: With Power Africa support from EXIM, Weldy Lamont Associates, a U.S. small business based in Illinois, is supporting grid extension into rural areas of Ghana under the Government of Ghana's Self-Help Electrification Programme (SHEP). Upon completion, Weldy Lamont's work will extend the grid to more than 2,000 rural villages and connect more than 128,000 new households and businesses to the power grid. At the end of June 2016, they had completed just over 73,000 connections.

Power Africa support for Nigerian DISCO: In Nigeria, Power Africa is addressing network gaps and recommending technologies as part of a plan of action for utility-wide rollouts. Building on a 2013 reverse trade mission with Nigeria's newly privatized distribution companies (DISCOs), USTDA is providing project preparation assistance for the Eko, Ikeja and Benin DISCOs, to support modernizing their networks and reducing technical and commercial losses, as well as identifying ways to increase collections. USAID has additional advisors working in the Abuja, Benin and Eko DISCOs to address management challenges. While this assistance is still ongoing, it has already resulted in the implementation of metering and other systems that can improve grid operations.

> "Part of ZESCO's strategic plan is to improve the quality of electricity and enhance connections to the national grid. Power Africa and Standard Chartered's support has already delivered more than 15,000 new power connections. Furthermore, some of the funds provided will be used for other scheduled power system upgrades, contributing to new and existing connections to homes and businesses across the country. ZESCO remains committed to meeting its aspirations of electrifying 60% of Zambia by 2030."
>
> *– Victor Mundende, Managing Director, ZESCO*

INTENSIFYING BEYOND THE GRID EFFORTS

Private sector innovations are enabling people to access power in increasingly shorter periods of time through off-grid energy solutions. Households and businesses who are not yet connected to the grid no longer have to wait months, years, or decades to have access to electricity on a scale that transforms their way of life. The private sector is providing innovative solutions that have an immediate and practical impact on the ability of local businesses to provide services to customers.

As this technology becomes more efficient and reliable, people in remote villages are increasingly turning toward off-grid solutions for the energy they need to operate their homes and businesses. The private sector is seizing these developments as a major market opportunity for off-grid power generation and distribution, and Power Africa is

supporting the development of these firms into market driven, sustainable businesses.

OPIC funding of off-grid power projects: OPIC is providing financing to multiple projects that are introducing off-grid sources of power. With a $15 million OPIC loan, Lumos Inc. is introducing home solar kits in Nigeria, a nascent off-grid market even though there are 90 million households without grid connections. OPIC also provided a $5 million loan to Greenlight Planet Inc., to expand its distribution of solar energy products to underserved populations in sub-Saharan Africa. In addition, OPIC is providing a $15 million loan to a new investment vehicle managed by SunFunder Inc. that will provide financing to companies operating in developing countries that manufacture, distribute, and install solar lighting and energy systems. SunFunder estimates that millions of individuals will benefit by switching from kerosene and diesel fuels to solar energy, reducing their expenditures on energy while significantly reducing CO_2 emissions.

> "As a result of the grant USTDA awarded to my company, we were able to attract financing for small hydropower projects that will bring electricity to hundreds of thousands of villagers in northern Rwanda. The funding has been an important part of our success, but the broader support we've received from the Power Africa team has been integral to helping us make progress and begin construction."
>
> *– Chad Bannick, CEO of DC HydroPower*

Launch of Scaling Off-Grid Energy: A Grand Challenge for Development with the UK's Department for International Development (DFID) and Shell Foundation: In June 2016, Power Africa and USAID's Global Development Lab, in partnership with DFID and Shell Foundation, launched the Grand Challenge for Development at the Global Entrepreneurship Summit in Silicon Valley. The Grand Challenge is a $36 million investment to empower entrepreneurs and investors to connect 20 million households in sub-Saharan Africa to modern, clean, and affordable electricity. As part of the Grand Challenge, USAID partnered with the U.S. Department of Energy, DFID's Ideas to Impact Programme, and the Global Lighting and Energy Access Partnership, or Global LEAP, to launch a refrigeration prize that will leverage $600,000 to catalyze technological advancements in off-grid powered refrigerators.[1]

Power Africa partners facilitate successful negotiations for small hydropower projects in Rwanda: Many Rwandan communities outside the capital of Kigali have no access to electricity. Two local companies, Amahoro Energy and DC HydroPower, are developing projects, with USTDA support, to harness rivers to power tens of thousands of homes in the country's rural northwestern region. When these projects were stalled in negotiations, Power Africa helped mediate so the projects could get final agreements signed and move to construction. Resolution of these negotiations cleared the way for an additional seven small hydropower projects to move forward in Rwanda.

MCC $375 million Benin Power Compact: In September 2015, MCC and the Government of Benin signed the $375 million Benin Power Compact, which includes a $28 million contribution from the Government of Benin. The Compact aims to strengthen and modernize Benin's power system while expanding the population's access to power. Specifically, the Compact provides $46 million for off-grid electrification, MCC's largest off-grid electrification effort to date. This work will include support for relevant policy reforms and project finance, with a particular focus on low-income households.

[1] For more information on this Grand Challenge for Development, please visit https://www.scalingoffgrid.org/

For millions across sub-Saharan Africa, the limited or lack of access to electricity can make life challenging. Families and businesses increasingly need energy to power home appliances, computers, and machinery, but the costs of electricity can be a barrier, and fuels like diesel and kerosene are hazardous to human health. In Rwanda and Tanzania, however, Power Africa partner Mobisol is rapidly changing this situation, and improving the lives of thousands of people. Mobisol is one of more than 40 companies working with Power Africa to bring clean, renewable energy to people who live and work Beyond the Grid. Their smart solar power solutions are big enough to run refrigerators and other household appliances, while also illuminating LED light bulbs and charging laptops and cell phones. Mobisol's plug-and-play technology makes the systems easy to install, and their pay-as-you-go payment model means that people of all incomes can afford electricity.

Earlier this year, Mobisol reached an inspiring milestone: 30,000 solar power units installed in rural homes and businesses in Tanzania and Rwanda — in just over two years. These 30,000 installations have empowered a better quality of life and enhanced economic opportunities for hundreds of thousands of East Africans. Now, children can study after dark without the hazards of dirty kerosene lamps. Clinics can refrigerate vaccines. Small businesses can improve operations. Families can safely light homes and prepare food. Mobisol's milestone means that more than 3 MW of clean and reliable electricity have been added to communities across Tanzania and Rwanda. It's an achievement that places Mobisol among the largest rent-to-own solar energy providers in Africa. But Mobisol isn't done. Their next goal is to reach 100,000 installations by the end of 2016, and 10 million by 2020!

Power Africa's Beyond the Grid sub-initiative, and partners like Mobisol, help bring off-grid and small-scale energy solutions to families and businesses across Africa. Photo: Rachel Couch.

In addition to household-level solutions, Power Africa is also supporting private sector companies in developing micro-grid solutions through financing, risk mitigation tools, capacity building, and technical assistance to help get projects off the ground. In sub-Saharan Africa, micro-grids are typically run on solar, hydropower, biomass, or diesel power, and may incorporate multiple sources of power to reduce costs and increase availability. Central generators connecting multiple households, businesses, and community services can provide grid-quality electricity with 24-hour availability and high capacity, but may be constrained by cost. Micro-grid projects are more diverse than solar home systems, and the market has not yet converged on a single scalable model. Some micro-grid companies have achieved success with biomass, micro-hydropower, and solar generation systems. Other companies are piloting systems with remote monitoring, smart metering controls, and mobile payment capabilities that should make scaling-up easier.

Micro-grids face more challenges with regard to the enabling environment because they are technically and operationally similar to the central grid, but are not typically fully included in a country's regulatory framework. This gap results in uncertainty about equipment standards, the ability to charge cost-reflective tariffs, and the implications of the grid reaching an area served by a stand-alone micro-grid. Beyond the Grid focuses on helping to create clear regulatory frameworks that address the spectrum of needs of consumers, governments, and providers, while reducing the risk created by this uncertainty.

