Vol. 11 Issue 3

Alternative Energy Africa

ISSN 1756-4417

10th ANNIVERSARY

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May/June 2018

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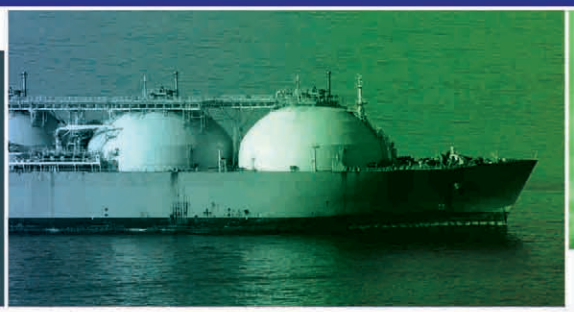


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CONTENTS

FEATURES

DEPARTMENTS

On the Cover

XiNa Solar One, South Africa's first tower plant

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Publisher's Note

MESSAGE FROM THE PUBLISHER

Now that South Africa is under new leadership and the stalled Renewable Energy Independent Power Producers Procurement (REIPPP) program has had a jump start, the picture is looking pretty rosy for the country's renewable energy sector. It was recently announced that another round of REIPPP would be launched later this year. It seems to me that this is a very timely announcement from the South African authorities as investment over the past years has moved to other parts of the continent and a higher level of competition for these crucial investment dollars has emerged.

Notably, Egypt, Kenya, Morocco and Uganda have inked deals for a number of significant projects and also offer attractive investment regimes and relatively stable political climates. But the past couple of years have also seen investment dollar flows increase to places such as Ghana and Nigeria across to Ethiopia and Tanzania. This is in addition to the many small-scale projects, notably off-grid and mini-grid, that are being undertaken with both private and donor capital in all corners of the continent. Be sure to stay tuned to *www.AE-Africa.com* for all the latest developments.

In this issue, learn more about South Africa and its most recent renewable developments in our Africa Focus section. Our feature article looks at the impressive XiNa Solar One project and its technology, while the Alternative Focus section covers sustainable building projects. As always, your comments and suggestions are welcome and can be sent to *info@AE-Africa.com*.

Dianne Sutherland
Publisher

DRC Sees Manono Solar Power-Up

The DRC's Manono solar power plant is now supplying power to the African nation. The plant went into service producing electricity in March, and supplies a new separate grid established by state-run SNEL. The plant is the largest 100% off-grid solar plant in the region.

The plant was designed, built and put into service by Congo Energy, a Forrest Group subsidiary, in partnership with the company ENERDEAL. The project was completed thanks to the financing of Forrest Group, the subject of a prior agreement with SNEL.

In addition to the power plant, Congo Energy built medium voltage grids, distribution cabins, low-voltage grids, customer connections and public lighting in the town of Manono.

The solar plant has a production capacity of 1 MW at peak and its battery storage capacity enables the plant to supply Manono with electricity when there is no sun.

Jubilee to Inject More Cash into Bujagali

Insurance firm Jubilee Holdings will inject an additional $44 million into Uganda's Bujagali hydropower plant as part of its diversification into the East African region. This follows another $54.2 million investment made in the same project two years ago, against shares.

Source: Bujagali Energy

"We are always interested in high-quality, conservative investments that offer consistent and competitive returns and a suitable asset-liability ratio for some of our long-term insurance liabilities," said Nizar Juma, the director of Jubilee Holdings.

With a capacity of 250 MW, the Bujagali hydropower plant currently produces 50% of the energy generated in the country. However, the very high cost of selling its output, 11 cents per kilowatt hour, has led to a considerable increase in the national electricity tariff that the country is seeking to reduce. To correct this there are plans to mobilize $500 million to refinance its short-term debts, for starters.

Actis to Acquire 88% Stake in the Kipeto Wind Project

Actis LLP aims to acquire an 88% stake in the Kipeto wind project in Kenya, according to a Bloomberg report. The company is currently negotiating the acquisition of 55% stake in the project from African Infrastructure Investment Managers (AIIM).

It intends to acquire 20% additional shares from the IFC. In addition, Kenneth Namunje and other partners of Craftskills Wind Energy International intend to sell some of their assets in order to increase their stake from 20% to 12%.

With a capacity of 100 MW, the Kipeto power plant will be located in the town of Oldonyo in Kajiado County. It will consist of approximately 60 turbines supplied by GE and is already covered by a 20-year PPA with Kenya Power.

World Bank Urges ROC to Invest More in Electricity

The World Bank is encouraging the Republic of Congo (ROC) to adopt a real national policy in its power sector. The lending group estimates that the investments made by the ROC in the sector are woefully insufficient and need to be increased.

Between 2006 and 2013 the World Bank estimates that the country has injected only about $1.2 million into the sector. At the same time, partner-financed interventions have increased national energy capacity by almost a third.

"Most of the investment since 2006 has been financed from external resources outside of any defined energy policy," says the World Bank. This makes it difficult to coordinate the interventions of external partners and assess the impacts of these actions.

While the country's production capacity has increased, 35% of these facilities are not available for production; the weakness of the investments not allowing for maintenance of the infrastructures. In addition, operating and maintenance costs exceed the revenues of the National Electricity Company, fueling the vicious circle of both the financial and the electrical deficit.

