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Africa Spotlight Kenya * Nigeria

September/October 2019

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Editorial Feature

Blended Finance Unlocking Capital

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Over the course of 2019 I have noted with interest the many announcements made by major international oil companies stating grand plans aimed at moving their operations in a more sustainable direction. Most interesting are those announcements by the European majors while American majors have largely dragged their heels when it comes to facing head on the challenges that come with adapting strategies toward a more sustainable future.

This year's announcements by the American companies are again less aggressive than the European firms. For example, Chevron established new goals to reduce net greenhouse gas (GHG) emission intensity from its upstream oil and natural gas operations. The company said it intends to lower upstream oil net GHG emission intensity by 5-10 percent and upstream natural gas net GHG emission intensity by 2-5 percent from 2016 to 2023. Meanwhile, Italy's ENI has come out with a number of new initiatives such as launching a new corporate mission integrating sustainability into its business, not to mention it is actively engaged in implementing renewable projects around the globe.

Back to the American side, ExxonMobil signed a \$100 million agreement that has it funding the National Energy Technology Laboratory (NETL), and other US Department of Energy laboratories over a 10-year span. While a step in the right direction, it certainly doesn't compare to French major Total's announcement that it will focus its global venture fund on fostering carbon neutrality. The fund will increase its capital to a cumulative \$400 million within five years' time. The company is already building solar plants around the world and forging strategic alliances to further its influence in the renewable energy sphere.

While the two announcements above by the American companies are not the sum total of their efforts - Exxon is active in Carbon Capture and Chevron has geothermal investments, for example - the scale of their commitment still falls flat compared to the Europeans. This could be set to change however if 2021 elections remove Donald Trump from office. You can expect a democratic president to reverse all of the detrimental climate policies the Trump administration has in place, and to also scale back access to drilling in a number of sensitive US locations. A smart administration would also look to incentivize companies for investing in renewable energy technologies and joining the fight to mitigate climate change. If the US presidential elections yield a democratic leader, it is certainly going to be interesting to watch the game change.

Be sure to catch all the latest developments out of Kenya's renewable energy sector as well as the great strides Nigeria's Renewable Energy Agency is making in Africa's most populous nation. Also be sure not to miss the feature on innovative African finance solutions in our feature. As always, we are always happy to receive your comments and suggestions and they can be sent to info@AE-Africa.com.

Dianne Sutherland Publisher

Africa Beat

Germany to Fund Cote d'Ivoire's Solar Plant

Cote d'Ivoire's first solar power plant will receive financial support from Germany. The country granted the project a 27 million equity financing and will mobilize 0.7 million from the EU.

The plant will have a capacity of 37.5 MW and will be located in the locality of Boundiali in the north of the country. It will supply around 30 000 households and will prevent the emission of 27,000 tons of CO₂ per year. The total cost of its construction has been estimated at 38 million.

The country's 2,000 MW of power is currently composed of 75% thermal power plants and 25% electric dams.

Africa50 and Partners Sign-Up

for Madagascar Hydropower Project

Africa50, Colas, Jovena and SN Power signed a shareholders' agreement to develop the Volobe hydropower plant in Madagascar. The project entails the construction and operation of a 120 MW hydropower plant on the Ivondro river, 40 kms from Toamasina, to be operated under a 35-year concession. It also includes the construction of a transmission line, refurbishment of the access road and infrastructure for the neighboring villages.

Under the terms of the agreement, partners agree to co-develop the hydropower plant by acquiring equity in *Compagnie Générale d'Hydroélectricité de Volobe* (CGHV), the project manager. Following this transaction, the shareholding of CGHV is comprised of Jovena (40%), Africa50 (25%), SN Power (25%) and Colas (10%).

Jovena, a leading local industrial player, will provide institutional support while Africa50, the pan-African infrastructure investment platform, will bring its project development and finance expertise on board. SN Power, a leading player in hydropower infrastructure, will offer its technical and operational know-how and Colas, its expertise as a major infrastructure construction company operating in Madagascar.

Considered as a priority in Madagascar's national development program, Volobe seeks to provide reliable and affordable access to electricity for over two million Malagasy, thereby contributing to the country's transition towards renewable energy. The power plant will reduce the cost of electricity to the end user. The project is expected to create up to 1,000 direct jobs during construction and is expected to be commissioned by 2023.

Algeria Says Renewable Energy a National Priority

Delivering a keynote speech at the Africa Oil & Power event, Chahar Boulakhras, the Managing Director of Sonelgaz, the state-owned utility in charge of electricity and natural gas distribution in Algeria, said renewable energies have become a national priority.

"In view of Algeria's solar potential, its immense territory, our energy transition is focused on the development of renewable energy, particularly through the construction of photovoltaic solar power plants. We have launched an ambitious National Renewable Energy and Energy Management Program which was adopted in 2011 and updated in 2015. We have set ambitious and promising renewable energy targets and we are committed to make the next 20 years the era of the deployment of sustainable energies for the country. The program provides 47 to 51 TWh by 2035-2040."

Boulakhras said the program is currently being implemented and that 22 photovoltaic plants with a total capacity of 350 MW peak in the South and the Hauts Plateaux regions have been completed. A 10 MW wind farm and small renewable energy plants operating with different technologies have also been completed.

Boulakhras also went over the broad scope of the country's plans which included capacity building, energy efficiency, clean fuels, hybrid power plants for isolated regions, and low consumption consumer products such as solar water heaters and lamps.

Solar-Hybrid Power Plant Brings Electricity to University Students

The Federal Government of Nigeria's Rural Electrification Agency (REA) commissioned the 7.1 MW Solar-Hybrid Power Plant at Bayero University in Kano. The plant, the largest of its kind in Africa, is part of REA's Energizing Education Program (EEP) and will provide uninterrupted electricity to nearly 60,000 students and staff at the university in northern Nigeria.



Bayero University Kano state

Power Africa's Nigeria Power Sector Program (NPSP) provides REA technical and human resource advisory support to ensure these projects are sustainable and have lasting impact. NPSP is also supporting REA with EEP's large-scale deployment by institutionalizing processes to complete all university electrification efforts, including creating detailed user guidelines and manuals to assist developers, universities, and investors.

"The students and staff of Bayero University, Kano can now experience learning and teaching in a safer, cleaner and more conducive academic environment," said the Managing Director of the Rural Electrification Agency, Mrs. Damilola Ogunbiyi. "And when students can continue their studies, they can become their best and brightest for Nigeria."

EDF and Elswedy Commission

130 MWp at Egypt's Benban Solar Complex

EDF Renewables and the Elsewedy Electric Group announced the commissioning of two solar power plants in Egypt at Benban with a total installed capacity of 130 MWp. These photovoltaic projects jointly owned by the partners hold a 25-year power purchase agreement (PPA) with the Egyptian Electricity Transmission Company (EETC). Their commissioning brings the EDF Group one step closer to meeting its goal under the CAP 2030 strategy of doubling its net renewable energy capacity in France and worldwide to 50 GW net between 2015 and 2030.

The solar power plants, which each have 65 MWp in installed capacity, are located in the Aswan province of southern Egypt. They form an

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integral part of the Benban solar complex, which will soon have capacity totaling close to 1,800 MWp. This additional solar capacity represents a step forward towards the Egyptian government's objective of generating 20% of its electricity from renewable sources by 2020.

EDF Renewables is set to build a further 800 MW in North Africa as part of the innovative Moroccan Noor Midelt I hybrid solar project won last May.

Scatec Solar Completes the 390 MW Benban Project in Egypt Scatec Solar and partners have grid connected the last of the six 65 MW solar power plants in Egypt. This marks the completion of the 390 MW Benban solar project located near Aswan in Upper Egypt. The project is part of the 1.8 GW Benban solar park – one of the world's biggest solar parks where Scatec Solar is the largest developer.

"We have been a pioneer in Egypt since 2013 and been supporting the country's efforts to increase generation capacity and increase the share of renewables in its energy mix. I'm very proud that we have completed our largest project ever. Constructing a total of six solar plants in just over 16 months is a major achievement for everyone involved," said Raymond Carlsen, CEO of Scatec Solar.



A Scatec Solar Installation at Egypt's Benban solar complex In April 2017, Scatec Solar and partners KLP Norfund and Africa50 signed a 25-year Power Purchase Agreement with the Government of Egypt for delivery of electricity from six solar plants, totaling 390 MW. The project was both the company's first, as well as the world's largest solar plant to utilize bi-facial solar modules, capturing the sun from both sides of the panel to increase the clean energy generation. The estimated annual electricity production is 870 GWh, enough to provide energy for more than 420,000 households in Egypt. The solar plants will also contribute to avoid about 350,000 tons of CO₂ emissions per year.

Zimbabwe Moving Full Throttle on Solar

In Zimbabwe, the country's regulatory body on energy, Zimbabwe Energy Regulatory Authority (Zera), authorized the start-up of 39 solar projects with a combined capacity of 1,151.87 MW. The projects have a combined cost of more than \$2.3 billion.

According to details from Eddington Mazambani, Acting Director General of Zera, three projects are in the design or pre-feasibility stage and have a production capacity of 111 MW while 22 solar projects are currently in the feasibility study or technical study stage. These 22 projects will have a combined capacity of 885.1 MW; three projects will have a production capacity of 70 MW and are also in the feasibility stage. Five other projects with a total capacity of 78.3 MW are in the financing stage or under construction. The most advanced projects, six in total, currently supply 7.47 MW of power in the network, a capacity that is expected to increase to 25 MW once the initial phase of production is completed.

Secretary Keter Hails First Geothermal Well in Baringo-Silali Kenya's Cabinet Secretary for Energy, Charles Keter lauded the Geothermal Development Company's (GDC) efforts in developing geothermal in the Baringo-Silali block. While on a technical inspection tour of the project, Keter singled out the success in the drilling of the Paka Well One (PW-01) as a major "milestone" for the country.

"This is a big milestone for Kenya," Keter said. "This success is a great opportunity towards cheaper power."

The Baringo-Silali Geothermal project is emerging as a key hub for renewable energy. The vast block spans three prospects namely Paka, Korosi and Silali. It is estimated to host a potential of 3,000 MW. GDC will in the first phase develop 300 MW – 1000 MW from each prospect. The Baringo-Silali geothermal projected is being supported by different development partners including the Government of Kenya, KfW of Germany, Geothermal Risk Mitigation Fund (GRMF), Japan International Cooperation Agency (JICA) and the Icelandic International Development Agency (ICEDA).

EETC Enters into Negotiations with Siemens

The Egyptian Electricity Transmission Company (EETC) entered into negotiations with Siemens on the feed-in tariff for wind power plant production.

According to a *Daily New Egypt* report, EETC hopes to buy the energy generated by the wind farms at 3.6 cents per kilowatt hour. These negotiations are part of a selection process in which consortiums of Toyota-Orascom and El Sewedy-Marubeni are also involved.

Caculo Cabaça Hydroelectric Expected Online in 2024

Angola's Energy and Water Minister João Baptista Borges announced that the first turbine of a total of four at the Caculo Cabaça hydroelectric facility will start producing electricity from 2024. The new facility is under construction in the Angolan province of Kwanza Norte.

The minister said the Caculo Cabaca facility "will meet the country's needs, as growth in demand is around 12.5% per year, which means that consumption doubles every eight years, which is the construction period of this hydroelectric facility."

The facility has an anticipated maximum power generation capacity of 2,172 MW and will be the largest hydropower plant in Angola. The main dam wall will be 103 meters high with a crest width of 553 meters The maximum length of the reservoir will be 16.3 km and an area of 16,6 sq kms will be inundated. The hydropower project is part of eight dams planned for the Kwanza River Hydropower Scheme. Two hydroelectric power stations are currently in operation on the Kwanza River, while nearby Lauca is currently under construction.

Chad Solar Gets Funding

The African Development Bank (AfDB) approved a loan and a Partial Risk Guarantee of 38 million to Chad to establish a PV solar power plant. The construction and operation of the Djermaya photovoltaic solar power plant, with a maximum capacity of 32 MW, is planned 30 km north of N'Djamena.