USTDA piloting solar hybrid micro-grids in Tanzania: With support from USTDA, Kansas City, Missouri-based MRI Global will pilot a solar hybrid micro-grid on Gana Island in Lake Victoria. A unique configuration of solar panels, battery storage, and diesel backup will generate power for hundreds of households. Several businesses will also be electrified, including a refrigeration depot, which will positively impact local fisherman hoping to sell their catch for a premium on the mainland. The U.S. Department of Energy's National Renewable Energy Laboratory is assisting with the analysis and optimization of the micro-grid design. If the pilot is successful, the model will be scaled up to at least nine additional islands throughout the region. Estimates suggest 37,000 individuals could achieve access to electricity through a successfully scaled-up pilot test.

USADF supporting the Liberia Engineering and Geo-Tech Consultants Company to construct a solar mini-grid: Liberia Engineering and Geo-Tech Consultants Company is a Liberian-owned company comprising a group of trained Liberian general construction engineers, architects, and electricians, which was formerly providing electricity to 13 households using a fuel based generator in the town of Totota in central Bong County. This project is utilizing funding from a USADF grant to construct a stand-alone 25 kilowatt solar mini-grid to serve up to 50 households who will pay small monthly fees based on metered usage of electricity.

Driven by a burgeoning industry of technology entrepreneurs, off-grid and small-scale solutions are increasingly providing Africans additional opportunities for energy access and a quality of life comparable to that available to those connected to the grid. As these services continue to evolve, off-grid solutions may very well be preferred over services from less efficient utilities. This market shift can provide the incentives for governments and utilities to become more efficient and innovative in their approach to increasing access to electricity.

Power Africa's innovative private sector partners are demonstrating that rural areas present a market opportunity. Rural households and businesses are proving to be viable customers, and this realization is translating into a vibrant micro-economy of businesses that install and service equipment as well as provide training. Outreach to new customer bases is providing information on market preferences and customers' ability to pay for services. This data stream is increasingly monetized by product developers, marketing firms, and micro-lending institutions, who are using it to identify the most effective way to structure profitable products for rural customers at affordable prices.

Amahoro Energy is an innovative hydropower company that uses local labor to build and maintain run-of-the-river hydroelectric power generation plants in Rwanda's Mukungwa River valley. Photo: Matt Chenet.

CHAPTER 3
UNLOCKING ENERGY SECTOR POTENTIAL

The third pillar of the Power Africa Roadmap concentrates on enablers that expedite, strengthen, and sustain energy deals.

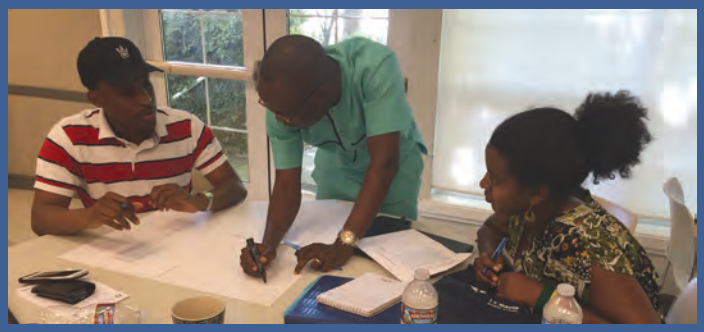
Power Africa supports policy interventions that help build and maintain a sustainable energy sector, and move transactions forward in a sustainable manner by assisting in the development of cross-border trade and regional power systems to unlock generation, providing highly qualified regulatory and legal advisory support to senior government leaders, and investing in institutions that will maintain progress. A primary focus of Power Africa is building the capacity of African governments and institutions to improve the business climate and to integrate national and regional power pools in order to attract the levels of private sector investment that are needed to double access to electricity in sub-Saharan Africa and to reach our power generation and connections goals.

CAPACITY BUILDING FOR AFRICAN GOVERNMENTS AND INSTITUTIONS

Power Africa builds capacity by placing advisors with strong technical and management expertise directly in government institutions or state-owned utilities. These advisors work alongside host government officials, sharing knowledge and expertise for over prolonged periods of time. In the area of capacity building, one of Power Africa's top priorities is to assist African governmental bodies and institutions to take ownership over building, managing, and overseeing utility policies and legal frameworks, including the regulation of power and other energy utilities.

Some examples of how Power Africa supports capacity building that ultimately leads to responsible stewardship of countries' energy sectors include:

YOUNG AFRICAN LEADERS INITIATIVE (YALI)



Young African Leaders Initiative (YALI) collaborated with Power Africa to develop the Energy Institute, the first sector specific training program for YALI Fellows. YALI, USAID, the U.S State Department, the U.S. Department of Energy's Lawrence Berkeley National Laboratory (LBNL), and the University of California at Davis (UC Davis) collaborated to design a course tailored to the needs and interests of Fellows active in or interested in pursuing a career in the energy sector. The Energy Institute will provide Fellows with core leadership skills, legal and policy reform solutions, and best practices for addressing Africa's critical energy challenges. The team also assured that development and gender issues were meaningfully addressed throughout the course of the curriculum.

Fatima Oyiza Ademoh

Nigeria – Fatima Oyiza Ademoh – Ajima Farms: Miss Fatima Oyiza Ademoh is a YALI, Mandela fellow at the Power Africa Energy Institute at UC Davis. She has over six years of experience in business development, entrepreneurship, agribusiness, and the energy sector. Currently, Fatima is the Project Manager for the USADF Power Africa Off-Grid Energy Challenge project implemented by Ajima Farms in Nigeria and also an Entrepreneurship & Finance lecturer at Baze University in Abuja, Nigeria. Fatima is passionate about using clean energy sources to electrify rural off-grid communities and businesses and seeks to unlock the growth potential of rural communities by creating access to electricity for productive uses. With support from USADF, Ajima Farms is constructing a 20 kilowatt biogas-powered mini-grid to provide affordable electricity and clean cooking technology to households and businesses. The mini-grid is being built in rural Rije Village in the Kuje Area Council of the Federal Capital Territory where community members have to live without access to electricity. The system is expected to connect its first customers by September 2016. Fatima holds a BSc in Finance from American University of Nigeria and an MSc in Financial Risk Management from the University of Leeds, UK.

MCC working hand-in-hand with the Governments of Malawi, Ghana, Liberia, Sierra Leone, Benin, and the private sector to lay the foundation for businesses to invest in power projects that will grow economies and reduce poverty: MCC is assisting governments in the preparation of potential projects, while also helping to establish regulatory and institutional structures needed to promote private investment. In September 2016, MCC's $498.2 million power compact with Ghana entered into force. The five-year compact is expected to catalyze billions of dollars in private energy investment. MCC is working with the Government of Malawi to develop and implement a roadmap for restructuring its power market to encourage private sector participation in the power sector while also building capacity for its regulator (MERA) and utility (ESCOM). In Liberia, MCC is funding the addition of a transaction advisor to its utility (LEC) to put in place a management services contractor. In Sierra Leone, MCC is funding work to develop a transparent framework and process for tariff setting – including the establishment of its regulator – and to build the capacity of its transmission and generation utility (EGTC).

The U.S. Department of Energy (DOE) providing expertise on energy technologies to African governments through its program offices and a network of 17 national laboratories: DOE also supports local capacity building in the areas of policy, regulatory, and commercial frameworks to help increase private investment in the energy sector and encourage utilization of a diverse set of energy solutions. A highlight this year was an in-country technical assistance assessment provided to the Kenya Electricity Generating Company Limited (KenGen) in the areas of data and reservoir management for geothermal resources. DOE also organized a natural gas training in Tanzania for officials, researchers, and students from 15 Tanzanian universities, organizations, and government agencies. Capacity building support focused on the technologies and economics of natural gas development, including natural gas pricing, and gas infrastructure. The support prompted a request from participants for more information on liquid natural gas (LNG) development. In response, DOE is developing, with the support of Power Africa, an LNG handbook that will provide Tanzania, and other East African countries, with an expert reference on LNG resources.