GET FiT Zambia chooses Multiconsult

Multiconsult has been selected to implement GET FiT Zambia. The program aims to realize investments in 200 MW of renewable energy. The firm will manage the secretariat for the GET FiT program in Zambia and provide comprehensive commercial, technical and administrative support in an effort to realize up to 200 MWs of small-to medium-scale renewable projects.

Multiconsult has, in a 4.5-year time period, played the same role as Implementation Consultant for GET FiT in Uganda, where the program has leveraged some $439 million in investment, leading to 17 renewable energy projects now in operation or under construction. During this period, Uganda has emerged as one of Africa's most attractive renewable energy investment destinations and the country with the most renewable IPPs currently under development.

The German development bank KfW is now looking to tailor the program in an effort to roll out the success to Zambia. Multiconsult will take up the role as the Implementation consultant, a comprehensive and multi-year role covering everything from policy and regulatory support to tender implementation and construction supervision. Multiconsult will staff and manage the GET FiT Secretariat in Zambia for at least the next three years.

An Implementation Consultancy will compliment efforts by Multiconsult as Tender Agent for the ongoing 100-MW solar tender.

New Power Plant in the Works for Mozambique

Mozambique signed an agreement with Great Lakes Africa Energy (GLAE) for the construction of a 250-MW gas-fired power plant in the northern region of the country.

The infrastructure, which will cost an estimated $400 million, will be fueled by natural gas produced in the country. Under the terms of the contract, the company will ensure the development, financing, construction and operation of the plant.

"Mozambique has significant resources in conventional and renewable energy. Our government's priority is to ensure a stable and reliable supply of energy for its citizens, hence the importance of this contract. We found in GLAE, a reliable partner for the establishment of this plant," said Bruno Senguaio, cabinet member of the Mozambican Minister of Energy.

Power Africa Promotes Micro-Finance in Nigeria

Power Africa's Beyond the Grid (BTG) team in Nigeria is working with companies to catalyze the market and ensure that off-grid products and services are within easier reach for consumers in rural Nigeria. Access to reliable and affordable energy services in rural Nigeria is an increasingly critical need.

Nigeria has the largest off-grid population in Africa, and one of the highest in the world.

Power Africa's BTG team is working with off-grid energy companies, such as Azuri, Greenlight Planet, d.light, Barefoot and Emel, to introduce solar home systems (SHS) and other products into the Nigerian market. The BTG team is helping companies find innovative ways to reduce the upfront costs of their products, a key barrier to sector growth, while also helping consumers access loans through existing micro-finance banks (MFBs).

Nigeria's strong micro-finance sector is emerging as an attractive and viable option for off-grid companies to offer financing options to consumers who wish to invest in SHS. The Power Africa BTG team is supporting this trend by striking partnerships between high-potential off-grid companies and MFBs, and training sales agents in the off-grid products.

Thus far, the BTG team has established new partnerships with at least three MFBs at the national level, 10 at the state level, and several others at the local level.

The BTG team provides on-the-ground training to the MFBs' loan officers to help them market the solar solutions in tandem with their loans to their customers. The BTG team also monitors and assesses the distribution strategies of the off-grid sales agents working with each MFB to ensure that customers are happy and that sales of the solar systems can grow sustainably.

Toshiba and Malawi Ink Geothermal Deal

Toshiba signed a MoU with the Malawian Ministry of Energy for the development of a geothermal power plant. Under the terms of the agreement, the two entities will collaborate to set up a plant with a capacity of between 1 MW and 10 MW.

The two are also discussing building local capacity in the sector.

"Toshiba is the world leader in the manufacture of geothermal turbines. We have so far been involved in the construction of 56 manufacturing units with a total capacity of 3,628 MW, and we are delighted to put our experience at the service of increasing the electrical power of Malawi," said Toyoaki Fujita, responsible for development at Toshiba.

China to Invest in Egypt Solar Panel Factory

China's GCL Group signed a MoU with Egypt for the creation of a solar panel manufacturing facility worth up to $2 billion, local news

outlet *Al Ahram* reported. The location of the plant has yet to be determined.

Under the MoU, the facility is to manufacture panels capable of producing 5 GW annually. No further details were given.

Flexicycle Plant for Senegal

Wärtsilä signed a contract to engineer, manufacture and deliver a 130-MW Flexicycle plant in Senegal. The Malicounda power project in Mbour is located 85 km from the country's capital Dakar. The order, booked in March, was placed by Matelec, contractor of the Independent Power Producer MPG (Melec Power Gen) and part of the Matelec Group, based in Lebanon.

Source: Wärtsilä

The project is part of Senegal's bid to increase its energy production, while in the medium term, reducing the cost of electricity for consumers. Importantly, the Wärtsilä thermal plant solution will provide the flexibility needed to facilitate the integration of intermittent renewable energy into the country's network.

The project was initiated in September 2017 with the signing of a development agreement between Africa 50, the infrastructure development fund for Africa, and Senelec, Senegal's state power utility. The plant is expected to become operational in 2020.

Wärtsilä Flexicycle power plants combine the advantages of a flexible simple cycle plant with the superb efficiency of a combined cycle plant. The Flexicycle solution is based on a gas, multi-fuel, or liquid fuel power plant combined with a steam turbine. Flexicycle power plants can operate both in highly efficient combined cycle mode and in dynamic and fast simple cycle mode.