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Africa Beat

The interconnection infrastructure includes a 33-kV double circuit, 33 kV overhead transmission line, two 33 / 90kV transformers at the Lamadji substation and a 4 MWh battery system for network stabilization. The project will be the first public-private partnership (PPP) in the power sector for Chad. The project will contribute to building sustainability in Chad's power sector by reducing production costs; will increase installed capacity in the country and contribute 10% of the energy supplied to the interconnected system (the equivalent of 25,000 customers).

Solar Project in DRC Wins Phanes Group's Third Solar Incubator

Phanes Group, an international end-to-end solar developer headquartered in Dubai, UAE has announced Justin Nseya and his Congo Green Energy Project (2 x 50 MW) as the winner of the third edition of its Solar Incubator. The announcement was made at the "Unlocking Solar Capital: Africa" conference in Dakar, Senegal, where three finalists presented their proposal to a panel of international industry experts from Power Africa, ECREEE, 3E, Solarplaza and Phanes Group.



Phanes Group Solar Incubator ceremony

Maintaining a long-term stake in the project, Mr. Nseya and Phanes Group will work collaboratively, aiming to bring the solar energy project to financial close. The Solar Incubator phase will kick off with an intensive face-to-face workshop for Mr. Nseya in Dubai, UAE, where he will work with Phanes Group's team and its incubator partners to set the foundations to deliver a bankable project. During that phase, Mr. Nseya will gain access to commercial and technical know-how covered by experts from project finance, project development and execution, legal, marketing and CSR, followed by further remote mentoring sessions in the succeeding months.

"Mr. Nseya's project convinced the evaluation panel, not only with its strong CSR component but especially with his knowledge and commitment to the region where he hails from. He showed strong determination to bring his project to life in a challenging market environment. We believe this is where Phanes Group and its incubator partners can create the most positive impact, through the workshop and ongoing mentoring and knowledge sharing," said Andrea Haupts, COO of Phanes Group."

The goal of the Phanes Group Solar Incubator, held under the theme, "Your Project, Our Expertise, For a Sustainable Future," is to provide access to commercial and technical knowledge, and eventually funding, to promising locally developed PV projects in sub-Saharan Africa, and to help entrepreneurs overcome obstacles that could prevent solar initiatives from reaching fruition.

US Cancels \$190 Million in Power Grants to Ghana

On October 19, 2019 the government of Ghana (GoG) informed the Millennium Challenge Corporation (MCC) in Washington, D.C. of its decision to terminate the concession agreement between Electricity Company of Ghana (ECG) and private operator Power Distribution Services Ghana Ltd (PDS). As a result, the US made the decision to cancel \$190 million in power grants to the country.

In response, a statement on the US Embassy website read: "The United States of America notes this decision with regret. Based upon the conclusions of the independent forensic investigation, the U.S. position is that the transfer of operations, maintenance, and management of the Southern Distribution Network to the private concessionaire on March 1, 2019 was valid, and therefore the termination is unwarranted. As such, MCC has confirmed that the \$190 million funds granted to Ghana at the March 1 transfer to the 20-year concession from ECG to PDS are no longer available."

There is still \$308 in grants still available and the US will continue to implement these Tranche I funds with the Millennium Development Authority (MiDA). This funding will continue to support important improvements to the infrastructure of Ghana's southern distribution network, increase reliability and power access to key markets, and advance energy efficiency programs directly benefiting the people of Ghana.

Large-Scale Storage Project Planned by Eskom

Eskom, South Africa's state-owned utility, will be issuing a call for tenders for a large-scale battery-powered electricity storage project, according to Prince Moyo, Eskom's General Manager of Energy Delivery Engineering.

A timeline for the project was not released, but it is expected to be implemented in two phases with an estimated capacity of 1.4 GWh. The first, which will be inaugurated in 2020, will install the batteries to store 800 MWh of electricity (200 MW). These batteries will be installed in four sets. For a storage capacity of 640 MWh (160 MW), the second phase of the Eskom project will be implemented before the end of 2021.

According to Eskom, bidders will be evaluated on the basis of the total cost of their proposals. For the implementation of this project, the World Bank is expected to provide Eskom a \$1 billion loan.

Voltalia Starts Râ Solar Production in Egypt

French firm Votalia's Râ Solar power plant is now in operation and has started to produce its first MWh. Equipped with 93,150 Suntech photovoltaic panels, the plant benefits from the region's high solar irradiation, with a load factor expected above 25%. Voltalia benefits from a 25-year power sales contract with the Egyptian Electricity Transmission Company (EETC).

Located in the Aswan region (Upper Egypt), the power plant is part of Benban, one of the largest clusters of solar plants worldwide with a total capacity expected to reach 1.8 GW. The cluster will enable to avoid 2 million tons of greenhouse gas emissions per year while improving access to competitive energy in Egypt. Benban is therefore instrumental in achieving the 2 GW target of solar installed capacity set by Egypt within the scope of the Paris Agreement in 2015.

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Africa's Cities and Local

Governments Climate Ambitions Declared in Accra

In Accra, Ghana 2,000 representatives of African cities, local and regional governments, and non-state actors gathered at the 2nd African Climate Chance Summit, featuring the Conference of the Covenant of Mayors in Sub-Saharan Africa (CoM SSA) which was organized between 16 and 18 October. The theme of the conference was "Towards the Institutionalization of Local Climate Action and Access to Finance."

The CoM SSA initiative uses a bottom up approach pioneered by funders the European Union that mobilizes local actors for sustainable energy access, to elaborate and implement climate action plans. Furthermore, the objective of the conference was to inspire and enable policy makers, donors, local governments and key actors involved in the implementation of CoM SSA to accelerate the pace and scale of transformational change and the mobilization of cities. It is for this reason that working with national associations and CSOs are critical for the acceleration of action on the ground.

Jean-Pierre Elong-Mbassi Secretary General of the United Cities and Local Governments of Africa chaired the first day's opening and highlighted four key messages with the most critical being "to ensure



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climate finance is accessible at the local level." During the closing ceremony the challenge of access to finance was further reiterated by the Minister for Local Government, Hon. Hajia Alima Mahama. She called for establishing a dedicated financing window for local authorities to implement their climate change priority action plans. "The imbalance between mitigation actions represents an effort of over 600 billion dollars put by the international community compared to 200 billion for adaptation that must be addressed," she stated.

The CoM SSA initiative will continue to support cities and local governments through vertical integration and political advocacy; technical assistance and capacity building for cities and supporting organizations such as National Associations of local governments, Civil Society Organizations (CSOs); and the promotion, communication, dissemination, awareness raising and visibility of the initiative.



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Tech Beat

Probe Introduces UHT DimensionTM – First Xy Caliper for Geothermal Well Operations

Probe, a leading supplier of cased-hole logging and advanced monitoring technology to the global oil and gas and geothermal industries, announced the launch of its UHT DimensionTM XY Caliper, the first XY Caliper Tool specifically designed to operate in ultrahigh temperature environments. This new development expands upon the renowned Kuster[®] geothermal logging tool portfolio, used extensively in the global geothermal industry for its performance and reliability.

Developed to operate in hostile environments up to 325°C (617°F), the UHT Dimension tool provides two continuous independent perpendicular measurements (X and Y) of the internal diameter of the casing. The tool also produces a high-resolution temperature profile of the well via an external fast-response resistance temperature detector (RTD). There is no other caliper tool that offers this versatility for ultra-high temperature and geothermal well operations.

Featuring Kuster[®] high-temperature technology, it is the latest addition to Probe's range of Kuster[®] pressure-temperature (PT) sensors, pressure-temperature-spinner (PTS) sensors, and Protherma[™] (UHT PLT with pressure-temperature-spinner-gamma ray-



Probe UHT Dimension T XY Caliper tool

casing collar measurements). All materials used to produce the UHT Dimension tool meet with the requisite NACE MR0175 specifications for use in corrosive wellbore environments.

Acting upon early warning signs prevents reduced flow

"The introduction of ultra-high temperature XY Caliper technology for the geothermal industry is a major breakthrough. A critical factor is that mineral deposition regularly affects geothermal well conditions. Until now, gauging the internal diameter of these wells was ineffective. The ability to generate a continuous log and accurately calculate flowrates is a huge differentiating advantage," said Steve Beattie, Sales Manager for Well Monitoring for Probe. "By gathering accurate, reliable on-depth casing dimensions, geothermal companies can quantify scale buildup and any other restrictions due to the reduction in casing diameter. The tool also identifies downhole components and other anomalies. By detecting such issues early on, the operator engaging in such proactive maintenance can maintain a critical flowrate by removing the restriction; which will aid in reducing the operational downtime and treatment cost."

Source: UHT

Versatile tool offers increased efficiency

The UHT Dimension tool is very versatile. It can be run stand-alone or combined with other Kuster[®] geothermal PT and PTS tools. Its robust mechanical design features single roller arms that conform easily to most wellbore conditions. However, if there is a need to run over slotted sleeves or sandscreens, an optional triple roller arm is available for increased run efficiency.

Rigorously tested during field trials executed in Asia and the USA, the UHT Dimension[™] XY Caliper is now available for purchase.

Sensus Launches Cordonel, a Smart Utility Solution

Sensus, a specialist in water metering solutions and a precursor to smart water networks in the Middle East, unveiled its new ultrasound static water meter, Cordonel, that has been designed to help achieve a smarter utility network. An extremely versatile metering system, Cordonel helps users manage distribution networks more efficiently, thereby contributing to better water resource management, through accurate and reliable data.

Cordonel is an intelligent response to two of the major challenges that network managers face including lack of hyper-accurate metrology to detect the smallest leaks, and the lack of a connected meter that communicates critical network data in real-time. By addressing these, it will not only help address leakage and save costs, but also enable managers to optimize daily maintenance to increase the uptime of the network.

Francois Frigaux, Regional Director, Middle East and North Africa, Sensus, said: "Cordonel is a revolutionary innovation that will enable water utility networks to draw on rich realtime data for unprecedented insights on water usage. This will help users to achieve higher savings through the close monitoring of consumption patterns as well as the various patterns in the distribution network."

Major features of Cordonel include real-time water data analytics, intelligent city support, intelligent water consumption, and better productivity and cost savings.

Among other technical features, Cordonel has an optional pressure sensor integrated into the meter, which allows water utilities to avoid buying and deploying these sensors on their network. The pressure data is also transmitted and processed with the flow data, making operations simpler and will help generate substantial CAPEX and OPEX savings.

With a strong footprint in the Middle East and Africa, Sensus supports major utility providers with advanced solutions that help reduce the downtime of mission-critical equipment. Its communication networks and product



range, which includes advanced metering infrastructure, automatic meter reading, conservation voltage reduction, distribution automation, leak management, electric outage management, power line carrier migration, are ideally suited to serve the region's needs





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ALLEVIATING POWER CHALLENGES IN SOUTHERN AFRICA THROUGH INNOVATIVE INVESTMENTS, TECHNOLOGIES & SOLUTIONS



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Siemens/Evonik Enter Phase 2 of Joint Rheticus Research Project

Evonik and Siemens have launched their joint research project Rheticus II. The goal is to develop an efficient and powerful test plant that will use carbon dioxide (CO_2) and water as well as electricity from renewable sources and bacteria to produce specialty chemicals. In the Rheticus I project, the two companies worked for two years to develop the technically feasible basis for artificial photosynthesis using a bioreactor and electrolyzers. Evonik and Siemens are now combining these two, previously separate plants in a test facility at Evonik's site in Marl (Germany). Rheticus II will run until 2021 and will receive funding of around €.5 million from Germany's Federal Ministry of Education and Research.