> "The session introduced me to a whole new dimension: the economic and technical aspects of gender issues in large- and small-scale energy projects. This is immensely useful for me to think about as I develop [my own] mini-grid projects in rural off-grid communities in Nigeria. It will help me develop a more gender-responsive business model as I scale up my business."
>
> *– Fatima Oyiza Ademoh, Ajima Farms/YALI Fellow*

USTDA's Global Procurement Initiative (GPI) working with energy officials in Botswana and Ethiopia to structure procurements that will ensure sustainable energy infrastructure: GPI promotes the use of value-based procurement mechanisms, including life-cycle cost analysis, to strengthen emerging economies' acquisition and management of infrastructure projects. In Botswana, the Agency's first GPI partner country, USTDA funded two senior advisors who are helping the Ministry of Minerals, Energy and Water Resources streamline its procurement processes. Efforts under the GPI have led the Government of Botswana to propose amendments to its national procurement law, which will enhance efficiency, increase transparency, and foster greater competition. In Ethiopia, USTDA is working with Ethiopian Electric Power, a large executor of public funds, to strengthen its procurement systems. By placing a greater emphasis on quality and value in the procurement process, Botswana and Ethiopia can increase efficiency and spur innovation in their energy sectors.

Power Africa supporting energy sector financing in Kenya: Power Africa is working with Kenya's Ministry of Power, the World Bank, and other partners to develop an off-grid strategy and financing platform for Kenya. At the same time, Power Africa is helping the Ministry of Power to form a high level Steering Committee with Kenya's energy

sector parastatals and leading private sector partners to explore ways in which Kenya can overcome the $14-18 billion funding gap necessary to achieve its generation, transmission, distribution, and off-grid electrification targets.

The U.S. Department of Commerce's Commercial Law Development Program and the African Development Bank's African Legal Support Facility bring together world-class experts to draft a handbook titled "Understanding Power Project Financing:" Released in February 2016, this new handbook is intended to provide decision-makers with an overview of the structuring of private investment and financing for power projects, and insight into the important supporting role that governments play. The handbook was the culmination of months of consultations, and was drafted by experts from African governments, development banks, private banks, and leading international law firms. The handbook is the second in a series published by Power Africa under a free, open-source license. There are over 20,000 copies of the handbooks in print (both in French and English), and they have been adopted by numerous Power Africa partner governments as reference guides for power project negotiations.

USAID's Engendering Utilities program building capacity within African utilities to support a more gender diverse workforce: This program is working with the utilities to identify very specific interventions that can be made to make their work environment more supportive of women employees. Interventions identified and adopted to date include revisiting maternity and family leave policies, strengthening sexual harassment policies, allowing for flexible work schedules, developing mentoring programs for women, and creating safe working environments for women. The expectation is that by building a gender diverse workforce the utilities performance will be improved, resulting in a more sustainable and responsive energy sector.

NATIONAL AND REGIONAL INTEGRATION THROUGH POWER POOLS

Power Africa continues to advance cross-border electricity trade and regional integration of energy grids in sub-Saharan Africa. We are building the capacity of the public and private sectors to expand regional trade in power pools founded by economic communities. Our partners are helping to develop sustainable financial models to attract private investment, encourage direct investments, and facilitate greater private investment through risk mitigation products.

Some of the most exciting work of Power Africa and its partners in the regional integration sphere include:

Power Africa building the capacity of utility regulators: Through its regulatory partnership program, Power Africa worked with the Eastern Africa Power Pool Independent Regulatory Board (EAPP-IRB) to develop a Uniform System of Accounts that will require utilities to abide by the same accounting rules, making it easier to calculate the true costs of regional projects and develop more transparent tariffs. Elsewhere in East Africa, the U.S. National Association of Regulatory Utility Commissioners (NARUC) is assisting utilities and regulators from Ethiopia, Kenya, and Tanzania to develop an electricity wheeling agreement and tariff methodology that will serve as a model for other cross-border transactions on the continent.

Power Africa working in collaboration with regional power pools across sub-Saharan Africa: In support of the Eastern Africa Power Pool, Power Africa and other development partners assisted the Council of Ministers to approve a short-to-medium-term roadmap for Eastern Africa power systems integration. In support of the West Africa Power Pool, Power Africa and NEPAD's Infrastructure Project Preparation Facility jointly funded a 330kV Nigeria-Benin Interconnection Reinforcement Project with $500,000 and $1,992,721, respectively, for a feasibility study, preparation of bidding documents, an assessment of the line route, and the environmental and

social impacts. In support of the Central African Power Pool, the U.S. Department of State is laying the groundwork for engaging on the planning of generation and transmission infrastructure, creation of the regulatory environment to attract private capital for infrastructure development, development of market and regulatory mechanisms for electricity sales, and capacity building for relevant ministries.

United States Energy Association (USEA) and USAID's Grid Management Support Program in Kenya: This program supported the development of the Kenya National Transmission Grid Code and the Kenya National Electricity Distribution Code to Kenya's Energy Regulatory Commission. Working together, USEA and USAID helped build the capacity of authorities to upgrade Regional Load Flow Planning Models in Ethiopia, Kenya, Tanzania, Rwanda, Uganda and Burundi. Going forward, the Eastern Africa Transmission Planning Partnership will apply load flow and dynamic models to analyze and verify the regional transmission network's capacity to support the 2025 Eastern Africa Power Pool Master Plan.

Power Africa is unlocking the potential of the energy sector in Africa by strengthening the effectiveness of local institutions within partner governments and regional organizations to support and maintain sustainable power projects. We are helping local public and private sector leaders establish policies and practices that ensure transactions can be effectively identified and completed in order to reach our goals of 30,000 MW and 60 million connections.

Off-grid energy sources are helping to connect millions of people in Africa who live beyond the traditional electrical grid.

Cap des Biches 53 MW Power Plant, Senegal. Photo: U.S. Embassy Dakar.

CHAPTER 4
POWER AFRICA PARTNERS

Partnership is the core of Power Africa.

Our approach links our goals with public and private sector goals and resources, and it connects investors and entrepreneurs to opportunities to bring cleaner, more efficient electricity to sub-Saharan Africa. African partner governments are managing and coordinating their grid development, while our development partners are ensuring that every step of the transmission and distribution value chain receives adequate technical and financial support.

POWER AFRICA HAS FOUR TYPES OF PARTNERS:

1. **African governments and institutions** that set national and regional power priorities and policies, provide power, finance projects, and create the enabling environment necessary for power sector transactions to move forward
2. **Private sector institutions,** which includes developers, project sponsors, financiers, equipment suppliers, and consulting services
3. **Development partners,** including multilateral institutions, bilateral partners, and convening bodies that provide direct support for power sector transactions and assist our African government partners to improve sector governance
4. **Civil society organizations,** ranging from international non-governmental organizations to local African non-governmental organizations, to local community-based organizations

AFRICAN GOVERNMENTS AND INSTITUTIONS MAKING STRIDES

African governments, regulators, and utilities are making great progress in establishing the foundations for efficient service delivery and creating policy environments that are friendly to private sector investments and cost-reflective pricing structures, including:

The Government of Malawi passing the Electricity (Amendment) Bill of 2016: In June 2016, the Government of Malawi passed the Amendment, which allows for private sector participation in the electricity sector and enables the restructuring of electricity supply in Malawi by allowing independent power producers to have non-discriminatory access to the transmission network and electricity market. The Amendment adds to the list of reforms the Government of Malawi has made with the assistance of Power Africa (through MCC) to create an environment conducive for privatized generation. Other reforms include improving the financial health of the national utility, Electricity Supply Company of Malawi (ESCOM), and unbundling the generation function from electricity transmission and distribution. This commitment to reform has played a direct role in attracting investors to Malawi and advancing critical energy infrastructure projects.