The plant will operate on seven Wärtsilä 50 engines operating initially on heavy fuel oil (HFO). However, there is an option to convert to natural gas fueled operation as soon as the resource becomes available. Senegal and Mauritania have signed an inter-governmental cooperation agreement to develop substantial natural gas resources to be shared by the two countries.

South Africa to Launch New REIPPP

South Africa is set to launch a new Renewable Energy Independent Power Producer Procurement (REIPPP) round in 2018, possibly by November. The round, which would be the country's fifth, follows the signing of deals from previous rounds that led to a host of investment in the renewable energy sector.

Currently the country has approximately 1.47 GW of cumulative installed PV power, with another 813 MW expected to come online soon. The South African government believes the new procurement round may raise investment of more than $3.1 billion in the sector.

"A new bid round – BW5 of the Renewable Energy IPP Program – will be launched this year and it is estimated [it will secure] 1,800 MW of similar technologies, as in the expedited bid window," South Africa's Minister for Energy Jeff Radebe announced on his Ministry's Twitter account.

"This could bring another ZAR40-50 billion [$3.16-3.95 billion] of investment to the country, and ensure investment and economic growth as well as the opportunity to encourage opportunities for black industrialists and the development of black independent power producers," said Radebe.

Uganda to Go Nuclear

Uganda signed a cooperation agreement with China for the development of nuclear power. Under the terms of the MoU signed with China National Nuclear Corporation (CNNC), the two countries plan to build nuclear power plants with a capacity of about 2,000 MW within the next 10 to 15 years.

The signing of this agreement is part of Uganda's Vision 2040 for development, which aims to include nuclear energy in its energy mix in order to gain access to cheaper energy.

The country currently has one of the highest electricity tariffs in East Africa at around 11 cents a kilowatt hour. A state of affairs that, combined with the tightness of the electricity grid, prevents the expansion of access to electricity which is about 30% despite the country's current energy surplus of 750 MW.

Kenya to Help Djibouti Develop Geothermal

Kenya will provide technical support to Djibouti in the development of renewable energy, mainly geothermal energy. The news was revealed when Djibouti's president, Ismael Omar Guelleh, paid a visit to Kenya.

"Kenya and Djibouti are strategic partners and this visit will allow us to increase our cooperation, more specifically in the energy sector. In this regard, we will put a special emphasis on the renewable which we have a great experience in Kenya. Thanks to our investments in geothermal energy, for example, we have significantly reduced our energy bill," said Rebecca Miano, executive director of Kenya Generation Company (KenGen).

Djibouti wants to replicate Kenya's success using the renewable energy. The country is estimated to have more than 1,000 MW in geothermal potential.

Zambia to See First Large Scale Solar Project This Year

Zambia will complete its first large-scale solar power plant in September. With a capacity of 50 MW, the infrastructure is being built by Neoen and First Solar as part of the World Bank's Scaling Solar program.

The project will ultimately cost an estimated $60 million to develop. The energy produced will be sold for 25 years to the Zambian power grid, at a price of 6.02 cents per kilowatt hour. The plant was financed through a combination of own funds made available by the construction companies and debt secured from the IFC and CIPO.

The World Bank, for its part, provided support services such as a guarantee obtained from its Multilateral Investment Guarantee Agency (MIGA).

The construction of a second solar power plant was launched as part of the program. Located in Mukelabai, the infrastructure with a capacity of 50 MW should see its financial mobilization completed in Q2 2018.

New Thermoelectric Plant for Tunisia

Ansaldo Energia signed a turnkey supply EPC (Engineering, Procurement and Construction) contract with Société Tunisienne de l'Électricité et du Gaz (STEG) to build a gas-fired open cycle thermoelectric power station, with an installed power of 625MW, in Mornaguia, south west of Tunis. An LTSA (Long Term Service Agreement) contract covering maintenance and assistance work for the plant was also signed.

The plant will be equipped with two AE94.3A model gas turbines, plus the relative generators and auxiliary systems, built in Ansaldo Energia's Genoa production facilities. Work will take 22 months from receipt of the Notice to Proceed.

"This new order is the result of concerted teamwork involving the entire company," commented Ansaldo Energia CEO Giuseppe Zampini. "I'd like to thank the government institutions involved for their constant and effective support in defense of Italian industry on international markets."

Ansaldo Energia looks to consolidate and strengthen its historic presence in Tunisia, where it built the "Sousse C" and "Sousse D" plants in the Sidi Abdel-Hamid region (Sousse Governorate) and the "Rades B" plant, and where it coordinates service work on the Ghannouch plant.

Sonatrach to Focus on Solar

Abdelmoumene Ould Kaddour, Algerian oil company Sonatrach's CEO, revealed at an industry event in Oran that the company has plans to focus on solar power with foreign partners. He said Sonatrach was determined to boost its efforts in developing the solar sector in Algeria. "We have invested to get 1.6 gigawatts, we definitely need to focus on solar," he said.

Source: Sonatrach

Ould Kaddour

The conference played host to a number of European energy firms including Italian oil major ENI, whose CEO Claudio Descalzi told attendees that Algeria was one of the "best alternatives" for Europe in terms of energy supply. "Given Algeria's conventional, non-conventional and renewable resources, Algeria could secure the supply of the north and south Mediterranean," Descalzi said.

Hybrid Plants for Madagascar

Jirama, the national utility of Madagascar, plans to install 45 hybrid plants with a total capacity of 65 MW. The infrastructure will operate from a renewable energy source to which diesel will be added for periods of non-availability. These plants will mainly be located in regional capitals.