"The innovative technology used for Rheticus has the potential to contribute to the success of Germany's energy transition," says Thomas Haas, who is responsible for the Rheticus project at Evonik. "In the future, this platform could be installed anywhere CO₂ is available - for example, at power plants or biogas plants. We use available CO₂ as the raw material for the production of highvalue chemicals using artificial photosynthesis." Siemens is contributing the world's first CO₂ electrolyzer to the Rheticus project. "We are developing a flexible system that can provide

answers to various questions raised by the energy transition," says Karl-Josef Kuhn, who is in charge of Power2X research at Siemens. "We are making it possible to store renewable energy by converting it into useful substances such as specialty chemicals or fuel. We are also contributing to the stability of the grid because production is so flexible that we can respond to fluctuations in power supply." The test facility is scheduled to start operating in early 2020. It comprises electrolyzers and a bioreactor. In a first step, carbon dioxide and water are converted into carbon monoxide (CO) and hydrogen in electrolyzers with the aid of electricity. Special microorganisms then convert the CO in the gases synthesized in this way into chemicals. Siemens and Evonik are each contributing their core competencies electrolysis and biotechnology - to this artificial photosynthesis process. Artificial photosynthesis means combining chemical and biological steps so that energy can be used to produce viable chemicals from CO₂ and water. Plants use natural photosynthesis in a similar way: chlorophyll, enzymes and sunlight are used to synthesize glucose - a vital, energycapacity of 2,000 liters. Microorganisms work continuously in the reactor. Their main nutrients are hydrogen and carbon monoxide. Siemens has developed a fully automated CO_2 electrolyzer which was integrated into a container in summer 2019. The world's first CO_2 electrolyzer comprises 10 cells and the total surface area of the electrodes is 3,000 cm². The electrolyzer and the bioreactor will be combined in the coming months. In addition, a unit to process the liquid from the bioreactor is being built to obtain pure chemicals.

In the test facility, bacteria will produce butanol and hexanol for research purposes. These substances are used as starting products, for example, for specialty plastics and food



In Evonik's module for the Rheticus test facility, bacteria convert synthesis gases into specialty chemicals such as butanol

rich nutrient. Another advantage of Rheticus is, that the technology platform also contributes to the reduction of carbon dioxide levels in the atmosphere, as it uses CO_2 as a raw material. Three tons of carbon dioxide would be needed to produce one ton of butanol, for example.

The synthesis module came on stream at Evonik in spring 2019. At its heart is an 8-meter high stainless steel bioreactor with supplements. However other specialty chemicals are conceivable, depending on the bacterial strain and conditions.

Following successful completion of Rheticus II, Evonik and Siemens will have a unique technology platform allowing production of useful, energy-rich substances such as specialty chemicals and artificial fuels from CO_2 in a flexible, modular process.

Guardian Glass Introduces Coated Solar Control Glass in New Bold Colors

Guardian Glass in the Middle East and Africa has introduced three new coated solar control glass products, all of which offer enhanced aesthetics, as well as excellent performance, product availability and quality. These products are specifically developed to meet architects' requirements for high performance glass where appearance matters as well as the building's impact on its surrounding.

The SunGuard[®] Double Silver (DS) range from Guardian Glass combines solar or low-E coatings to provide a great balance between light transmission and thermal insulation for commercial building projects. These highperformance, double silver coated solar control glass products are readily available in three new colors tuned to meet the aesthetic requirements of architects.

SunGuard[®] Double Silver Steel Grey- This new addition to the SunGuard[®] DS range satisfies current architectural design trends by providing a neutral steel grey appearance that architects desire. This opens new design possibilities for architects that can help give their projects a unique edge, flair and style. The glass also provides high performance in terms of visible light transmission, solar protection and thermal insulation – making it an ideal choice for doubleglazed windows and façades.

SunGuard[®] Double Silver Emerald Green – This new

product from the SunGuard[®] Double Silver range provides a striking, natural emerald green appearance. The enhanced aesthetics are combined with optimal performance attributes in terms of light transmission, solar protection and thermal insulation.

ClimaGuard[®] Shadow Grey – Guardian ClimaGuard[®] is a growing family of advanced glass products designed specifically to provide superior thermal protection and a desired performance well suited for the region's climate. Ideal for use in windows, doors, skylights and conservatories, the enhanced appearance of the glass can help make living and working spaces more beautiful, comfortable, safe and energy efficient. The glass can be tailored to suit specific



climates and help meet performance expectations or achieve distinctive styles, opening new design possibilities.

ClimaGuard[®] Shadow Grey is a new highly durable and easy to process low-E coating with a desirable grey appearance on a clear substrate. Suitable for both insulated and laminated glass applications, the glass offers superior thermal insulation, while allowing plenty of natural daylight into the building.

All three new products are available on clear substrate, which means a more efficient manufacturing process, which in turn means better value for customers in terms of product quality, cost and availability.

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ALE Helps GE Unveil and Test World's Most Powerful Offshore Wind Turbine

Haliade-X 12 MW is the world's most powerful offshore wind turbine, capable of powering 16,000 European households while saving carbon emissions equivalent to those of 9,000 vehicles per year. Featuring the world's longest blades, it has a rotor span of 260 meters.

Following its launch, a number of heavy lifting operations were required. The turbine's two prototype nacelles, weighing several hundred tonnes, required transportation on site, while separately the yokes that position each blade during installation required load testing to ensure they could withstand the required load. The clients called upon ALE to assist due to its expertise in engineering and supporting sequences of onsite lifts. Its role in providing turnkey turbine installation packages and load testing projects was also key to satisfying the clients' needs.

Transportation of the first Haliade-X 12 MW nacelle took place at its factory in Saint-Nazaire, France. It was moved via SPMT approximately 200 meters, from the factory in which it was manufactured to the yard, forming part of the nacelle's global unveiling ceremony.

Two nacelles in total were transported by ALE and then loaded onto barges for shipment to Rotterdam, the Netherlands and Blyth, UK. Here, each nacelle will form part of a test installation – one on land, one at sea – undergoing the certification and operational testing required to confirm their performance levels and reliability.

The weight of the nacelles was borne by 32 axle lines of SPMT in a 16×4 file configuration. A selection of load cells was used to perform the weighing operations. During down time, the SPMTs were made available for a selection of smaller lifting tasks on site, enhancing their value to the project as a whole.

Concurrent with the launch ceremony, ALE completed lift operations to test the yokes that are used to install the Haliade-X 12 MW blades at sea. The yokes – known as Blade Eagles –

are 170 tons and have dimensions of 32m x 10.5m x 14m.

To perform this testing, ALE provided a 150ton-capacity LR1600 crane and a load cell in slings. The scope of this testing was to lift the 50-ton blade using the Blade Eagles through a series of angles of maximum +15 degrees and minimum -30 degrees from horizontal, and also to perform various friction tests.

This testing lasted for three days in total, following which the blades were placed back into support frames and the Blade Eagles placed on the quay for later collection by a vessel. This was the first lift of the longest wind turbine blade in the world.

The Blade Eagle yokes will be used for all offshore installations of the Haliade-X 12 MW. The turbine as a whole will undergo testing with an aim of mid-2021 for its first commercial production – following which it will start to generate an annual gross energy of 67GWh at locations around the world.



WindFloat Atlantic Begins Installation of First Floating Wind farm in Continental Europe

The first WindFloat Atlantic platform with the turbine fully installed has set off from the Spanish Port of Ferrol towards its final destination 20 km off the coast of Viana do Castelo in Portugal. Once at the final location, the three floating structures – stretching 30 meters in height and with a distance between each one of their columns of 50 meters – will be installed to form the first floating wind farm in continental Europe.

The structure that has set off from the outer harbor of Ferrol comprises a floating platform and a wind turbine, the largest installed on a surface of these characteristics to date. In the coming months, two other platforms will be added to complete the windfarm which, with its 25 MW installed capacity, will be able to generate enough energy to supply the equivalent of 60,000 users each year.

The project is led by the Windplus consortium, comprising EDP Renewables (54.4%), Engie (25%), Repsol (19.4%) and Principle Power Inc. (1.2%). The facility has three wind turbines

mounted on floating platforms which are anchored only with chains to the seabed at a depth of 100 meters. It includes cutting-edge technology that minimizes the environmental impact and facilitates access to untapped wind resources in deep waters. This technology has wide-reaching benefits that enhance its accessibility and cost-effectiveness, including its aptness for dry-dock assembly and towing without the need for specialized towing craft, or the advantages of not having to rely on complex offshore operations associated with the installation of traditional bottom-fixed structures.

WindFloat Atlantic project builds on the success of the WindFloat1 prototype, which was in operations between 2011 and 2016. The 2-MW prototype successfully generated energy uninterruptedly over five years, surviving extreme weather conditions, including waves up to 17 meters tall and 60-knot winds, completely unscathed. The transport alone of the first of the three floating structures making up the floating wind farm

at Viana do Castelo marks a milestone in itself, as it sidesteps the need for towing craft designed specifically for this process. This benefit, alongside the simple mooring process, make it possible to replicate this initiative in other geographical areas and facilitates the commissioning phase regardless of geographical boundaries.

The WindFloat can also support the world's largest commercially available wind turbines on a floating structure of almost 9 MW each, helping to increase power generation and drive significant reductions in lifecycle costs. The project uses WindFloat disruptive technology, which enables wind platforms to be installed in deep waters, inaccessible to date, where abundant wind resources can be harnessed.

The partners that have made this project possible include Principle Power, the joint venture between Navantia/Windar, the A- Silva Matos Group, Bourbon, the wind turbine supplier MHI Vestas and dynamic cable supplier JDR Cables.



Global Alternatives

Statkraft Acquires 320 MW of Irish Solar Projects

Statkraft Ireland has completed the acquisition of nine Irish solar projects with a combined output of 320 MW. This, added to the company's existing portfolio of 1.25 GW of onshore wind and 500 MW of offshore wind in Ireland alone, sees Statkraft very positively positioned to play its part in helping this country deliver on targets set out in the Government's Climate Action Plan published in June.

The solar projects in question are at an advanced stage of development and several of the projects will participate in the upcoming Renewable Electricity Support Scheme (RESS) auctions. They are being purchased from solar developer, JBM Solar Limited. The company also reiterated its commitment to a capital spend of €1.5 billion in the Irish renewable energy generation sector.

"Each MW of these developments will be necessary if we are going to be successful in tackling climate change. Work carried out to date has ensured that the Irish electricity grid system is operating successfully with renewable energy levels of up to 65% at any given time which proves that we are not that very far away from having a Grid system which can be run almost exclusively on renewable energy," said Statkraft Ireland Managing Director, Kevin O'Donovan.

Statkraft's ambition is to become a major wind and solar developer, aiming at 2,000 MW of solar and 6,000 MW of wind power capacity by 2025.

Canadian Solar Picks Up 393.7 MWp in Brazil Auction

Canadian Solar has been awarded three solar photovoltaic (PV) projects totaling 393.7 MWp in two recent Private Corporate Auctions held in Brazil in Q3 2019. The company will develop and build two projects, one in the State of Pernambuco (190.5 MWp) and the other in the State of Ceará (76.2 MWp). The latter will be an expansion of the existing Project Lavras which is under development by the company. Construction is expected to start in 2021, and the projects will reach commercial operation before the end of 2022.

Once in operation, the two solar power plants will generate approximately 598 GWh of electricity annually. Most of the energy generated will be purchased by COPEL Energia, under two 15-year Power Purchase Agreements (PPAs).

In addition, the company will develop and build a 127 MWp project in the State of Minas Gerais, southeast of Brazil, which is expected to reach commercial operation before January 2023. Once in operation, this solar power plant will generate approximately 280 GWh of electricity annually.

Most of the energy generated will be purchased under a long-term PPA. This project will be constructed in the same region and close to other existing projects developed and built by Canadian Solar in Minas Gerais.

Canadian Solar's high efficiency bifacial BiHiKu modules are planned to be installed on the three projects. These corporate PPAs will be the first of its kind to be executed by Canadian Solar in Brazil and will add to the company's portfolio of more than 1 GWp of contracted PPAs since the company entered the Brazilian market. Canadian Solar now has over 2 GWp of awarded and contracted PPAs in Latin America.

Total Launches Construction of its Third Solar Power Plant in Japan

Total Solar International announced the start of the construction of Miyagi Osato Solar Park, a large-scale solar plant of 52 megawatt-peak (MWp) located in Osato, Miyagi prefecture, Japan. The project, which has achieved financial close, is expected to start up in 2021 and will provide clean and reliable electricity to Japanese households.