Groundbreaking progress in Ethiopia's Renewable Energy Sector: Power Africa is assisting the Government of Ethiopia in the competitive tendering of the first three solar IPPs (100 MW each) in the nation's history by helping to develop the Requests for Purchase (RFPs), the PPAs, and Connection Agreements. In parallel, Power Africa is employing an expert to perform tariff benchmark studies for solar, wind, and hydropower generation for the national utility company. Power Africa has also retained a regulatory legal advisor to advise the government on incorporating private sector involvement in energy production. These activities are intended to improve the bankability and investor friendliness of the country's electricity sector, and assist Ethiopia in meeting its growth and development goals of adding more than 10,000 MW and 6 million connections in the next decade.

Since the release of our last Annual Report, we have welcomed a host of new private sector partners, including ENKA Insaat ve Sanayi, CPCS Development International Limited, SunPower, Power Engineers, Ariya Capital, Solektra, One Degree Solar, Angaza, African Power Corporation, Morganti, Millhouse, Lumos, M-Kopa, and ENEL Green Power (see a full list of our private sector in Annex 4).

Power Africa and the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) delivering clean energy policy assistance through the Clean Energy Solutions Center (CESC): In 2016, CESC provided assistance to 15 countries in West Africa through the Economic Community of West African States (ECOWAS) Centre for Renewable Energy and Energy Efficiency (ECREEE), facilitating the harmonization of countries' Intended Nationally Determined Contributions with Renewable Energy and Energy Efficiency Action Plans. NREL support in West Africa also included the "ECOWAS Policy for Gender Mainstreaming in Energy Access," which was developed based on findings from an NREL-supported analysis of energy and gender issues in ECOWAS member states. The analysis and policy, finalized and released this year, lay a strong foundation for ECOWAS in meeting the energy needs of women in the region.

SUCCESSES FROM POWER AFRICA PRIVATE SECTOR PARTNERS

Power Africa encourages the private sector to play a leading role in developing sustainable and practical ways to generate power and increase access to energy. Our private sector partners range from project developers, to private equity and debt finance providers, to engineering, procurement, and construction firms, to associations. We

work with all of our private sector partners to facilitate transactions and advance deal flow by tracking progress against commitments, connecting partners with one another, and troubleshooting various issues as they arise.

Highlights over the past year from our Private Sector Partners include:

BioTherm Energy: BioTherm develops, finances, owns, and operates both wind and solar power plants across the African continent, with 52 MW currently under operation in South Africa and an additional 284 MW being brought to financial close under South Africa's Renewable Independent Power Producer Programme by Q4 2016. Elsewhere, BioTherm is reaching financial close on 44 MW of solar projects in Burkina Faso and Zambia, and is in the process of developing over 800 MW, in North, West, East, and Southern Africa. Its 2020 vision is to have secured power purchase agreements for 1,000 MW and to be operational in five other African countries. It is also actively developing solar rooftop and commercial and industrial projects under private PPA mechanisms.

Ariya Capital: Ariya Capital's work with Powering Agriculture, an Energy Grand Challenge for Development, is creating a scalable, fully-financed energy leasing solution that is providing cost-effective, low-risk, renewable energy generation and energy efficiency services to farms in Kenya. Through an alliance with African Solar Designs, plans are underway to design, finance, install, and manage $5.7 million worth of Distributed Renewable Energy Systems in 20 horticulture and flower farms. These efficient systems produce renewable energy at a lower cost than grid power and commonly-used diesel backup generators. Moreover, they provide a reliable power supply not subject to load shedding or instability. Over the next three years, this innovative initiative is expected to generate more than 15 MW of on-site power, enabling agribusinesses to have greater control over energy costs and their bottom lines.

Standard Chartered Bank: Standard Chartered is the lead arranger on the $750 million Oma Power Project, which is one of the few greenfield IPPs in Nigeria anticipated to reach financial close in the near term. Additionally, the bank is the mandated lead arranger and structuring bank for the 495 MW Okija Gas Power Project in southeastern Nigeria, a privately-owned and funded greenfield IPP seeking long-term debt financing on a limited recourse basis. Standard Chartered is well-placed to meet its $5 billion commitment to Power Africa, and support the delivery of 7,500 MW of cleaner power generation in sub-Saharan Africa. To date, the bank has a pipeline of mandated power deals valued at over $7.3 billion. The bank's robust pipeline also includes several other large-scale gas projects including Ghana 1000, in which Standard Chartered is a financial advisor.

> "We have identified a large gap in the market and, through our fruitful collaboration with USAID and other donors as well as with the Power Africa team, we are able to build a scalable customer-centric business that removes the barriers to accessing renewable power for businesses in East Africa. The model, once proven in Kenya, can be quickly deployed all over Africa."
>
> *– Dr. Herta von Stiegel, Executive Chair, Ariya*

Power Africa partners Development Bank of Southern Africa (DBSA), Investec, and Nedbank are part of a consortium of investors financing the new 100 MW Kathu Solar Project in South Africa: The project uses parabolic trough technology for efficiency and a molten salt storage system that significantly increases the amount of time that solar energy can be stored. This exciting new power generation project is managed by Kathu Solar Park through a 20-year power purchase agreement with Eskom, South Africa's state-owned power utility. The greenfield project promotes local economic development through the creation of 1,200 construction jobs and sourcing of services from local entrepreneurs. Additionally, the use of solar power is projected to avoid approximately 6 million tons of CO_2 emissions during the first 20 years of the

park's operation. The total cost of the Kathu Project is approximately ZAR12 billion, of which the DBSA provided funding of approximately ZAR2 billion.

BBOXX offering the world's first securitization for off-grid solar: At the end of 2015, BBOXX, a solar energy provider, announced that they funded the distribution and financing of solar technology for low-income households in Kenya through securitization. The securitization structure was created by setting up a special purpose vehicle, a company called BBOXX DEARs, that bundled the contracts of existing BBOXX customers who are paying for energy via monthly installments. BBOXX DEARs issued the note and sold it to Oikocredit. The value of the note was based on future receivables of customer contracts. The sale of these contracts provided BBOXX with capital to supply more solar systems to thousands of new households. This model elegantly completes the financing loop of raising and selling debt within the same cycle, thereby de-risking the balance sheet and giving BBOXX the ability to become more innovative in its value proposition. BBOXX expects to issue a DEARs note every three months from 2017 onwards.

Denham Capital Management: Denham Capital, an $8.5 billion global energy-focused private equity firm, is continuing its commitment to low-cost African power. Denham has been actively investing in Africa since 2008, building some of the first wind and solar projects on the continent, with its portfolio company and Power Africa partner, BioTherm Energy. Another Denham backed Power Africa partner, Endeavor Energy, has several projects in advanced stages of development, totaling over $2.5 billion of capital expenditure and 1,400 MW of baseload power generation, some of which are expected to begin construction by the end of 2016. In June 2016, Denham announced a partnership with GreenWish Partners to develop, build and finance a portfolio of 600 MW of renewable energy assets across sub-Saharan Africa by 2020. The capital commitment will allow the African renewables platform to carry out a $1 billion project pipeline.