The goal of this new direction is to achieve a reduction in the cost of generating electricity on the island nation, which currently sits at 22 cents a kilowatt hour.

Power Plant for Delta State

A locally owned power company in Nigeria, Onose Tbea Energy, plans to build a 400-MW gas-fired power plant at Ekrokpe in Delta state. The plant, whose work has already been launched, is expected to deliver its first megawatts of power within 18 months. The plant is being constructed in such a way as to allow for an expansion in capacity at a later date.

"The Nigerian government is still struggling to produce the energy needed for its development and for improving the living environment of its people. But we are confident that with the private sector, we will be able to face this challenge more serenely and that these much-needed capabilities can be put in place in the near future," said Ifeanyi Okowa, the governor of Delta state.

Desertec Still Under Consideration

The Desertec project to export solar and wind energy produced in the Sahara Desert to Europe has been off the front pages for some time, but according to recent reports it has not been abandoned.

"This very good idea to produce electricity from sites where solar energy resources are abundant, was not abandoned but the project was not technically feasible and its cost was estimated very high (€400 billion)," Adnan Amin, the director of the International Renewable Energy Agency told TAP news agency.

The delays in the implementation of the project, according to Annan, were due to the project being seen as more favorable to the EU market than to the countries who would be producing the wind and solar power. One of the components of the project that is planned to be established in Tunisia provides for injecting $1.6 billion into the construction of 100 km of underwater power lines connecting the country to Malta. A second network of submarine cables will also connect the country to Italy and a third is currently being studied to export energy to France.

Construction on Koukoutamba Dam to Launch

The Organization for the Development of the Senegal River (OMVS) plans to launch construction on the Koukoutamba hydroelectric dam. The 280 MW capacity facility will be established on Guinean territory at an estimated cost of €990 million.

Source: T.L Unsplash

Construction on the" project is expected to last three years and the energy it will produce will be used to supply Guinea, Mali, Senegal, and Mauritania.

225 MW of Solar Planned for Guinea

Indian energy company Avaada Power is ready to build nine solar plants with a total capacity of 225 MW in Guinea. The plants will have power generating capacities of between 5 and 85 MW.

Avaada Power's plans were revealed by the team sent by the company to Guinea for a site visit that took place from April 12 to 15.

By the end of the team's visit it had been determined that plants would be built in the Boké, Labé and Kankan regions.

The company has signed with the Ministry of Energy, a MoU to carry out feasibility studies for the projects within the next five months. If the studies are conclusive, the energy company will commit to deliver the infrastructure about 18 months after the signing of the power purchase agreements.

Talks on Grand Renaissance End without Resolution

Talks between the three countries whose water supplies will be affected with the construction of the Grand Renaissance Dam in Ethiopia met in the capital of Sudan, Khartoum. Egypt, Ethiopia, and Sudan met to resolve differences over the dam Ethiopia is building for a mega hydro project. The talks ended early without agreement.

Egypt fears the dam will reduce waters that run to its fields from the Nile and reservoirs from Ethiopia's highlands via Sudan. For its part, Ethiopia denies the dam will undermine Egypt's access to water. Ties between Egypt and Sudan were strained when Khartoum backed the dam because of its need for electricity.

"We were not able to reach an agreement on a joint decision, and it's a technical issue that we cannot discuss," Sudanese Foreign Minister Ibrahim Ghandour told reporters after the talks. Ghandour said the talks on the dam on the Blue Nile were constructive and important, but more time was needed, according to Khartoum's state news agency SUNA.

BP Commits to a Low Carbon Future

BP published a new report setting out its commitment to a low carbon future and to helping meet the dual challenge of providing the increasing energy the world demands while at the same time working to reduce greenhouse gas emissions.

The report, "Advancing the Energy Transition", details BP's framework for delivering this commitment: reducing greenhouse gas emissions in its operations, improving its products to help customers reduce their emissions, and creating low carbon businesses.

The report also sets out clear near-term targets for limiting greenhouse gas emissions from BP's operations, against which its progress can be measured. These targets are concrete, measurable and are intended to be met over 10 years.

Some of the goals include: zero emissions growth, sustainable emissions reductions, limiting methane emission intensity, carbon offsetting, and advancing low carbon.

Siemens Gamesa Secures New 74.8 MW Order in Japan

Siemens Gamesa reached its first agreement with Tokyu Land Corporation for two projects in Hokkaido and will supply 22 of its SWT-3.4-108. Both nacelles and hubs will be manufactured in Denmark, while the blades will be produced in China and Denmark.

The turbines will be delivered over 2018-19 and the first batch arrived at the port in Hokkaido last April. Siemens Gamesa will also handle the operations and maintenance services at these facilities for the next 20 years.

In the words of Álvaro Bilbao, CEO of Siemens Gamesa's APAC Onshore business, "Siemens Gamesa is strongly committed to the Japanese market. We were pioneers in this market and we have established ourselves as the leading supplier thanks to our ability to adapt to our customers' needs."

The contracts were signed in August 2017 and March 2018 and are part of the Order Book announced in the results of Q2 FY2018.

Source: Siemens Gamesa

Kazakhstan to see First Wind Farm

Italian oil and gas company ENI will be undertaking a renewable energy project in Kazakhstan, the country's first wind farm. Construction of the Badamsha project in the Aktobe province will start by the end of the year with commercial operation and grid connection expected by the end of 2019.