The Miyagi Osato Solar Park is Total's third and biggest solar plant in Japan, which will allow the company to reach a cumulated capacity of over 100 MWp in the country. The plant is designed to fully meet Japan's stringent earthquake-resistant building standards. The facility will be equipped with around 116,000 SunPower[®] Maxeon[®] high efficiency solar panels that deliver reliable performance throughout the entire life of every installation. The plant will be operated by Miyagi Osato Solar Park G.K., a special purpose company, majority-owned by Total Solar International (90%), alongside SB Energy Corp. (SB Energy) (10%), a Japanese subsidiary of SoftBank Group.

The launch of the construction of Miyagi Osato Solar Park follows the beginning of the operation of two other large-scale solar plants by Total Solar International in Japan: Miyako Solar Park (25 MWp, 2019) and Nanao Power Plant (27 MWp, 2017).



Afghanistan Launches Scaling Solar RFQ

The Government of the Islamic Republic of Afghanistan, which signed a solar power mandate with the International Finance Corporation – a member of the World Bank Group – in September 2018, has decided to structure and tender the 40-megawatt project under the Scaling Solar program.

The Ministry of Energy and Water (MEW) has now issued a Request for Pre-Qualification for the project located near Gozareh district in Herat Province. Only prequalified bidders will be eligible to receive the Request for Proposals and to participate in the second and final stage of the selection process.

Pre-qualified bidders will be given access to the Virtual Data Room and will be invited to attend one or more organized site visits and/ or pre-bid conferences as part of their due diligence, prior to submission of final proposals.

ENI Scores Australian PV Projects

ENI Australia Limited has completed the acquisition of two construction-ready solar photovoltaic (PV) projects at Batchelor and Manton Dam, in the Northern Territory of Australia, from NT Solar Investments Pty Ltd, a wholly owned subsidiary of Australia's Tetris Energy. The projects will comprise the installation of 2x 12.5 MWp (Mega Watt peak) of ground-mounted PV panels and will be completed by the third quarter of 2020.

The installation of innovative cloud coverage predicting technology will ensure optimum operational performance in all weather conditions. This technology will forecast possible variations in solar irradiation so as to minimize the impact to the grid. State-owned Jacana Energy will purchase 100% of the new plants' output, which will supply clean energy to over 5,000 homes each year. The new projects will create local jobs and opportunities and will contribute to the Northern Territory's government goal for providing 50% of energy generation from renewable sources by 2030.

This initiative, together with the previously announced 33.7 MWp Katherine solar farm (currently under construction), increases ENI's renewable energy investment into the Australian market and complements the company's existing assets in the region.

KORE Power Intends to Build 10 GWh Battery Manufacturing Plant in US

KORE Power, a developer of high-density, high-voltage energy storage solutions, has announced its intentions to build a lithium-ion battery manufacturing plant in the U.S. to support global growth efforts for its Mark 1TM Energy Storage System. The new facility will produce systems that are made in the USA and will stimulate economic growth with 2,000 U.S.-based manufacturing jobs. The new one-million square foot facility will be used to manufacture and produce the company's Mark 1TM Energy Storage System using state-of-the-art, fully automated battery assembly lines and processes. Once completed, the plant will have 10 GWh of highly scalable manufacturing capacity that will meet the rapidly growing market demand for customized industrial battery solutions. Currently, KORE Power is reviewing specific potential sites in a handful of states and has narrowed the search down to sites with broad access to labor and logistics hubs. The assembly lines and processes for battery manufacturing will be based on those already being used for the Mark 1TM Energy Storage System production at a plant in Jiaozuo, China, which is owned by KORE Power's manufacturing partner, Do Fluoride Chemicals (DFD).

Scatec Solar Sets New World Record

Scatec Solar set a new world record at the at Guanizuil IIA project in Argentina by installing 54,090 solar modules in less than 12 hours. This equals approximately 17.5 MW of the 117 MW total solar plant capacity.

The record was a result of the "module installation challenge day" where the company gathered a team of 300 people with the help of its mechanical works contractor, CIPSA. They were divided in 10 teams and the challenge's target was to install 4,950 modules each. All teams reached the target, while four teams managed to exceed their target and installed even more modules. The numbers are even more impressive when considering that in one day, the Scatec team on site was able to install close to 15% of the expected capacity of the solar plant.

Once completed, the Argentinian plant, Guanizuil IIA, is estimated to deliver an annual



production of 308 GWh, powering 82,000 households. The solar plant is covering an area larger than 380 soccer fields and will contribute

to avoid 107,000 tons of CO_2 emissions per year. The project is jointly owned with Equinor and grid connection is expected in Q1 2020.

ACWA Power Inks MoU for 3,600-MW Gas Plant in Bangladesh

ACWA Power, a global leader in water desalination and power generation, announced signing a Memorandum of Understanding with the Bangladesh Power Development Board (BPDB) for a LNG-based power plant and terminal in Bangladesh. As part of the agreement, ACWA Power will target the development of 3,600 MW gas-fired Independent Power Plants representing a total investment amount of approx. \$2.5 billion, that will help meet the country's growing power demand.

Markets & Policy

IEA Predicts Solar PV to See Spectacular 5-Year Global Growth

he installation of solar PV systems on homes, commercial buildings and industrial facilities is set to take off over the next five years, transforming the way electricity is generated and consumed, according to the International Energy Agency's latest renewable energy market forecast.

These applications – known collectively as distributed PV – are the focus of the IEA's Renewables 2019 market report. The report forecasts that the world's total renewable-based power capacity will grow by 50% between 2019 and 2024. This increase of 1,200 gigawatts – equivalent to the current total power capacity of the United States – is driven by cost reductions and concerted government policy efforts. Solar PV accounts for 60% of the rise. The share of renewables in global power generation is set to rise from 26% today to 30% in 2024.

The expected growth comes after renewable capacity additions stalled last year for the first time in almost two decades. The renewed expansion remains well below what is needed to meet global sustainable energy targets, however.

"Renewables are already the world's second largest source of electricity, but their deployment still needs to accelerate if we are to achieve long-term climate, air quality and energy access goals," said Dr Fatih Birol, the IEA's executive director.

The report highlights the three main challenges that need to be overcome to speed up the deployment of renewables: policy and regulatory uncertainty, high investment risks and system integration of wind and solar PV.

Distributed PV accounts for almost half of the growth in the overall solar PV market through 2024. Contrary to conventional wisdom, commercial and industrial applications rather than residential uses dominate distributed PV growth, accounting for three-quarters of new installations over the next five years. This is because economies of scale combined with better alignment of PV supply and electricity demand enable more self-consumption and bigger savings on electricity bills in the commercial and industrial sectors.

Still, the number of solar rooftop systems on homes is set to more than double to some 100 million by 2024, with the top markets on a per capita basis that year forecast to be Australia, Belgium, California, the Netherlands and Austria.

"As costs continue to fall, we have a growing incentive to ramp up the deployment of solar PV," said Birol. The cost of generating electricity from distributed solar PV systems is already below retail electricity prices in most countries. The IEA forecasts that these costs will decline by a further 15% to 35% by 2024, making the technology more attractive and spurring adoption worldwide.

The report warns, however, that important policy and tariff reforms are needed to ensure distributed PV's growth is sustainable. Unmanaged growth could disrupt electricity markets by raising system costs, challenging the grid integration of renewables and



Contrary to conventional wisdom, commercial and industrial applications rather than residential uses dominate distributed PV growth

reducing the revenues of network operators. By reforming retail tariffs and adapting policies, utilities and governments can attract investment in distributed PV while also securing enough revenues to pay for fixed network assets and ensuring that the cost burden is allocated fairly among all consumers.

"Distributed PV's potential is breathtaking, but its development needs to be well managed to balance the different interests of PV system owners, other consumers and energy and distribution companies," Birol said. "The IEA is ready to advise governments on what is needed to take full advantage of this rapidly emerging technology without jeopardizing electricity security."

According to the report's Accelerated Case, improving economics, policy support and more effective regulation could push distributed PV's global installed capacity above 600 GW by 2024, almost double Japan's total power capacity today. Yet this accelerated growth is still only 6% of distributed PV's technical potential based on total available rooftop area.

As in previous years, Renewables 2019 also offers forecasts for all sources of renewable energy. Renewable heat is set to expand by one-fifth between 2019 and 2024, driven by China, the European Union, India and the United States. The heat and power sectors become increasingly interconnected as renewable electricity used for heat rises by more than 40%. But overall, renewable heat potential remains vastly underexploited. The share of renewables in total heat demand is forecast to remain below 12% in 2024, calling for more ambitious targets and stronger policy support.

Biofuels currently represent some 90% of renewable energy in transport and their use is set to increase by 25% over the next five years. Growth is dominated by Asia, particularly China, and is driven by energy security and air pollution concerns. Despite the rapid expansion of electric vehicles, renewable electricity only accounts for one-tenth of renewable energy consumption in transport in 2024. And the share of renewables in total transport fuel demand still remains below 5%. The Accelerated Case sees renewables in transport growing by an additional 20% through 2024 on the assumption of higher quota levels and enhanced policy support that opens new markets in aviation and marine transport.

Africa Spotlight

President: Uhuru Kenyatta (since April 2013) Independence: December 1963 (from UK) Population: 52,952,365(July 2017 est.) GDP (purchasing power parity): \$163.5 billion (2017 est.) GDP - real growth rate: 5.1% (2017 est.) GDP - per capita (PPP): \$3,461.4(2018 est.) Energy Minister: Charles Keter (Cabinet Secretary) Oil - production: N/A Oil - consumption: N/A Oil - proved reserves: 750 million barrels (2017) Natural gas - production: N/A Natural gas - proved reserves: 2.01 billion cubic meters

Source: CIA FactBook, World Bank, Population Review

s East Africa's most developed country, Kenya is uniquely positioned in the region. situated on the equator on Africa's east coast. Kenya has been described as "the cradle of humanity," being the home to some of the earliest evidence of humanity. Today the country has a vibrant culture, full of ethnic diversity.

KENYA

Arabs began settling coastal areas, over the centuries developing trading stations which facilitated contact with the Arab world, Persia and India. The Portuguese tried to establish a foothold on Kenyan coast in the 16th century but were driven off by Swahili states and Omani Arabs by the late 17th century. In the late-1890s Kenya fell under the British Ease African Protectorate and British settlers began moving inland, building a railway from the coast to Lake Victoria.

In 1920 the East African Protectorate became crown colony of Kenya, administered by a British governor. A little more than 20 years later the calls for independence from the British began, with the Kenyan African Union (KAU) forming to campaign for African independence with Jomo Kenyatta as the KAU leader. After two decades of a violent campaign against whites in Kenya, the British initiated plans to prepare Kenya for majority African rule.

In 1963 Kenya gained independence and Kenyatta was named prime minister, one year later the Republic of Kenya was formed with Kenyatta being named president. Kenyatta died while in office in 1978 and was succeeded by Vice-President Daniel arap Moi. Kenya's next president faced coup attempts and a host of opposition that he had suppressed through political arrests; but he still managed to stay in office until 2002 when Mwai Kibaki won the 2002 elections in a landslide victory.

Kibaki ruled Kenya until 2013 when Uhuru Kenyatta, the son of Kenya's first president, won the presidential elections with just over 50% of the vote. A challenge to the results by his main rival, Prime Minister Raila Odinga, was rejected by the Supreme Court. The next elections in 2017 had Kenyatta being declared the winner, however the election was declared null and void and was re-run in October; Kenyatta once again came out on top.

The country, while it has many political parties, is dominated by two main political parties; the ruling Jubilee party created in 2016 when 11 smaller parties merged, and the main opposition party – the Orange Democratic Movement (ODM). The Jubilee Party is scheduled to hold crucial party elections by March 2020, where Deputy President William Ruto will try to gain control of the party to anchor his 2022 presidential bid. Meanwhile, the ODM picked up some crucial seats in recent by-elections with the Jubilee candidates coming in second and even a distant third in at least one instance.