Enel Green Power, a new Power Africa partner: Enel Green Power has been awarded the right to develop, finance, construct, own and operate a 34 MW PV solar project in Zambia following the first round tender of the Scaling Solar Program launched by the state-owned investment holding company Industrial Development Corporation Limited with support from the International Finance Corporation (see page 26 for additional details on the Scaling Solar Program). Enel will invest approximately $40 million in the construction of the new PV plant, and the project – called Mosi-oa-Tunya – will be supported by a 25-year power purchase agreement for the sale of all the energy generated by the plant to the state-owned utility ZESCO. The project is expected to enter into operation in the second quarter of 2017 and will generate around 70 GWh per year.

HIGHLIGHTS FROM POWER AFRICA DEVELOPMENT PARTNERS

Power Africa's development partners are indispensable to the expansion sub-Saharan Africa's energy sector and they share our goal of doubling access to electricity on the continent. To increase the flow of electricity to households and businesses, we are accelerating transactions by bringing together and deploying the combined tools, expertise and financing resources of our development partners, leveraging our shared expertise, and collaborating to support the private sector, governments, and utilities responsible for developing power projects. The breadth of our development partners' support ranges across project sizes, types, technologies, regions, and sectors.

In the past year, some of the highlights from Power Africa development partners include:

The World Bank Group: The World Bank Group has made significant progress towards its $5 billion pledge in support of Power Africa through technical and financial support in Ethiopia, Ghana, Kenya, Liberia, Nigeria, and Tanzania, announced at the USABF in 2014. To date, $3.8 billion has been allocated in these six countries. The World Bank is a major investor in the African energy

In the past year, Power Africa has established new development partnerships with the Governments of the United Kingdom, the European Union, Norway, Canada, and Japan, as well as partnerships with the International Renewable Energy Association , and the Development Bank of Southern Africa.

sector, and in FY 2016 had a portfolio of 46 active projects across the continent totaling $9.7 billion. The World Bank Group's approach consists primarily of financial support through investment lending, loans and guarantees from the Multilateral Investment Guarantee Agency (MIGA) and the International Bank for Reconstruction and Development (IBRD), and investments from the International Finance Corporation (IFC); coupled with capacity building and technical assistance. In 2016, World Bank President Jim Kim was a co-signatory of the Power Africa Roadmap, along with U.S. President Obama and AfDB President Adesina, reaffirming strong support for Power Africa's path to reaching 30,000 MW and 60 million connections.

The World Bank Group's Scaling Solar Program in Zambia: Scaling Solar is a utility-scale solar PV competitive procurement program that was launched by IFC with the Republic of Zambia in July 2015, making Zambia the first sub-Saharan African country to implement Scaling Solar. Power Africa and USAID's Mission in Zambia are supporting the World Bank and IFC by providing $2 million to support the development of two sites up to 50 MW. This support will help finance critical development costs, build institutional capacity, and catalyze market growth. In May 2016, Scaling Solar-Zambia selected two provisional winning bids with costs of $0.06 and $0.078 per kWh, which represent some of the lowests solar PV costs in Africa. Power Africa will provide an additional $4 million for Scaling Solar efforts in other sub-Saharan African countries.

The Government of Sweden (through Sida) and the Renewable Energy and Energy Efficiency Partnership's launch of the Power Africa Beyond the Grid Fund for Zambia: Launched in 2016, the €20 million fund aims to bring modern clean energy access to one million Zambians over the next four years and jump-start the country's burgeoning markets for energy services. Zambia has enormous potential for increased power production from a vast array of renewable energy sources including solar, hydro, biomass, biogas, biodiesel, ethanol, and waste-to-energy. As a result of support from Power Africa partners, basic legal and regulatory frameworks are in place that make it possible for independent power producers to generate and sell power, as well as to operate off-grid and isolated mini-grids. The fund will directly support private enterprises in the off-grid energy space through an innovative *Social Impact Procurement* approach, which offers opportunities for the private sector to contribute to developmental challenges while directly linking financial payment to on-the-ground results.

The African Development Bank (AfDB): In 2013, the AfDB announced its support to advance Power Africa's goals as an anchor partner, with an initial commitment of $3 billion. The AfDB invests in transactions, supports policy reforms, and provides advisory and capacity building services. From 2013 to 2015, the AfDB exceeded their initial pledge and approved approximately $4 billion for power sector projects across sub-Saharan Africa in the form of grants, loans, guarantees, equity investment, and technical assistance, including investments to strengthen the regional interconnection, upgrading national grids, and extending the grid to rural communities.

The AfDB's launch of The New Deal on Energy for Africa: Launched in 2016, the New Deal is a partnership-driven effort with the aspirational goal of achieving universal access to energy in Africa by 2025. To achieve this goal, the AfDB is working with governments, the private sector, and bilateral and multilateral energy sector initiatives to develop a Transformative Partnership on Energy for Africa – a platform for public-private partnerships for innovative financing in Africa's energy sector. As part of the New Deal, the AfDB is scaling up its support to Africa's power sector.

Kathu Solar Park RF (PTY) Ltd. Photo: Charles Corbett.

Ever more innovative, the AfDB is currently in the process of structuring, with support from the Sustainable Energy Fund for Africa, a $500 million debt fund for off-grid solar, mini grids and small scale independent power producers. This fund, known as the Facility for Energy Inclusion, is expected to be operational by Q1 2017.

INCREASING PARTNERSHIP WITH CIVIL SOCIETY

Power projects — especially those implemented at a larger scale — inevitably have environmental and social impacts. In all elements of its work, Power Africa aims to ensure that the U.S. Government and its partners effectively identify, mitigate, and appropriately manage environmental and social risks. All U.S. Government entities participating in Power Africa apply strict environmental and social standards. While specific guidelines for consultation and assessment vary among institutions, these agencies generally apply the IFC's Performance Standards on Social and Environmental Sustainability, which represent the most common threshold standards for risks management applied by bilateral and multilateral development agencies.

Partnership with civil society is a critical prerequisite to success along all stages of power sector development. Inclusive stakeholder consultations are generally a precondition before international sponsors, including development agencies, development finance institutions, or international banks, will provide financial or technical support to a specific project. Ongoing dialogue with civil society partners also strengthens communication with local populations and helps ensure that citizens and stakeholders have an effective voice in energy sector development. At the project, community, and country level, civil society offers vital guidance, feedback and resources regarding local context; lessons learned; relevant history and local sensitivities; identification of key stakeholders; considerations for monitoring and evaluation; local talent and impact on local employment and resources; capacity development priorities; and project selection.

Over the past year, Power Africa has increased both formal and informal engagement with non-governmental organizations both in the United States and abroad. Power Africa continually seeks out opportunities to make information about energy sector development in sub-Saharan Africa more transparent and more readily available to a wider stakeholder base, including through the development of the PATT. Power Africa will continue to build on such efforts to strengthen engagement with civil society partners around the world.

Innocent Nkubiri is the retail manager for BBOXX in Rwanda. BBOXX is a solar-power off-grid solution powered through a unique financing model to sell affordable solar systems on a monthly payment plan.

CHAPTER 5
CHALLENGES AND OPPORTUNITIES IN AFRICA'S ENERGY SECTOR

While many African governments and institutions across sub-Saharan Africa are making tremendous strides in expanding electricity access and facilitating private sector investment, significant political, institutional, and economic challenges remain. This year, falling commodity prices, fluctuating exchange rates, political turnover, and energy pricing have been among the main barriers to implementing energy projects. By continuing to work creatively with partners to address these issues, Power Africa aims to ensure sustained, long-lasting impact.

Falling Commodity Prices — Over the last few years, international commodity prices have fallen dramatically, creating significant challenges for countries economically dependent on exporting raw materials, including many in sub-Saharan Africa. In many cases, the drop in commodity prices has had significant direct impact on the energy sector, as significant capital and maintenance costs make large infrastructure projects particularly susceptible to financial turmoil during periods of economic downturn. Many African countries are taking steps to effectively address short-term fiscal shocks resulting from declining commodity prices in an effort to avoid damage to longer-term growth outcomes. To reduce vulnerability in this context, many African policymakers are working to diversify economic portfolios, strengthen regulatory frameworks, and prioritize building human capital. While implementing these critical measures will take time, their institutionalization will better equip African countries to weather external shocks and build more sustainable energy sectors over the long-term.