This is ENI's first large-scale investment in wind power. The company has recently confirmed it is looking to expand further into renewable energy and is considering a number of projects to complement its oil facility operations. Solar will play a key role in these plans.

Punta Sierra Wind Turbines Installed

Goldwind completed the installation of 32 wind turbines for the Punta Sierra project in Chile on April 20. The Punta Sierra project is Pacific Hydro Chile's first in the country. On November 1, 2017, the first wind turbine at the project was installed. It withstood wind speeds of over 30m/s during day hours.

Located in Región de Coquimbo in central Chile, 320 km to the north of San Diego, the project has an installed gross capacity of 80 MW with 32 Goldwind GW121-2.5MW wind turbines. It can generate 310 million kw/h of electricity per year, which can supply power to 175,000 Chilean residents. The project can slash carbon emissions by 200,000 tons every year.

Since Chile is located in an earthquake-prone zone, requirements for the wind turbines' quake-resistance performance are demanding.

Source: Goldwind

Goldwind's GW121-2.5-MW wind turbine easily passed the rigorous assessment by a local third-party company, which specializes in seismic assessment in the country. The project site experienced a 6.2-magnitude earthquake on April 10, 2018. The Goldwind team dealt with the situation calmly. All staff and wind turbines remained safe.

New Wind Capacity for Iowa

GE Renewable Energy and Alliant Energy announced they will be adding 470 MW of wind power capacity to the U.S. state of Iowa with two projects.

The English Farms and Upland Prairie wind farms with respective 170 MW and 300 MW of installed capacity will be owned and operated by Alliant Energy's Iowa energy company and provide clean and reliable renewable sourced electricity to its customers in Iowa. This is part of a broader plan by Alliant Energy to install up to 1,000 MW in Iowa by the end of 2020.

Both wind farms will be equipped with a total of 190 of GE's proven 2 MW platform type turbines and will add to the 2,300 GE 2MW turbines already running in North America. These include the 2.3-116, the 2.5-116 and GE's newly introduced 2.5-127 turbine. The new 127-meter rotor combined with the robust 2 MW electrical system enables the turbine to reach a best-in-class capacity factor and higher levels of annual energy production.

World's First Grid-Scale Liquid Air Energy Storage Launched

Highview Power announced that the world's first grid-scale liquid air energy storage (LAES) plant has been officially launched. The 5 MW/15 MWh LAES plant that is located near Manchester, United Kingdom, is the first operational facility using LAES technology at grid scale.

Professor John Loughhead OBE FREng FTSE, Chief Scientific Adviser at the UK government's Department for Business, Energy and Industrial Strategy (BEIS), had the honor of officially switching on the plant at Viridor's Pilsworth landfill gas site.

The plant was developed in partnership with Viridor, a recycling and renewable energy company, and was enabled in part by over £8 million (~$10.6 million) in funding from the UK government. The Pilsworth LAES plant will be able to store and deliver enough electricity to power about 5,000 average-sized homes for around three hours and also provide a number of reserve, grid balancing, and regulation services.

With LAES technology now being proven at grid scale, the plant paves the way for the wider adoption of LAES technology globally. True long duration energy storage is critical to enable the broader deployment of renewable energy; overcome the intermittency of solar and wind energy; and help smooth peaks and troughs in demand. LAES can easily and cost-effectively scale up to hundreds of megawatts and could easily store enough electricity to power a town of around 100,000 homes over a period of many days.

Source: Highview Power

LAES technology makes use of a freely available resource – air – which is stored as a liquid and then converted back to a gas in a process that involves a 700-fold expansion in volume and produces zero emissions. This expansion releases stored energy, which drives a turbine to generate electricity. In addition to providing energy storage, the LAES plant converts waste heat to power using heat from the on-site landfill gas engines. A unique advantage of LAES technology is that plants can be located at the point of demand. No exotic metals or harmful chemicals are involved. The plant comprises mostly steel which has a lifespan of between 30 to 40 years, in comparison with just 10 years for batteries. At the end of life, an LAES plant can be decommissioned and the steel recycled.

Renewable Energy Jobs Reach 10.3 Million Worldwide in 2017

The renewable energy industry created more than 500,000 new jobs globally in 2017, a 5.3% increase from 2016, according to the latest figures released by the International Renewable Energy Agency (IRENA). According to the fifth edition of *Renewable Energy and Jobs – Annual Review*, launched at IRENA's 15th Council in Abu Dhabi, the total number of people employed in the sector (including large hydropower) now stands at 10.3 million globally, surpassing the 10 million figure for the first time.

China, Brazil, the United States, India, Germany and Japan remain the world's largest renewable energy employers, representing more than 70% of all industry jobs globally. Although growing numbers of countries are reaping the socio-economic benefits of renewables, the bulk of manufacturing takes place in relatively few countries and domestic markets vary enormously in size. Sixty percent of all renewable energy jobs are in Asia.

"Renewable energy has become a pillar of low-carbon economic growth for governments all over the world, a fact reflected by the growing number of jobs created in the sector," said Adnan Z. Amin, Director-General of the International Renewable Energy Agency.