The economy will be on trial in both the 2020 and 2022 elections. Over 2019 the country continued to make progress with a recent World Bank report stating that Kenya's "medium-term gross domestic product growth (GDP) is expected to rise to 5.9% in 2020

Africa Spotlight

and 6.0% in 2020 underpinned by private consumption, a pick-up in industrial activity and still strong performance in the services sector. Inflation is expected to remain within the government's target range while the current account deficit is projected to remain manageable. Growth will also be driven by ongoing key investment to support implementation of the Big 4 development agenda and improved business sentiment. Growth could have been stronger in the absence of interest rate caps that continue to derail recovery in private credit growth.

"In addition to aligning fostering economic development through the country's development agenda to the long-term development plan; Vision 2030, the President in December outlined the "Big Four" development priority areas for his final term as President. The Big Four will prioritize manufacturing, universal healthcare, affordable housing and food security.

The World Bank also highlighted that Kenya has met some Millennium Development Goals (MDGs) targets, including reduced child mortality, near universal primary school enrolment, and narrowed gender gaps in education. "Interventions and increased spending on health and education are paying dividends. While the healthcare system has faced challenges recently, devolved health care and free maternal health care at all public health facilities will improve health care outcomes and develop a more equitable health care system," the global institution stated.

Industry Backdrop

Kenya's installed generation capacity at the end of 2018 stood at about 2,710 MW with 75% of the population having access to energy, according to the Ministry of Energy's Cabinet Secretary Charles Keter in June. This figure represents a significant gain over 2014's estimate of only 32%. Kenya has achieved this increase implementing both on- and off-grid solutions.

According to the World Bank, donors have contributed to more than \$3 billion in grants and loans to support the development of new generation capacity, and the government of Kenya's flagship last mile electrification program has attracted \$770 million from the donor community, including World Bank support for the Kenya Electricity Modernization Project. The World Bank has given Kenya high marks for its achievements in the power sector, stating "Kenya has achieved remarkable success in expanding generation capacity of a well-diversified mix with close to 85 percent of energy being generated from clean sources (mainly geothermal, hydro and wind)...37% of the installed generation capacity (~1,009 MW) today has been developed through Independent Power Producers (IPPs) representing 53% of the incremental generation capacity since 1990." Today, geothermal capacity contributes to almost half of energy generated, thus ensuring security of energy supply even in periods of drought. Hydropower constitutes about a third of energy generated today.

The country will look to add 7,200 MW to its installed capacity by 2030 and provide universal access to energy by 2022, just a few short years from now. Assisting in this goal is the Kenya Off-Grid Solar Access Project (KOSAP). The government, with the Ministry of Energy (MOE), Kenya Power and Lighting (KPLC) and the Rural Electrification Authority (REA) will implement the facilities in four components over a 5-year period (2018-2023). The World Bank has provided \$150 million in financing for KOSAP implementation.

When completed, the project targets 277,000 households (approximately 1.3 million people from the 14 counties and 1,100 public and community facilities i.e. schools, health facilities, administrative offices along with 380 boreholes that have remained un-electrified. The Project also expects to facilitate the provision of 150,000 clean cooking stoves in West Pokot, Turkana, Marsabit, Samburu, and Isiolo.

2019 Project Updates

It has been a very exciting year for renewable energy in Kenya with important commercial projects either sanctioned or coming online. Small-scale off grid has also made important strides. Kenya took a step closer to achieving its clean energy goals in August with President Uhuru Kenyatta unveiling the continent's largest wind power plant – the Lake Turkana Wind Farm. The Lake Turkana Wind Power project (LTWP) is located in Loiyangalani District, Marsabit County on the shores of Lake Turkana. It is comprised of 365 wind turbines, each with a capacity of 850kW, and a high voltage substation that has been connected to the Kenyan

Source: LTWI

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Sour

national grid through an associated transmission line; constructed by the Kenyan Government.

Since March, the wind farm has been providing reliable, low cost energy to Kenya's national grid – approximately 17% of the country's installed capacity according to LWTP, which is being bought at a fixed price by Kenya Power & Lighting Company Ltd. over a 20-year period in accordance with the Power Purchase Agreement.

The LTWP consortium includes KP&P Africa B.V and Aldwych International as co-developers, Investment Fund for Developing Countries, Vestas Eastern Africa Limited, Finnish Fund for Industrial Cooperation Ltd, KLP Norfund Investments AS and Sandpiper.

Next in line and set to become the second largest wind farm in Kenya behind Lake Turkana is the Kipeto Wind Power project. In December Kipeto Energy Ltd. announced it had reached financial close for the project which is being funded by equity from Actis (88%) and Kenyan company Craftskills Wind Energy International (12%) alongside senior debt from the Overseas Private Investment Corporation. Once operational, Kipeto, located in Kajiado county south of Nairboi, will supply 100 MW of clean energy to the national grid.

GE Renewable Energy will provide 60 of its GE 1.7-103 turbines to the Kipeto project, providing power to the equivalent of approximately 40,000 homes in the region. The 100-MW Kipeto Wind Power project will provide clean energy to the national grid as a significant contribution to Kenya's Vision 2030 and Big Four Agenda. The project is expected to reach commercial operation in 2020.

On the geothermal front, the Olkaria V plant Unit 2 came online this October. Construction of the Olkaria V plant started in 2017 with the first unit commissioned in July 2019 by Kenya Electricity

Africa Spotlight



Olkaria V

Generating Company (KenGen). The Olkaria V geothermal plant, is one of the largest geothermal power plants currently under construction and the largest African geothermal plant. Both Unit 1 and 2 will supply a total of 160 MW of electricity and absorbing 500 tonnes of dry steam per hour, at temperatures of about 270 degrees Celsius. Mitsubishi Corporation (MC), together with Mitsubishi Hitachi Power Systems Ltd. (MHPS) and H Young & Co. (E.A.) Ltd. (HY), were awarded the full turnkey contract by KenGen for the construction of Olkaria V in early 2017.

The Geothermal Development Company (GDC) is developing geothermal in the Baringo-Silali block. The vast block spans three prospects namely Paka, Korosi and Silali. It is estimated to host a potential of 3,000 MW. GDC will in the first phase develop 300 MW, that is 100 MW from each prospect. The Baringo-Silali geothermal projected is being supported by different development partners including the Government of Kenya, KfW of Germany, Geothermal Risk Mitigation Fund (GRMF), Japan International Cooperation Agency (JICA) and The Icelandic International Development Agency (ICEDA).



Baringo Silali

Meanwhile, the construction of the first of three privately owned geothermal power plants at the Menengai Crater in Nakuru, Kenya, is set to start construction in December, according to local media reporting, including the Kenya Broadcast Corp.GDC has granted the Independent Power Producers (IPPs) the necessary licenses by the State to begin operations at the project site. OrPower22 (Ormat), Quantum Power East Africa and Sosian Menengai Energy are the three IPPs. The combined project will see an approximate 105 MW of geothermal energy come online once completed. Each company will be responsible for bringing online 35 MW of power on a buildown-operate basis.

Not to be left behind is Kenya's solar potential. Globeleq started the construction of a £52-million solar photovoltaic plant in Malindi this past June. With a capacity of 40 MW, the plant is located about 120 km from Mombasa. It is the first solar power plant built by an independent producer who has reached the construction phase in the country. The construction works are planned to extend over 12 months. Its production will be divested to Kenya Power (KPLC), the national electricity distributor, under a 20-year power purchase agreement.



Globeleq is collaborating on the project with Africa Energy Development Corporation which owns 10% of the plant. The company has also partnered with IDEA Power, which will provide capital and experience in project development and construction management. The project is expected to boost the local economy, with up to 250 direct jobs being created and a further 5,600 jobs in the wider economy supported thanks to the availability of power.

On a smaller scale, the UK government, through InfraCo Africa, a Private Infrastructure Development Group (PIDG) company, is investing \$2.2 million in the development of two rural solar plants in Samburu and Transmara, each at 10 MW. The Samburu and

Transmara projects will demonstrate the commercial viability of strategically sited small-scale solar plants (10 MW and below) and so mobilize greater private sector participation in this market segment.

In addition, work is also underway to explore the potential for one or both of these solar projects to take part in a local currency power purchase agreement PPA pilot. If confirmed, the solar project(s) would be among the first in sub-Saharan Africa to have negotiated local currency renewable energy PPAs outside of South Africa.

It was also announced in 2019 that the Mwale Medical and Technology City (MMTC), the green city currently under construction in Kakamega, is to be equipped with a solar photovoltaic power plant. The 30-MW plant (expandable to 50 MW) will be built by MCX Environmental Energy. The company said that construction of the solar park will begin in November. The project will require an overall investment of more than 10 billion Kenyan shillings, or nearly \$100 million.

The city of MMTC is currently under construction in Butere Sub County (Kakamega) in western Kenya. It will house 4,800 medium-



Construction at Mwale

sized, affordable and environmentally friendly housing units, as well as a 5,000-bed reference hospital. One of Kenya's largest shopping centers will be built, as well as an airport.

MMTC will also house a 144-MW waste-to-energy power plant which will convert all hospital and municipal solid waste into clean renewable power upon commissioning in December 2020. AEA



Africa Spotlight



The Nigerian Rural Electrification Agency is pushing the national agenda forward with off-grid projects

he Nigerian Rural Electrification Agency (REA) is an implementing agency of the Federal Government of Nigeria tasked with the electrification of unserved and underserved communities. REA is carrying out the Nigeria Electrification Project (NEP), an innovative program to catalyze off-grid development in Nigeria, through the provision of grant funding, detailed market data and technical assistance. The NEP components are Solar Hybrid Mini Grids, Solar Home Systems (SHS) and the Energizing Education Program (EEP).

The REA works in collaboration with international funding institutions such as the World Bank and African Development Bank, as well as donor organizations. Recently, the REA signed grant agreements with seven renewable energy investors under the World Bank-funded NEP. The grant agreement signing for the Performance Based Grant (PBG) and Output Based Fund (OBF), which took place on October 18 in Abuja, was attended by power sector stakeholders and representatives from international donor agencies.

courtesv of REA



Developer and participants with the MD/CEO Rural Electrification Agency Mrs Damilola Ogunbiyi, during the Grant Agreement Signing for PBG and OBF

The OBF grant agreement is for the sale of solar home systems to homes and businesses and the PBG is for the deployment of mini grids to unserved and underserved communities across Nigeria. Following a thorough procurement process, the first six companies to be signed to the OBF are: A4&T Integrated Services Limited, ASOLAR Systems Nigeria Limited, Txtlight Power Solutions Limited (Lumos Nigeria), Greenlight Planet, Smarter Grid International and Solar Energy by D. light Limited. With these grants, the companies will play a major role in enabling the NEP Solar Home Systems (SHS) component to achieve its goal of electrifying one million Nigerian households in five years using renewable energy solutions.

PowerGen Renewable Energy is the first company to sign for the Performance Based Grant under the NEP Mini Grids component. Under this partnership with REA, PowerGen will deploy mini grids to Rokota community, Niger State. Mini Grids Component Head, Lolade Abiola, leads the project to provide clean, safe, reliable and affordable electricity to 300,000 homes and 30,000 local businesses with mini grids. After the signing, she reiterated that "the grant agreement signing today is an attestation to both local and foreign investors of the readiness of the Nigerian Government to leverage renewable energy technologies for increased access to electricity. I can confidently state that renewable energy is the next big thing for the sector."

In her remarks, the REA Managing Director, Mrs. Damilola Ogunbiyi, expressed optimism over the determination of the Federal Government to transform the power sector in accordance with its Next Level agenda. She acknowledged the support of the World Bank and the African Development Bank to improve electricity access through the provision of grant funding and technical assistance. "REA, in collaboration with the Federal Government of Nigeria, has secured funds from the World Bank (\$350m) and African Development Bank (\$200m). These funds will go a long way in helping us connect communities, schools and homes to constant electricity."