Electricity Pricing — Across much of sub-Saharan Africa, the complex considerations surrounding electricity pricing contribute to volatility and financial instability. In many countries, electricity tariffs are set well below what is needed to recover costs, often requiring heavy government subsidies to make up the loss and creating

significant financial challenge across the entire power sector value chain. If utilities cannot recover their costs, they cannot make much-needed investments in infrastructure maintenance or modernization. These financial shortfalls also create significant risk for potential investors, further hindering development. To attract and maintain private investment, African governments and regulatory entities must establish legal and regulatory systems that ensure fair and viable pricing, while also implementing mechanisms to make power affordable and safeguarding the interests of consumers. To reduce pricing risk and increase long-term confidence, Power Africa supports the strengthening of legal and regulatory environments that enable the establishment of long-term power purchase agreements between power producers (such as a privately-funded power plant) and offtakers (such as a public utility company) that distribute electricity to consumers. Power Africa and its partners also support African governments and regulatory entities in determining appropriate tariff levels and working with civil society to implement fair pricing.

Investment Risk — In the face of fiscal and macroeconomic challenges, many African governments are reluctant or unable to incur additional liabilities on their balance sheets by providing direct guarantees, creating significant barriers to private investment. In the absence of a sovereign guarantee to provide investors with the requisite level of comfort to invest, private developers often seek alternative credit enhancements. One such risk mitigation tool is the Put-Call Option Agreement (PCOA), whereby host governments agree to purchase power assets at an agreed strike price in the event of a default or termination of a power purchase agreement. With the successful implementation of the PCOA in the Azura-Edo IPP in Nigeria, a number of other countries have sought to replicate this model. While wider adoption of the PCOA has been slow as a result of factors including limited government capacity, lack of familiarity with the arrangement, and delayed approval processes, their broader usage could ultimately help mitigate risk and encourage investment across the continent.

Political and Institutional Challenges — Many African countries continue to face a diverse set of political and institutional challenges, many of which have significant negative impact (either direct or indirect) on energy systems. In the past year, several countries have dealt with major political upheaval or security risks, each of which can have long-term implications for investment and development more broadly. In addition to Power Africa's efforts to address specific policy barriers and build capacity within power sector institutions, the U.S. Government and its partners are working more broadly on a number of fronts to strengthen governance and address structural challenges. By continuing to help facilitate the development of strong institutions, free and fair elections, and inclusive and accountable governance, the U.S. Government and its partners aim to help unlock the continent's potential for development and economic growth as well as stable, sustainable, and market-driven power systems.

These challenges are some of the most difficult because Power Africa has limited ability to influence global markets and security concerns. While no silver bullet exists to solve these complex challenges, Power Africa is committed to working with African governments, civil society organizations, development partners, and the private sector to unlock Africa's vast energy potential. By harnessing the diverse set of tools Power Africa and its partners have at hand — from diplomacy, to technical assistance, to financial support — we continue to make progress toward achieving our ambitious goals, complementing and strengthening the reform efforts African leaders are leading across the continent.

CHAPTER 6
THE ROAD AHEAD

Power Africa is helping to shape the future of Africa's energy sector.

After three years of operation, Power Africa is building momentum toward reaching our goals of increasing generating capacity by 30,000 MW and adding 60 million new connections in sub-Saharan Africa. Power Africa has helped facilitate the financial close of private sector power transactions that are expected to generate over 4,600 MW. In addition, Power Africa has also supported off-grid projects expected to yield 2.5 million new home and business connections – which are expected to provide access to more than 10 million people. This year showed continued progress toward putting sub-Saharan Africa on a viable path to an economically and environmentally sustainable energy sector.

The Power Africa Roadmap charts a clear path forward to expanding access to electricity and shaping Africa's energy development. Power Africa will continue its implementation of the Roadmap and build on the solid foundation that has been established to support the realization of the Electrify Africa Act, which encourages the efforts of countries in sub-Saharan Africa to improve access to affordable and reliable electricity, and unlock sub-Saharan Africa's potential for inclusive economic growth, job creation, food security, and improved health, education, environmental outcomes.

To reach our goals, we will continue developing new and existing strategic partnerships with the public and private sectors to deliver power to communities through power generation, transmission, and distribution value chains that are responsive to market demand. We will support African governments to undertake the reforms necessary to attract and sustain private sector investment. We will continue prioritizing the 60,000 MW of projects we have identified for possible Power Africa support while adding and developing new viable transactions to this list.

To ensure that power reaches households and businesses, we will continue supporting grid expansion at scale in densely populated urban and rural areas, and we will use our Beyond the Grid tools to connect households and businesses in remote areas. Unlocking generation and connection opportunities requires enabling environments that are conducive to structuring and managing sustainable, market-driven energy programs. Therefore, we will support African governments to build capacity and to make the necessary legal and regulatory reforms to increase investment and grow the power sector. Recognizing that critical regional transmission projects can unlock "stranded" generation, and help strengthen national grids, we also will invest in institutions such as trade associations and engage with civil society to ensure that the private sector and local voices help to shape policy and regulatory reforms.

In the coming year, Power Africa expects to assist more countries in implementing competitive tendering processes, accelerating the pace of bringing larger quantities of power online. As the Scaling Off-Grid Energy Grand Challenge moves into implementation, it will increase both the number of viable off-grid companies and their ability to scale in new markets. This will also be the year that Power Africa expands its support to utilities and regulators to enable expansion of access through grid connections. Based on the foundation we've laid in our first three years, in terms of capacity building, technical assistance, and pipeline identified, we expect to see significant progress in the year(s) ahead.

Ultimately, we are working toward a future in which local communities and leaders — without the support of Power Africa — will be empowered to connect the right people to the right organizations and resources to achieve universal access to affordable, reliable, sustainable electricity. Through partnership, we are confident Power Africa will achieve its goal of expanding access to energy and offering a brighter future to millions of Africans.