"The data also underscores an increasingly regionalized picture, highlighting that in countries where attractive policies exist, the economic, social and environmental benefits of renewable energy are most evident," continued Amin. "Fundamentally, this data supports our analysis that decarbonization of the global energy system can grow the global economy and create up to 28 million jobs in the sector by 2050."

The solar PV industry remains the largest employer of all renewable energy technologies, accounting for close to 3.4 million jobs, up almost 9% from 2016 following a record 94 gigawatts (GW) of installations in 2017. China was estimated to account for two-thirds of PV jobs – equivalent to 2.2 million – representing an expansion of 13% over the previous year.

Despite a slight dip in Japan and the United States, the two countries followed China as the largest markets for solar PV employment in the world. India and Bangladesh complete a top five that accounts for around 90% of global solar PV jobs.

Jobs in the wind industry contracted slightly last year to 1.15 million worldwide. While wind jobs are found in a relatively small number of countries, the degree of concentration is lower than in the solar PV sector. China accounts for 44% of global wind employment, followed by Europe and North America with 30% and 10%, respectively. Half of the top 10 countries with the largest installed capacity of wind power in the world are European.

By GlobalData

Government Policies Helping to Drive Smart Grid Growth

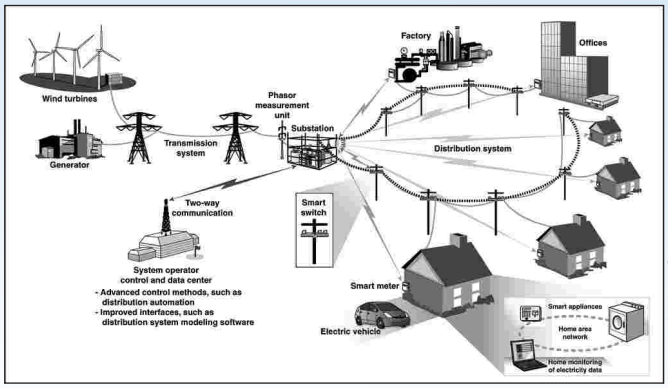
A number of governments are increasingly viewing smart grid technology as a strategic infrastructural investment that will enable their long-term economic prosperity and help them to achieve their carbon emission reduction targets. This need to mitigate climate change for renewable energy development is driving smart grid initiatives across the world, according to data and analytics company GlobalData.

The EU introduced a strategic energy technology plan in 2006 for the development of a smart electricity system over the following 30 years. If the EU is to meet its 2020 targets, which are increasing energy efficiency by 20%, increasing its share of renewable energy by 20% and reducing its greenhouse gas (GHG) emissions by 20%, it must modernize and liberalize its aging electricity grid, create economies of scale for renewable energy, and promote consumer efficiencies.

Every country, when creating a smart grid roadmap or implementing a smart grid, creates its own Smart Grid Task Force or Smart Grid Association with the major stakeholders such as utilities, key equipment manufacturers, electricity market participants and government bodies. International agencies along with the EU have developed standards aimed at helping countries to develop their own individual standards.

Several countries already have net energy metering protocols and equipment in place, and a number of countries are exploring the technology and mechanism. In the US, 45 states and four territories have mandatory net metering rules available for solar and wind renewable sources. The number of net metering customers in the US increased from 0.16 million in 2010 to over 1.83 million in 2017. Under advanced metering infrastructure, as of 2017, the country installed around 76 smart meters and is expected to install over 90 million by 2020. In the US, there are now more than 16,000 publicly accessible charging stations, up from 500 in 2008, giving electric car owners more confidence in the range of their vehicles.

In 2016, ANEEL implemented a net metering system in Brazil that would enable customers to connect their micro-generation system to the Brazilian power grid with ease. By May 2017, over 10,000 PV systems had been installed in Brazil under the net metering scheme with a combined capacity of 78 MW. ANEEL is aiming to reach 1.2 million PV systems under net metering by 2024.



Source: GAO analysis

India has a target of installing 130 million smart meters by 2021 under Smart City Initiatives. The government has made it mandatory to install the smart meters for consumers whose monthly electricity consumption was 500 units and more at the earliest by December 2017 and consumers with the monthly consumption above 200 units by 2019.

> "China has the largest number of NEV charging stations in the world with 214,000 public NEV charging points as of 2017."

In 2013, China overtook the US and became the largest smart grid market. The country invested $4.3billion in smart grids, which accounted for more than one-quarter of the $14.9billion spent globally in that year. China has the largest number of NEV charging stations in the world with 214,000 public NEV charging points as of 2017. The number of public charging points in China grew by around 51% in 2017. From January to August 2017, over 282,000 electric cars were registered.

Chinese OEMs are likely to emerge as leaders in the pure EV market and are becoming the target of many foreign investors in smart grids. General Electric, Siemens, ABB, and several other enterprises are cooperating with domestic partners to expand their smart grid business in China. AEA

OXFORD PARKS

A Catalyst for Urban Regeneration

Oxford Parks, which officially broke ground in April 2017, is envisaged to be a sustainable and cosmopolitan medium-density urban environment that brings 300,000 square meters of development rights to the Dunkeld Precinct linking Illovo to Rosebank along Oxford Road in Johannesburg, South Africa.

The precinct is targeting a 4-Star Green Star Sustainable Precinct Pilot Rating, and each building will be encouraged to attain a minimum 4-Star Green Star Design certification. Carollyn Mitchell, Director at Intaprop, says that the vision is to build on the strength and unique energy of Rosebank to develop, from the outset, a dynamic, vibrant urban lifestyle with a strong pedestrian focus, located close to public transport offerings.