In September, REA commissioned a 98.8-kW solar hybrid mini grid power plant at Kare-Dadin Kowa, Kebbi State, under its Rural Electrification Fund (REF), as part of its commitment to provide equitable access to electricity across regions in Nigeria. The Fund strives to maximize the economic, social and environmental benefits of rural electrification grants, to promote off-grid electrification, and to stimulate innovative approaches to rural electrification.

The solar hybrid mini grid system will provide clean energy to 483 residential buildings, 82 commercial buildings and will serve over 3,000 inhabitants of Kare-Dadin Kowa. A total of 565 high grid



Tour of the Kare Dadin facility during commissioning

solar panels have been installed to power homes, businesses, places of worship, schools, health centers etc.

Speaking on the project's implementation, the REF Executive Director, Dr. Sanusi Ohiare, mentioned that "Kare-Dadin Kowa community is the second of twelve communities earmarked to benefit from REF grants. This is due to following and attaining legal, regulatory and procurement compliance and no objection from the Federal Government."

The Governor of Kebbi State, Abubakar Atiku Bagudu, stated that "the solar hybrid mini-grid will expand and transform the economic landscape of Kebbi state. Small businesses like welders, cold rooms, as well as processing mills can now operate more effectively with reliable and clean electricity as a result of this project."

In line with REF's Public Private Partnership (PPP) model, private sector participation and investment was also critical to the successful implementation of the project. Anayo Okenwa, MD/CEO, Nayo Tropical Technology Limited, shared that "the installed solar hybrid mini grid was constructed in line with international standards and best practice. As an indigenous firm, we are proud to have leveraged the skills and capacity of our host community, in addition to providing the enabling environment for skilled labor and job creation."

Solar and Education: A Perfect Partnership

The Federal Government and REA are focusing on utilizing the power of solar for education as well. Under implementation by REA, the Energizing Education Program (EEP) is a federal government intervention focused on developing off-grid dedicated independent power plants, rehabilitating existing distribution infrastructure to supply clean, safe and reliable power to 37 federal universities and seven affiliated university teaching hospitals. As a result, the first solar hybrid power plant at Alex Ekwueme Federal University Ndufu-Alike Ikwo (FUNAI) in Ebonyi state under the Energizing Education Program (EEP) was implemented.

The FUNAI commissioning included the launch of 7.5 km of solar powered streetlights for illumination and safety, as well as a world class renewables training center. FUNAI students and teaching staff now have access to electricity supply from the university's 2.8-MW solar hybrid power plant.



Alex Ekwueme Federal University

"Thanks to this Administration's focused and integrated off-grid power policy, over 7,700 students and 1,819 faculty staff at FUNAI will have access to clean reliable energy. This Program will undoubtedly improve the quality of education, research and health care services at our federal universities and teaching hospitals. I'm proud of the role that women have played in the successful implementation of this project from the Head of project being a women to the female STEM students that all worked on the project," Mrs. Ogunbiyi stated at the commissioning event.

FUNAI is one of the Energizing Education Program Phase 1 university projects that will deliver clean and sustainable energy to nine Federal Universities and one University Teaching Hospital using solar hybrid and/or gas-fired captive power plants. "It is a privilege that FUNAI is one of the flagship learning institutions paving the way. Our university campus and student life are being transformed every day. Twenty of our female students are among the over 180 participants in the first phase of the EEP STEM Female Internship Program, which provided our female students with hands-on experience in the design and construction of FUNAI's solar hybrid power plant and training center," the FUNAI Vice Chancellor, Prof. Nwajiuba Chinedum Uzoma explained. The commissioning culminated in the graduation of the STEM participants who received certificates of completion for their technical and practical training.

As an outcome of collaboration between the Rural Electrification Agency, Ministry of Power, Works and Housing, the Federal Ministry of Environment and the National Universities Commission, the EEP represents a significant milestone in green financing in Africa. EEP Phase 1 is fully funded by the Federal Government of Nigeria under the Green Bond, the first certified sovereign bond and the second one originating in Africa.

Subsequently, the pair launched the largest off-grid solar hybrid power plant in Africa at Bayero University, Kano (BUK), also under the EEP. Bayero University was the second project to be commissioned under Phase 1 of the EEP. As a result, 55,815 students and 3,077 staff now have access to electricity supply from the university's 7.1-MW solar hybrid power plant. The Bayero University commissioning included the launch of 11.41 km of solar powered streetlights as well as a world class renewables training center.

Africa Spotlight



Bayero University, Kano

According to Evangelos Kamaris, managing director, METKA West Africa Limited, the EPC contractor on the project, "the stateof-the-art solar hybrid power plant will result in carbon dioxide savings of 108,875,120 pounds, a feat we as green contractors are proud of."

Another achievement resulting from the commissioning event was the graduation of 20 female students who participated in the Female STEM Students Internship Program. The female students, who received practical training during the course



BUK STEM intern students

of the project's construction, were awarded certificates of completion.

Summary

The REA has made great strides over a short period of time in bringing power to underserved communities and institutions. With continued support from the Federal Government and supporting institutions such as the World Bank and AfDB, the objectives of the Nigeria Electrification Project will continue to be met, benefitting local communities and boosting their economies.



TANDEM SOLAR MODULES One-Two Combination Packs a More Powerful Punch

Perovskite/ CIGS semiconductor pairing promises to boost photovoltaic efficiency

he efficiency ceiling of commercially available solar modules leaves little room for improvement. Tandem solar modules with two light-harvesting active layers have far greater potential. The future could well belong to this promising technology. Researchers engaged in the Capitano project are combining thin-film solar modules based on perovskite semiconductors with semiconductors made of copper, indium, gallium and selenium (CIGS). This combination is the key to building remarkably efficient tandem solar cells with all the advantages of thin-film technology and an efficiency factor that could top the 30-percent mark. The Karlsruhe Institute of Technology (KIT), the Schwäbisch Hall-based enterprise NICE Solar Energy, and the Center for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW) have joined forces in this project with the ZSW acting as coordinator.

Tandem solar modules consist of two different types of modules in a layered array that puts the solar spectrum to much better use than any single solar cell. This combination is far more efficient. Multi-junction solar cells' efficiency could extend beyond 30 percent, in theory. The ceiling for single-layer silicon solar cells, for example, is 29 percent.

Two is better than one

Several variants of tandem modules are now available. The perovskite solar cell in the CIGS/perovskite version converts the light in the visible part of the solar spectrum into electricity. The underlying CIGS solar cell absorbs the light in the near-infrared spectrum that penetrates the perovskite solar cell. One of the reasons why these tandem solar cells look to be so promising is that they could be realized as thin-film technologies on substrates of several square meters. This would not only boost efficiency; it would also cut costs.

A joint effort to up efficiency

Commenting on this consortium's excellent skill-set, Michael Powalla, ZSW board member, head of the Photovoltaics division at ZSW and professor at KIT, says, "Given the wide spectrum of skills at work in this project ranging from fundamental science to mass manufacturing, I expect great advances to be made in the further development of this promising technology." Dr. Ulrich W. Paetzold, head of the junior research group at KIT, added, "We are developing the next generation of highly efficient thin-film tandem cells with an efficiency potential above 30 percent. Promising applications include highly efficient solar modules for buildingintegrated photovoltaic solutions, for example."

The Capitano project

Launched in July 2019, the Capitano project is to run for three years with the German Ministry for Economic Affairs and Energy providing around €5.2 million in funding. This project aims to develop cells with higher yet stable efficiency factors, and then combine these cells to make efficient tandem solar modules. The industry partner NICE Solar Energy will assess the possibility and cost of manufacturing these modules on an industrial scale.

To achieve this project's goals, the ZSW is developing CIGS modules with an adapted bandgap and optimized surface, and investigating semitransparent perovskite solar cells and highly efficient and transparent modules. Eager to test industrial processes such as slot-die coating for the perovskite layer, researchers are focusing on producing optimized intermediate layers and transparent contact layers that have been adapted accordingly. The results will flow into efforts to make tandem solar cells and modules that are interconnected in monolithic array. These scientists also want to assess the manufacturing process's ecological impact.

KIT is doing its part for this project by developing new materials, processes, and prototypes for manufacturing semi-transparent perovskite solar cells and highly transparent modules with an adapted bandgap a high efficiency factor. The institute's researchers are particularly interested in exploring scalable manufacturing processes such as slot-die coating and gas-phase vacuum deposition. Its scientists are developing a light management concept to improved light yield amid the complex architecture of the tandem solar cells. They have also been tasked to calculate yields.

NICE Solar Energy GmbH is providing small CIGS solar modules from its CIGS innovation line to underpin the other two partners' efforts to make tandem solar modules. The enterprise will then assess these tandem modules' suitability for manufacturing at industrial-scale, 300 megawatts capacity. A cost comparison with single-junction CIGS solar modules is also on the company's agenda.

Local Impact



CAMEROON Three Power Plants Financed by the AfDB to Reduce Power Cuts

With an estimated 23,000 MW of hydroelectric production capacity, Cameroon has

or many years, Cameroon's national electricity supply has been notoriously unreliable and subject to power cuts. The last significant electric system outage, which lasted eight hours, occurred last March and affected several of the country's regions (the Far North, North, Littoral, Adamaoua, South and Centre regions).

However, three projects financed by the African Development Bank (AfDB) for \$121.4 million in 2010-2011 are at last starting to provide long-suffering Cameroonians with much more reliable electricity.

Completion of work on transport lines, line maintenance and especially the replacement of wooden electricity transport poles with concrete poles are all part of the system improvements, whose goal is to increase the quality and reliability of public access to electricity.

The Lom Panga storage reservoir project is complete, but the dam's generating plant is still under construction. In the meantime, two

other power plants, Kribi and Dibamba, have begun working to strengthen Cameroon's generating capacity.

In November 2011, the African Development Bank awarded \$62.9 million for the construction of Lom-Pangar, the hydroelectric generation's 'lungs' in the country's East region. The project included the construction of a reservoir (6 billion cubic meters of water retained) for regulating the Sanaga's flow and optimizing generation during low water periods at the Song Loulou plant (335 MW) and the Edea plant (224 MW). The production from these two plants has grown from 450 MW in 2011 to 729 MW now.

A 30 MW hydroelectric generating plant is under construction at the base of the dam. It will be linked to the Bertoua thermal plant by a 105 km 90kV line that should start to work in May 2021 following the installation of an evacuation station and the construction of its four turbines. Lom-Pangar will provide electricity to 150 locations in the region and will significantly reduce power cuts in the area.



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Nachtigal Cameroon Electricity

"The Lom-Pangar dam will help save water in other reservoirs," said Theodore Nsangou, the General Director of the Electricity Development Corporation (EDC), in an interview with a government publication in March 2018.

The 216 MW capacity Kribi gas-fired generating plant began to work in 2013 after receiving \$32.8 million from the African Development Bank in July 2011 for an expansion project. Its production goal is 330 MW. Currently, the power plant has a 100 km 225 kV transport line connecting it with the Magombe substation in the Edea region in the country's South region. The plant operates with natural gas (with light fuel oil as emergency backup) from the Sagana South offshore gas field.

During the dry season, the Kribi plant and its nine simple cycle gas turbines are truly the system's "oxygen", maintaining the country's energy flow, particularly to the South's interconnected system, which receives its electricity from Kribi.

The Kribi gas-fired generating plant and the Dibamba generating plant provide access to electricity for close to half of Cameroon's population.

The Dibamba heavy fuel oil generating plant was also designed to meet the serious problem of power cuts during the dry season. It

was the first of the three plants to receive financial support from the African Development Bank of \$25.6 million in April 2010. Built to mitigate the country's shortage of electricity, high demand quickly outpaced its capacity the day after it began operations.

Located in the outskirts of Douala, Cameroon's second largest city, Dibamba is an 86 MW thermal generating plant with a 2 km 90 kV transport line linked to the network serving the most remote and densely populated areas in the country's West region.