ANNEX I

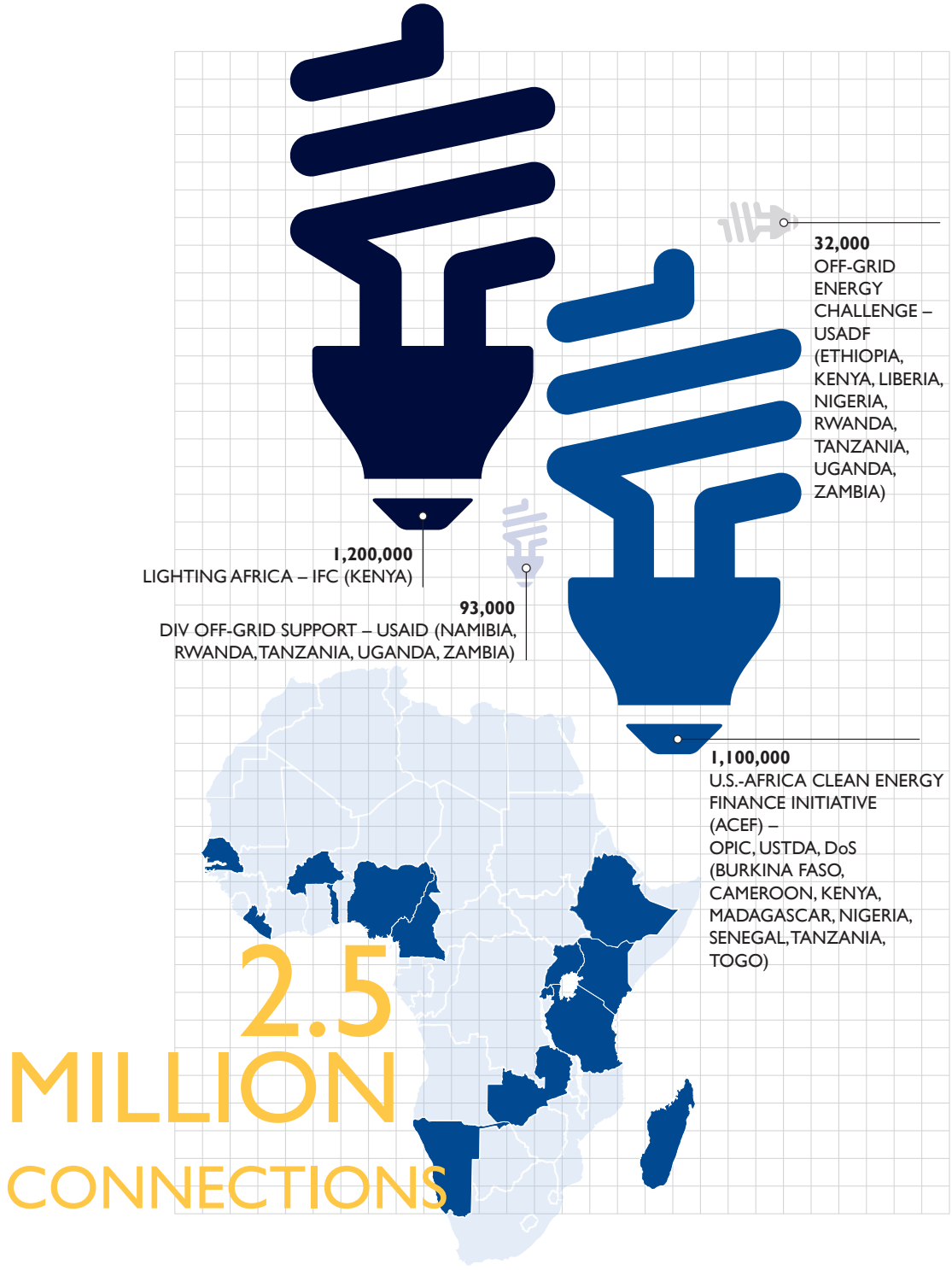
After three years of operation, Power Africa has helped facilitate the financial close of private sector power transactions that are expected to generate over 4,600 MW.

COUNTRY	TRANSACTION	TECHNOLOGY	MW
 GHANA	CenPower Kpone		350
 KENYA	Cummins Baringo		8.4
	Kinangop*		60
	Lake Turkana		310
 LIBERIA	Mt. Coffee		88
	Mein River		1
 NIGERIA	Azura-Edo		450
	FIRST Independent Power Afam		180
	FIRST Indpendent Power Elema IPP		75
	FIRST Independent Power Omoka IPP		25
	Privatized Generation Assets in Nigeria		2,653
 RWANDA	Gigawatt Global		8.5
	Amahoro Energy		5.3
 TANZANIA	Kinyerezi I		150
	Tulila		7.5
 SENEGAL	CountourGlobal Cap des Biches		53
	Senergy I		29
 SOUTH AFRICA	Firefly Investments		60
	Kaxu One Solar		100

*Kinangop Wind Park: Project reached financial close in November 2013, and construction began in Q1 2014. However, the project suspended in June 2014 due to political force majeure.

ANNEX II

Power Africa has funded projects expected to provide a total of approximately 2.5 million new off-grid connections for homes and businesses.



ANNEX III

UNLOCKING ENERGY SECTOR POTENTIAL – ESTABLISHING A STRONG ENABLING ENVIRONMENT

Power Africa tracks progress across twelve enabling environment principles. The table below lists some of the significant enabling environment accomplishment that Power Africa has helped facilitate over the past year.

COUNTRY	ENABLING ENVIRONMENT PRINCIPLE	PROGRESS / ACCOMPLISHMENT
Ethiopia	Strong, Transparent Legal and Regulatory Frameworks	In July 2016, Ethiopia's Parliament passed the Geothermal proclamation, establishing the regulatory framework for geothermal IPPs. A broader Renewable Energy proclamation is in process.
Malawi	Strong, Transparent Legal and Regulatory Frameworks	In June 2016, the Government of Malawi passed the Electricity (Amendment) Bill of 2016, which allows for private sector participation in the electricity sector and enables the restructuring of electricity supply in Malawi by allowing IPPs to have non-discriminatory access to the transmission network and electricity market, creating a transparent procurement process for IPPs and creating a single buyer model.
Liberia	Strong, Transparent Legal and Regulatory Frameworks	In September 2015, Liberia passed its Electricity Law establishing the basic regulatory frameworks for the sector.
Ghana	Creditworthy Off-takers	Under the MCC compact, the Government of Ghana paid its debt to the Electricity Company of Ghana, increasing its financial viability.
Malawi	Cost-Reflective Tariff Structures	In passing the 2016 Electricity (Amendment) Bill, Malawi also committed to transitioning to cost-reflective tariffs by September 2018.
Nigeria	Cost-Reflective Tariff Structures	In early 2016, Nigeria renewed its cost reflective tariffs. Although this revision has been challenged in Nigerian courts, it is a necessary step to ensuring the financial viability of the sector.
Malawi	Technical and Commercial Efficiency	Malawi's electricity utility ESCOM is in the process of transferring all customers to prepaid meters, with a goal of completing this effort by the end of 2017.
Ethiopia	Clear and Transparent Procurement Processes	In 2016, Ethiopia opened its first competitive tender for solar projects. The transition to competitive processes removes the inefficiencies and opaqueness of negotiated deals.
Rwanda	Sound, Strategic and Integrated Power Sector Planning	In May 2016, Rwanda approved it's rural electrification strategy that includes providing access to households through both grid and off-grid sources.
Uganda	Sound, Strategic and Integrated Power Sector Planning	NARUC is providing ongoing support to ERA to develop a uniform system of accounts. An initial draft has been completed.
Nigeria	Increased Clean Energy Share	In July 2016, the bulk electricity trader of Nigeria signed 14 power purchase agreements for solar projects. This milestone came as a result of the strong need to diversify the power generation mix following gas shortages.
East African Community	Strong Regional Power Pools	In January 2016, at the annual meeting of the Eastern Africa Power Pool (EAPP), the Council of Ministers approved a short- to medium-term roadmap for Eastern Africa power systems integration developed with the support of Power Africa and other donor partners.
Nigeria & Kenya	Gender Equality and Female Empowerment	With support from USAID's Engendering Utilities Program, utilities in Nigeria and Kenya are implementing interventions to promote a more gender diverse workforce and create work environments more supportive of women employees.