Mitchell explains, "We are looking at the precinct holistically with the intention of making an exceptional intervention into the existing city structure. The vision is to create a sustainable public environment that will assist in supporting the longevity of the investment by making an attractive, pedestrian-friendly precinct with well-managed infrastructure."

Considering the Public Realm

Marloes Reinink, founder and director of Solid Green, the green building consultants on both Oxford Parks precinct and the Phase 1 building, observes, "In order for cities to grow in a sustainable manner, developments must take the opportunity to move green design beyond the building scale into the public realm. We are excited to be involved with this development, which is intended to contribute positively to the existing urban fabric of the Rosebank-Dunkeld area."

Scaling of the public environment and active building interfaces was extremely important, and pedestrian-level lighting contributes towards a quality experience for pedestrians and cyclists alike. Moving from Oxford Road towards Cradock, there is a hierarchical progression of streets with the friction of road surfaces increasing so that cars are forced to slow down and be more mindful of pedestrian and cyclist activity.

Security was a concern from the outset as the development has no fences in order to seamlessly integrate into the city fabric. Passive surveillance design techniques have been used so that the wellbeing of pedestrians is considered at all times.

All images are courtesy of Intaprop

Oxford Parks South

According to Mitchell, the precinct is run by a Property Owners' Association, which will become a City Improvement District over time, tasked with ensuring that the vision of the development is adhered to.

Building heights will range from four to six storeys, with building uses envisioned at one-third residential to two-thirds offices. The residential component will comprise between 2,000 and 2,700 units, bringing in 4,000 to 5,000 residents; while the offices are expected to bring in 10,000 to 14,000 office workers. Hotel offerings, high-street type retail at ground floor level and various leisure activities are expected to generate a 24-hour vibrancy for the precinct.

In addition to its own amenities, Oxford Parks is close to a range of services within walking distance including schools, day care facilities, a gym, medical facilities, pharmacies, dry cleaners, banks and restaurants – which reduces the need for private car trips and provides convenience for precinct users.

The Precinct is also perfectly located from a public transport perspective. The Rosebank Gautrain Station is within easy walking distance, as are a number of bus routes on Oxford Road as well as the newly revamped Rosebank taxi rank.

Phase 1 Targets 5 Green Stars

The first building in the precinct, Oxford Park Phase 1, also developed by Intaprop, has been registered with the Green Building

Council South Africa (GBCSA), targeting a 5-Star Green Star Office v1.1 Design Rating.

Located on the corner of Jellicoe and Oxford Roads, the project comprises 6 floors with agross floor area (GFA) of 10,035 square meters excluding car parking areas. Rather than pursuing an As-Built certification, Intaprop has decided to implement commissioning and building tuning by an Independent Commissioning Agent and the project engineers, which provides a better return on investment and ensures that the building is operating optimally right from the start.

Environmental strategies are being implemented to enhance the wellbeing of the building's users such as ample fresh air, access to external views, and plenty of natural daylight. As salaries are the biggest cost to companies, enhanced work performance and an improvement in working quality and quantity equate to direct cost savings.

Being able to analyze consumption data is key to understanding and managing building systems and to assessing opportunities for savings. Accordingly, sub-metering of major energy and water consuming systems is in place. Water efficient fittings are also being installed that limit occupant water usage.

In addition, to minimize greenhouse gas emissions associated with operational energy consumption, an energy model of the building was generated during the design stage, comparing the building to a SANS 10400 notional building model. This energy model has helped to inform the building design to ensure a high performing building from a building envelope perspective.

Modelling also enabled internal operative temperatures to be assessed to ensure that they are within the ASHRAE Standard 55-2004 Acceptability Limits for at least 98% of occupied hours, thus ensuring a high level of thermal comfort. Building Glazing Performance modelling was also carried out and performance values were agreed with the architect and mechanical engineer to assist with specification of glazing.

In terms of reducing energy consumption, provision has been made to ensure that all individual or enclosed spaces are individually switched with occupancy sensors. The project also saves energy by providing office lighting that is not over designed, with an average maintained illuminance level of no more than 400 lux.

All selected gaseous and fire suppression systems, refrigerants and thermal insulants used for the development have an Ozone Depleting Potential (ODP) of zero, to eliminate any contributions to long-term damage to the earth's stratospheric ozone layer.

In terms of Green Star, three main requirements had to be met before the project commenced with demolition and construction – a Waste Management Plan (WMP), an Environmental Management Plan (EMP), and a Hazardous Waste Management Survey on existing buildings.

Oxford Parks Phase 1-199

NEMAI Consulting was appointed to compile both the Waste Management Plan and the Environmental Management Plan, which have been signed off by both the Bulk Earthworks Contractors and the Main Contractor. COH Consulting Occupational Hygienist was appointed to conduct hazardous material surveys of all the existing buildings that were on site, and Safe Disposal Certificates were required to ensure that any hazardous materials reported in the survey were safely disposed of by the demolitions subcontractors.

To reduce waste to landfill during building operations, a waste recycling storage area has been provided in the basement within 20 meters of the exit. This dedicated area meets the Green Star sizing requirement, and will accommodate paper, cardboard, plastic, glass, cans and metals.