With an estimated 23,000 MW hydroelectric production capacity, Cameroon has the second largest hydroelectric potential in Africa and the 18th largest worldwide. The country plans to complete the development of its hydroelectric industries by 2035. Construction of the Nachtigal hydroelectric generating plan began in 2019 and will be complete in about five years, with an estimated generating capacity of 420 MW.

The African Development Bank has awarded a funding package of \$154.8 million for the completion of this generating plant. Other development partners, such as the World Bank, the European Investment Bank and Proparco, are also involved. **AEA**

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Editorial Feature

Blended Finance Unlocking Capital to Grow Africa's Infrastructure Stock

The Private Infrastructure Development Group (PIDG) is in its 17th year of pioneering innovative finance solutions in emerging and fragile economies

⁶ B lended finance" is a phrase now being heard in boardrooms and conference podiums across the world. One of its pioneers is the Private Infrastructure Development Group (PIDG) and its operating companies, each of which provides specialist corporate finance products to stimulate private sector investment in infrastructure in developing economies in Africa and Asia. PIDG's focus is on the poorest nations, the ones most in need of infrastructure to secure economic sustainability and where commercial finance products are least likely to be readily available or affordable.

Since 2002, PIDG has supported 183 infrastructure projects and provided 243 million people with access to new or improved infrastructure. PIDG is funded by six governments (the UK, the Netherlands, Switzerland, Australia, Sweden, Germany) and the International Finance Corporation on behalf of the World Bank Group.

At its most simple, blended finance is using anchor financing provided by economically robust governments to lever private funds and expertise into achieving strategically important economic developments. But the act of bringing two pots of money together is in itself not enough to be remarkable. Where blended finance often delivers a superior project financing solution is in the culture of structuring and executing transactions. Robust business models, high managerial and technical ability are of course prerequisites, but it is the willingness of finance providers, exemplified by PIDG and its businesses, to be innovative in the search for solutions that can turn financially marginal projects into bankable deals. It is an approach entirely in line with the PIDG mission to contribute to the conditions to help alleviate poverty and one that provides for greater patience and longer horizons than is commonly found in more traditional finance sectors.

At its most successful, blended finance makes things happen that would have been unlikely otherwise to have come to pass. The Emerging Africa Infrastructure Fund (EAIF/the Fund), one of the PIDG companies, provides a comprehensive picture of how blended finance works in frontier markets and the impact its activities can have on helping fight poverty and strengthening economic foundations.

EAIF is the oldest of PIDG's businesses. It is a debt fund and is managed by Investec Asset Management. EAIF is owned by four European governments – the United Kingdom, the Netherlands, Sweden and Switzerland. It also raises its capital from private banks and financial institutions like Allianz Global Investors and Standard Chartered, and national and international development finance institutions, like KfW of Germany and the African Development Bank. In 2018, the total capital of the Fund was just over \$1.00 billion, made up of approximately \$400 million in equity and \$600 million of debt finance. It can lend between \$10 million and \$50 million, often up to 15 years or more. Its terms are commercial but with more elasticity than found in purely private sector debt markets.

EAIF's clients are mainly private sector infrastructure companies and projects across Africa. Just over half the Fund's lending is to energy generation and supply projects, of which approximately half is in the renewable sector. The balance is in the eight other sectors it can lend to – telecommunications and digital; water and waste services; infrastructure components and equipment; gas transport, storage and supply; transportation, agribusiness and affordable housing.

Gabon, Mozambique and Guinea

Three project financings announced in recent months show something of the range and impact of the EAIF project portfolio.

In August, the Fund announced a €40 million loan as part of a €305 million port expansion of the Gabon Special Economic Zone (GSEZ) at Owendo, Gabon. The Fund arranged the total debt finance package, while the African Development Bank structured the transaction. The new port infrastructure adds an additional 4 million tonnes of capacity, doubling the port's capability. In addition to developing the port, GSEZ has also created a business hub located within the port. It has attracted 123 businesses from 18 countries.

In August, Mozambique's president declared open the 40-MW Central Solar de Mocuba (CESOM) solar power plant. EAIF contributed a \$16.9 million B Loan, with a 16-year term. In addition, PIDG provided a \$7 million Viability Gap Funding grant for the project. This element of the financing package (raised from PIDG's Technical Assistance Facility) was a key component in completing the jigsaw of delivering a bankable business model.

In Guinea, EAIF is part of a lending consortium led by the International Finance Corporation that has raised \$750 million in



EAIF's first project in Mali was the 90-MW Albatros Energy Mali (AEM) power station

debt for the Guinea Alumina Company (GAC). GAC is using the majority of the capital to finance new port and marine facilities and create over 27 km of new railway. The railway will primarily move bauxite from inland to the port, but the additional track is also expected to enable greater passenger traffic and boost economic activity in general.

The GAC project aligns with PIDG's focus on infrastructure development in the world's poorest countries, and once completed, is expected to add at least 3% to Guinea's GDP. That GDP estimated uptick demonstrates the fundamental strategic importance of infrastructure to economic development; enabling the construction of resilient facilities that will have many decades of life, stimulating large-scale commercial activity, creating new jobs and bringing new skills.

Confidence building

Perhaps above all, the support of EAIF for a project, combined with the entrepreneurial skill, vision and drive of its private sector clients, sends signals that build confidence in a country. Indigenous and foreign investors have more reasons to believe they too can be successful there. Governments can use the successful financing of infrastructure projects as endorsement of the stability and efficiency of their economies and citizens have more reason to believe in a better future.

EAIF's strength lies in its flexibility of its approach. Every project is different, has different strategic economic needs and different human needs. Financial, commercial, social, geographic and environmental circumstances differ in every case and all these matters are carefully examined. All project proposals are thoroughly evaluated to be sure that the owners and contractors are fit and proper people, that the project is commercially viable, and that it meets strict environmental, social, governance and health and safety guidelines. Only when all the required conditions are met does EAIF agree to lend.

PIDG across the financing cycle

Alongside EAIF and the Technical Assistance Facility are other PIDG companies that can meet the financing needs of infrastructure projects at key stages in their planning and financing cycles. It is increasingly common for two or more PIDG companies to be involved in the entire financing cycle of infrastructure projects.

DevCo provides advisory services to governments in the poorer (DAC I and II) countries to help them create enabling environments that facilitate private sector participation in infrastructure projects.

InfraCo Africa support reduces the risks and costs associated with early stage project development and ensures projects are developed to the highest standards, from concept to financeable investment opportunities. InfraCo Asia provides similar products and support in south and south-east Asia.

Guarant Co provides local currency contingent credit solutions, primarily guarantees, to support projects and companies raising principally local debt financing for infrastructure developments in lower income countries in Africa and Asia.

PIDG's core ambition is legacy. Its owners, funders, public and private sector partners, its employees, advisers and suppliers want their efforts and their capital to have high and lasting impact, to help transform economies and lives. Their work and strategies seek to leave behind greater infrastructure capacity and stronger economies. It aims too to build greater capability and finance potential in local credit and capital markets. For as confidence grows and real, hardnosed investment decisions are seen to deliver success, local finance markets have greater reason to grow in confidence, size, product range and skills.

Blended finance is far more than about money. It is blended economic development project by project. It is to lever legacies of growth, opportunity and self-confidence. It is to lever better futures.

African Politics

Deputy Minister Hlongwa Dies in Car Accident

South Africans have been mourning the loss of Bavelile Hlongwa, who served as the Deputy Minister of Minerals and Energy. Hlongwa died in a car crash in mid-September.



Hlongwa was appointed as Deputy Minister of Mineral Resources and Energy in May 2019. Prior to her appointment she s er v e d as executive deputy chairperson of the National Youth D e v e l o p m en t Agency.

Bavelile Hlongwa

She studied at the University of KwaZulu-Natal (UKZN) Howard College where she obtained her Bachelors of Science Degree in Chemical Engineering. She started her career at Shell Downstream SA.

Deputy Minister Hlongwa was honored with an Official Funeral Category 2 in line with government's State, Official and Provincial Funeral Policy. The national flag also hung at half-mast at every flag station in the country until the Deputy Minister was laid to rest.

Zimbabwe's State Security Minister Sanctioned by US

US Secretary of State Mike Pompeo has imposed sanctions on Zimbabwe's state security minister, Owen Ncube. The US government says they have credible information of Ncube's involvement in "gross violations of human rights."

Secretary of State Pompeo made an announcement on his Twitter account. "Today, I publicly designated Owen Ncube for his involvement in a gross violation of Human Rights in Zimbabwe. State-sanctioned violence in Zimbabwe must end now and those responsible for human rights violations must be held accountable," the Tweet read.

Pompeo also said in a statement that Washington was troubled by the "Zimbabwean government's use of state-sanctioned violence against" protesters, opposition leaders and labor leaders.

Major Upset in Tunisian Elections Sees Outsider Sworn-In

Kais Saied, a 61-year-old law professor with no prior political experience has been sworn in as Tunisia's new president. In a runoff election on October 13, Saied won just over 72 percent of the votes, while his opponent, Nabil Karoui, took only 27% of the votes cast.

Saied was buoyed by support from the country's youth who came out in high numbers to elect the new president. Saied has vowed to fight corruption and promote social justice, while saying



Kais Saied

access to healthcare and water is part of national security. The president elect has also promised to decentralize government and the process through which representatives are elected to the popular assembly.

Protests Rock Egypt Once Again

From September 20-21, Egyptians took to the streets in Cairo and other major cities calling for the resignation of President Abdel Fatah el-Sisi. The protests were in response to an online call for demonstrations against government corruption by businessman and actor Mohamed Ali. From his self-imposed exile location in Spain, Ali instigated the protests after he began posting videos accusing Egyptian officials of squandering billions of Egyptian pounds. On September 2 his first video garnered 1.7 million views on his Facebook page alone.

Security forces and riot police used teargas on the crowds on day 1, and reports have it that on day 2 of the protests, rubber bullets and live ammunition in addition to tear gas were used to disperse the crowds. Hundreds of protestors were reportedly arrested in 12 locations throughout the country.

The government also issued warnings to media to be careful in their coverage of the crisis. They also blocked access to various international news organizations who covered the developments and access to some social media outlets was blocked or limited.

General Haftar Says "Open to Dialogue" Opposition General Khalifa Haftar has announced his willingness to open dialogue after repeatedly rejecting United Nations calls for talks. Haftar and his forces have been trying to capture Libya's capital from its internationally recognized government.

The statement was issued hours after Prime Minister Fayez al-Sarraj called Haftar a "war criminal" and ruled out peace talks during a speech at the UN General Assembly in New York.

"When all is said and done, we need dialogue and we need to sit down," Haftar stated.

At Least 67 Dead in Ethiopia Protests

At least 67 protesters were killed in Ethiopia and more than 200 were injured, according to the police commissioner for the Oromia region. The deaths and injuries were a result of direct clashes with security forces (19 killed) and also as a result of clashes between competing factions that included supporters of Prime Minister Abiy Ahmed and supporters of Jawar Mohammed, an independent media owner and a prominent critic of Ahmed.

Prime Minister Ahmed, a Nobel Peace Prize winner, has remained silent thus far.

The ongoing protests in the capital Addis Ababa along with the greater Oromia region erupted after an accusatory Facebook post by Mohammed, who has more than 1.7 million followers. In the post, Mohammed alleged that police were conspiring to attack him at his home after government officials told his security detail to leave his side. Police officials have denied his claim.

President Masisi of Botswana Wins Election

Mokgweetsi Masisi was declared president of Botswana once again, retaining his position and the ruling Botswana Democratic Party's (BDP) hold on power despite a strong opposition challenge in the presidential election. The main opposition party, Umbrella for Democratic Change (UMD) gave BDP its first true challenge in the five decades it has held power. The BDP has held power since gaining independence from Britain back in 1966.

The Southern African Development Community observers declared the election free and fair.

Mugabe Dies in Singapore Hospital at 95 Former Zimbabwean president Robert Mugabe died on September 6 at the age of 95, at Gleneagles Hospital in Singapore. Mugabe had

been receiving treatment at the Singapore hospital since April.