ANNEX IV

PRIVATE SECTOR PARTNERS[1]

DEVELOPERS AND SPONSORS

Abengoa
Access Infra Africa
Aeolus Kenya Ltd
Aldwych International
Angaza Design
APR Energy
Ariya Capital
Azura Power Holdings
Azuri Technologies*
BBOXX*
Berkeley Energy
BioTherm Energy
Canadian Pacific Consulting Services
Consolidated Infrastructure Group
d.Light*
Dominovas Energy
dVentus Technologies
EA Power, Ltd
EGG-Energy*
Embark Energy*
Enel Green Power
Fenix International*
General Electric
GG Energy Holdings
Gigawatt Global / Energiya Global*
Globeleq Advisors
Harith General Partners
Hecate Energy
Husk Power Systems
Hydromine
IAP Worldwide Services
KMR Infrastructure
Liberia Energy Network*
Little Sun*
Lumos*
M-KOPA Solar*
Milhouse
Mobisol*
NextGen Solar
Nigeria Solar Capital
Novi Energy
Off Grid Electric*
One Degree Solar*
Orchid Business Group
Ormat Technologies
Peppermint Energy*
Platinum Power
PowerGen Renewable Energy*
Powerhive*
Proton Energy
Quantum Power
Reykjavik Geothermal
SoEnergy International
Solar Reserve
Solar Sister*
Solektra*
SunEdison
Symbion Power
Upepo Energy
Vestas
Viability Africa
Virunga Power*
Vital Capital

DEVELOPMENT PARTNERS

African Development Bank
African Union's New Partnership for Africa's Development (NEPAD)
Development Bank of Southern Africa (DBSA)
European Union
Government of Canada
Government of Japan
Government of Norway
Government of Sweden
Government of the United Kingdom
Industrial Development Corporation of South Africa (IDC)
International Renewable Energy Agency (IRENA)
United Nation's Sustainable Energy for All (SE4All)
The World Bank Group

CONSULTING SERVICES

Interlink Capital Strategies
GreenMax

PRIVATE EQUITY AND DEBT FINANCIERS

Abraaj Group
Acumen Fund*
AFCORP Investments
African Capital Alliance
African Finance Corporation
African Infrastructure Investment Mgmt (AIIM)
African Power Corporation
American Capital Energy Infrastructure (ACEI)
Bamboo Finance*
Barclays Africa
Beyond Capital Fund*
Black Rhino
Blue Haven Initiative*
Calvert Foundation*
Capricorn Investments*
Christian Super*
Citigroup
CrossBoundary*
Denham Capital Management
Endeavor Energy Holdings
Global Environment Fund
Goldman Sachs
Gray Ghost Ventures*
Heirs Holdings
Imprint Capital*
Industry Capital
Investec Capital
Invested Development*
JCM Capital
Khosla Impact*
Kiva*
LGT Venture Philanthropy*
Low Carbon Enterprise Fund (ERM Foundation)*
Mosaic*
Nedbank
Persistent Energy Partners*
responsAbility Investments AG*
Schneider Electric*
Standard Bank Group, Ltd
Standard Chartered
SunFunder*
United Bank for Africa

ASSOCIATIONS, FOUNDATIONS AND NON-PROFITS

Corporate Council on Africa
Eleos Foundation*
Energy4Impact*
Geothermal Energy Association
Global Off-Grid Lighting Association*
Initiative for Global Development
National Rural Electric Cooperative Association
Rockefeller Foundation*
Shell Foundation*
Tony Elumelu Foundation*
U.S. Energy Association
United Nations Foundation*

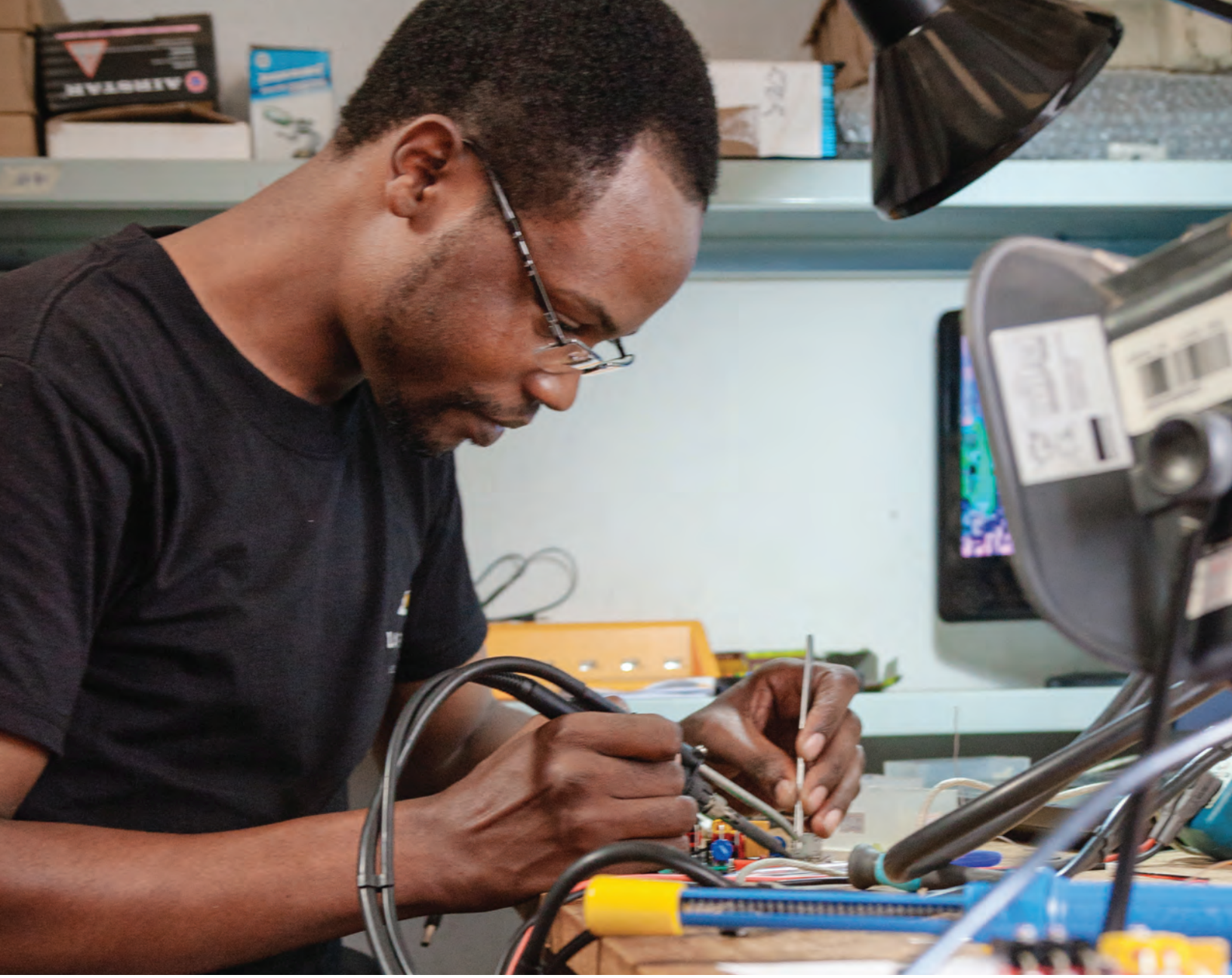
EQUIPMENT SUPPLIERS

PW Power Systems
SunPower Systems

ENGINEERING PROCUREMENT AND CONSTRUCTION

AEG International*
Enka
Morganti
Power Engineers

[1] List of partners as of August 2016 * Denotes Beyond the Grid companies



Mobisol is one of more than 40 companies working with Power Africa to bring clean, renewable energy to people who live and work Beyond the Grid. Mobisol is focusing beyond the "base of the pyramid" to middle-class families and entrepreneurs through products like barber's hair clippers, small appliances, and related promotional materials. Photo: Rachel Couch.

> "President Obama's challenge to the world to "Power Africa," was a necessary piece of leadership and the rest of the world has agreed and is aligning in the same direction. This was not true 10 or even 5 years ago. Power Africa and its more than 130 partners have put resources, including people, all over the African continent to help achieve these goals, which we believe are deliverable, executable, and possible."
>
> *– SE4All CEO Rachel Kyte*

"We've mobilized governments and multilateral institutions and more than 100 private-sector partners around our Power Africa initiative, funding everything from big power plants to off-the-grid and small, renewable energy projects. And we are proving that countries don't have to choose between expanding access to power and combating climate change. These projects are expected to generate electricity so that students can study at night, and businesses can stay open, and farmers can use mechanized tools. And I believe that by 2030, we can bring electricity to over 60 million African homes and businesses. And that will be transformative for the entire continent."

– President Barack Obama

POWER AFRICA

A U.S. GOVERNMENT-LED PARTNERSHIP