Mugabe held the presidency for almost four decades at 37 years, and was one of Africa's most controversial leaders. He was deposed in 2017 having been given an ultimatum by the ruling ZANU-PF to either resign or face impeachment. This pressure largely came due to his firing of First Vice President Emmerson Mnangagwa and fears that his much younger wife, Grace Miugabe, was being groomed to take over as president.

Coming to power as a hero for his fight against the former white masters of colonialism and African nationalism stance, he later digressed into an authoritarian. He was known for his brutalism against political rivals with many deaths attributed to his orders. At points during his rule, the economy was driven into the ground and the citizenry faced starvation.

Nyusi Retains Power with Resounding Win

President Filipe Nyusi won a landslide victory in Mozambique's presidential. Nyusi took 73% of the vote according to the National Election Commission (CNE). His party, Frelimo, also secured big wins in the legislative and provincial contests.

The main opposition candidate backed by Renamo, Ossufo Momade, garnered 21.8% of the tallied votes according to CNE Chairman Abdul Carimo. Daviz Simango, of the Mozambique Democratic Movement (MDM), took just over 4% of the votes cast.

As with many Africa elections, this one is also being challenged by the losing party. Renamo claims the elections were riddled with irregularities and fraud. Meanwhile, Frelimo maintains the elections were free and fair. International observers were onhand for the elections. Ignacio Sanchez Amor, leader of the European Union's OSCE observer mission, said "voting procedures were well-implemented" on election day, but



Filipe Nyusi

he did add that there were no observers in almost half of the country's polling stations.

"The pre-election and the voting phases of the 2019 electoral processes were generally peaceful and conducted in an orderly manner," said Zimbabwean Defense Minister Oppah Muchinguri-Kashiri, the head of the Southern African Development Community (SADC) which also observed the process.



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POLITICS

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Corporate

ENGIE Acquires Mobisol, Becomes Market Leader in African Off-Grid Solar

ENGIE has expanded its decentralized energy offering in Africa through the acquisition of Mobisol, a pioneer of off-grid solar solutions. Mobisol has operations in Tanzania, Rwanda, and Kenya and has installed more than 150,000 solar home systems, providing clean and reliable energy to over 750,000 people in sub-Saharan Africa.

With the acquisition of Mobisol, ENGIE will be offering solar home systems in three additional countries, complementing the six countries where it is already present with its solar home system company Fenix International. Mobisol's focus on productive use products, combined with Fenix's inclusive home solar power systems, will enable ENGIE to offer an unparalleled range of affordable energy products as well as extending its customer base from rural to urban areas. The closing of the acquisition of Mobisol will happen once all approvals of the relevant regulatory bodies are received.

ENGIE already has significant activities in off-grid electrification in Africa. With its subsidiary Fenix International, it provides access to energy and financial services via its solar home systems to over 500,000 customers, improving the quality of life for over 2.5 million people in Uganda, Zambia, Nigeria, Benin, Cote d'Ivoire and Mozambique. Additionally, with ENGIE PowerCorner, it supplies affordable electricity to rural populations through smart mini-grids powered by solar energy and battery storage. PowerCorner offers 24/7 energy services to households, local businesses and public services in villages across Tanzania and Zambia. All of these services are enabled by digital financial solutions such as mobile money and Pay As You Go technologies.

Eskom to Receive \$4 Billion Bailout

South Africa's parliament has agreed to distribute R59 billion (about \$4 billion) to beleaguered state utility company Eskom. Through a special appropriations bill, the government will provide the power utility R26 billion in the year through March and R33 billion the following year, according to Bloomberg. Eskom has amassed R450 billion in debt and isn't generating enough cash to cover its costs. The company already received a three-year R69 billion package in February.

The decision comes as South Africa's citizenry has been experiencing recent power cuts due to failing generation units.

Total Dedicates its \$400 million Global Venture Fund to Carbon Neutrality

Total announced that it will focus its global venture fund on fostering carbon neutrality. The fund will increase its capital to a cumulative \$400 million within five years' time. Its investments will support start-ups that develop innovative technologies and solutions which help companies to reduce their energy consumption or the carbon intensity of their activities. The fund will be known as Total Carbon Neutrality Ventures (TCNV).

"The Total Carbon Neutrality Ventures fund will fully support Total's ambition to become the responsible energy major. It will allow us to expand the reach of our low carbonbusinesses beyond our own borders," said Patrick Pouyanné, Chairman and CEO of Total. Over five years, the \$400 million fund will invest in start-ups whose technologies or innovative solutions could contribute to carbon neutrality".

TCNV will invest globally, with teams based in Europe and the U.S., focusing on the areas such as smart energy, energy storage, smart mobility, bioplastics and recycling.

The fund builds on Total Ventures' existing portfolio of 35 global start-ups that directly and indirectly contribute to carbon neutrality. That portfolio includes Solidia, Sunfire, Scoop, Shyft Power Solutions, Ionic Materials, MTPV, AutoGrid, Stem and OnTruck.

Siemens Gamesa to Acquire Selected Assets of Senvion

Siemens Gamesa Renewable Energy announced that it has reached agreement to acquire selected European assets of Senvion Group for €200 million.The assets included in the transaction are a large part of the European Onshore Service Business of Senvion Group and all associated assets and operations to provide full service, all the Intellectual Property of Senvion, as well as the onshore blade manufacturing facility in Vagos, Portugal.

Senvion's European service assets will strengthen Siemens Gamesa's capacity and potential in an important segment. The acquisition of a Service fleet of 8.9 GW from Senvion will take Siemens Gamesa to a total of nearly 69 GW under maintenance. The addition of these assets helps to diversify Siemens Gamesa's business mix and geographical exposure with contracts that offer long-term visibility and renewal rates that have historically been very high. The onshore blade manufacturing plant in Portugal is one of Europe's most competitive manufacturing facilities. The Vagos plant would help to strengthen Siemens Gamesa's industrial value chain and reduce dependency on supplier sourcing from Asia, mitigating volatility amid the uncertainties brought about by current trade issues. The highly competitive facility is complementary to existing SGRE blade capacity, has a best-in-class operational features and will help to support international sales. As part of the acquisition, approximately 2,000 Senvion employees are expected to join Siemens Gamesa.

Subject to obtaining the necessary regulatory approvals and achieving other closing conditions, Siemens Gamesa expects to close the respective acquisition of assets in the first half of the fiscal year 2020 (October 2019 -March 2020), and as a result it will have no impact on financial performance in fiscal 2019.

SolarEdge Files Patent Infringement Suit against Huawei

SolarEdge Technologies, Inc. announced on October 7 that it has filed three lawsuits for patent infringement against Huawei Technologies Co., Ltd., a Chinese entity. SolarEdge is evaluating filing additional actions to protect its patents.

The lawsuits, filed in the Regional Courts of Jinan and Shenzhen in China, cite unauthorized use of patented technology, which is prohibited by law, and are intended to protect SolarEdge's significant investment in its innovative DC optimized inverter technology. Seeking damages and an injunction, the lawsuits are intended to prevent the defendants from selling any products infringing upon SolarEdge's patented PV inverter and power optimizer technology. The recently filed lawsuits follow the filing of three other lawsuits in Germany by SolarEdge in June and July 2018 against Huawei Technologies Co., Ltd., a Chinese entity, Huawei Technologies Düsseldorf GmbH, a German entity, and WATTKRAFT Solar GmbH, a German distributor relating to three patents.

"SolarEdge spends considerable time and resources on developing innovative technology and this investment needs to be protected," said Zvi Lando, Acting CEO and VP Global Sales of SolarEdge. "Our industry is driven by innovation which over the past decade has made PV energy more affordable and more efficient. The significant financial investment and years of dedication and hard work from our R&D engineers needs to be protected from

exploitation. SolarEdge's patents are the result of our relentless pursuit of innovation and commitment towards PV proliferation. We will continue to take legal action against Huawei and others to protect our assets."

SolarEdge is a global leader in smart energy technology with world-class engineering capabilities. SolarEdge holds 303 awarded patents and 240 additional patent applications worldwide.

Mainstream Renewable Power Signs Cooperation Pact with Oil Major

Mainstream Renewable Power has signed a co-operation agreement with Italian oil and gas major ENI, to develop large-scale renewable assets, targeting strategically important and high-growth markets for both companies. By signing this agreement, ENI and Mainstream will collaborate on potential developments of power generation from renewable sources across Africa and Southeast Asia, with an initial focus on the UK

Luca Cosentino, Executive Vice President of Energy Solutions department for ENI said: "ENI's commitment towards renewable projects development is one of the main pillars of the company's decarbonization strategy, which also includes the reduction of direct GHG emissions in all its activities, a low-cost and low-carbon portfolio, and investments in R&D. In line with these key drivers, ENI has

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defined an integrated business model, which draws on specific areas of expertise and competitive advantages such as Eni's technical competences and global presence. We believe that this new partnership with Mainstream will bring additional value to our renewable business especially in the area of offshore wind."

Andy Kinsella, Group Chief Executive at Mainstream said: "We are delighted to announce this co-operation agreement with ENI. Our joint participation in the UK's Offshore Round 4 will combine our leadership position, expertise and unrivalled track record in the global offshore wind sector, with ENI's pre-eminence and experience in offshore energy infrastructure, its commitment to decarbonize the energy system, as well as its robust balance sheet, in what is a capital-intensive business."

UNHCR Launches Sustainable Energy Strategy

In recognition of the growing climate crisis and to boost refugees' access to safe and sustainable energy, while minimizing its own environmental impact, UNHCR, the UN Refugee Agency, launched a four-year Global Strategy for Sustainable Energy. The strategy promotes the transition to clean, renewable energy at refugee camps and hosting sites, including for individual households, communal areas and support facilities.

UNHCR has been working for several decades to reduce the environmental impact of refugee crises. Some key initiatives include the establishment of solar farms in Azraq and Za'atari refugee camps in Jordan; the provision of clean cooking fuel in Niger; clean fuel and a waste treatment plant for refugees in Bangladesh; and renewable energy and clean cooking solutions for refugees in Rwanda, Tanzania and Ethiopia.

UNHCR has also been pioneering modern and innovative land restoration projects such as the "Green Refugee Camp" project in Cameroon, which ensured the reforestation of more than 100 hectares of severely degraded land in and around Minawao Refugee Camp and the creation of 175 local jobs. The project was selected as a model for Global Best Practice for delivering on the Sustainable Development Goals (SDGs) during the UN General Assembly SDG Summit this year.

UNHCR's new Sustainable Energy Strategy builds upon current initiatives to mainstream access to sustainable energy and minimize environmental impact across UNHCR field operations worldwide. The strategy focuses on four key areas; ensuring that refugees meet their essential energy needs from the beginning of an emergency; improving refugees' access to clean and affordable energy to cook, and heat and light their households; and ensuring clean energy to run refugee community and support facilities such as central water supplies, street lighting, schools and health centres.

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Conferences

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17-19	Sugar & Ethanol Africa	Nairobi, Kenya	www.bit.ly
17-18	Future Energy East Africa	Nairobi, Kenya	www.future-energy-eastafrica.com
24-26	Power Nigeria 2019	Lagos, Nigeria	www.power-nigeria.com
Octo	ber 2019		
7-9	$7^{\rm th}$ Annual HOMER International Microgrid Conference (HIMC)	Cambridge, USA	www.microgridconference.com
16-17	Renewable Energy Cyber Security Forum	Berlin, Germany	www.bisgrp.com
29-31	5 th Annual Southern Africa Power Summit 2019	Cape Town, South Africa	www.ssapower.com
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The 4th annual edition of RES: West will make its first appearance in Dakar, Senegal, from 2-3 December 2019 at the King Fahd Palace Hotel. **RES: West Africa** will bring together over 300 investors, project leaders and utilities stakeholders to engage and present the latest developments on enhancing the energy mix within the wider West Africa region.

The Summit will feature project focused discussions on Gas, Wind and hydro and will showcase investment opportunities through regional anchor projects, infrastructure financing and the future of renewable energy within Senegal and beyond.

For more information please contact: res-west@energynet.co.uk quoting RESW_PE

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