The project is also targeting the Watercourse Pollution credit, which deals with stormwater runoff. It is important that a development like this tries to capture the stormwater and reuse it within the building or within the precinct. The system has also been designed so that minimal pollutants and trash are diverted to municipal stormwater channels.

Annelide Sherratt, Sustainable Building Consultant at Solid Green and the Accredited Professional on the project, says, "We are developing a Building Users Guide and Community Users Guide to enhance knowledge and understanding of the sustainability attributes implemented for the buildings and precinct. Additionally, an education facility will be provided within the precinct to provide education materials and examples of sustainable strategies used in the planning, design and construction of the project.

"The aim of the Building Users Guide is to inform occupants and users of all the building's incorporated service and management systems, to optimize the building's environmental performance and minimize its environmental impact; and to ensure that all future alterations, additions and program changes are consistent with the intent of the green building aims and the health of the environment."

As green building principles extend into the public realm in alignment with market demand, developments like Oxford Parks are becoming significant catalysts for positive change and urban regeneration.AEA

By Belzona Polymerics Limited

The Challenges of Maintaining the Leading Edge

Wind Power is Here to Stay

Wind energy is no longer just a novel way to generate electricity for a local area. The rapidly increasing size, efficiency and number of wind turbines is fast making wind a lucrative method for substantial power generation. In January 2018, a new European record was set for power generated by wind in a single day [1]. In fact, wind power is now the largest source of renewable energy in Europe, overtaking coal on its way to becoming the second largest source overall [2]. Therefore, the importance of a high-quality and easy-to-apply Leading Edge Protection (LEP) coating has never been more important to keep up with the demand from this blossoming industry.

Precipitation and Power Generation

Although it may seem innocuous, the impact of debris and weather on a blade (in particular rain) can cause significant damage. Using some rudimentary mathematics, the impact pressure of rain droplet can be estimated using modified water hammer equations. Based on a 2mm diameter droplet and an 80m/s tip speed, the pressure imparted by the rain drop is estimated at 120MPa [3]. This value is already higher than the yield stress quoted for some blade materials.

This type of damage manifests itself as pitting on the blade's surface, especially on the leading edge, where the most impact will occur (*Figure 1*). This deterioration causes a reduction in aerodynamic efficiency and subsequently a loss in operating efficiency. Some studies show that leading edge erosion can result in a drag increase of up to 500%, culminating in a decrease in annual energy output of up to 20% [4]. The effects of this damage can be apparent in as little as two years [5]. As wind turbines can reasonably be expected to perform continuously for 15 years, this is a significant problem for turbine operators.

Figure 1: Typical blade damage because of Leading Edge Erosion

O&M Overheads

A variety of studies have investigated the costs and strategies of O&M for Wind Power, some have found that these O&M ventures can account for as much as 30% of the overall per-MWh-cost for wind turbines [6]. Some studies have looked at failures on a component-by-component basis. Depending on the type of turbine, the blades can account for up to 22% of failures [7]. The resulting high costs means many companies are moving towards a preventative and predictive approach, especially in offshore markets [7].

All images are courtesy of Belzona Polymerics Limited

As well as being more costly to maintain, offshore wind turbines are also more susceptible to damage. An investigation into the impact velocity versus the rain flow rate found that impact velocity will cause more damage than increased rain flow [8]. As offshore wind is not limited by acoustic emission, the tip speeds and blade lengths tend to be much larger, thereby increasing the impact velocity of the rain droplets.

The Challenge

The difficulty with blade maintenance is not only finding suitable materials and methods for protecting new blades but, more commonly, repairing damage to those already in the field. The associated challenges can be twofold:

- Firstly, materials science – developing materials and techniques which will protect blades throughout their useful lifetime.
- Secondly, application – applying the protective measures in the field, often in difficult conditions, narrows the available maintenance windows.

There is already an extensive amount of research in the materials science field for ultimate performance, some of which can be found in the papers referenced here. This article will address the second major challenge, applying protective materials in situ.

Climatic Conditions

Climatic conditions are often the driving factor when considering an in-situ repair. The weather will not only affect a technician's ability to access the blades but also the applicability of the protective materials.

Nearly all materials used in LEP will be sensitive to moisture, temperature, and humidity. These elements are very difficult to control, especially for the duration of the repair. Therefore, a material which is less sensitive to these conditions is ideal for conducting repairs in situ.

As an example, let us look at the UK climate.

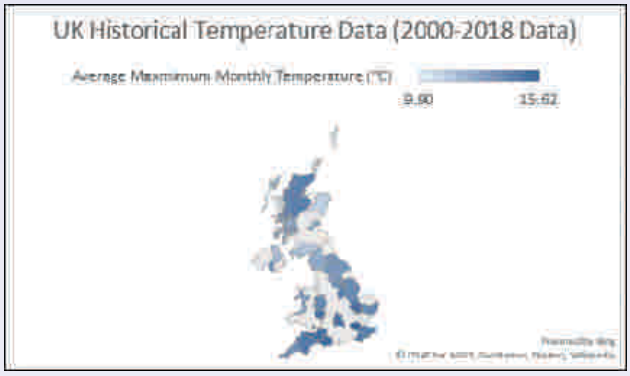


Figure 2: Average recorded maximum monthly temperature for regions of the UK, averaged for complete datasets between 2000-2018.

Temperature is a key factor with any application of a coating or tape system. The temperature will affect the viscosity, working life (pot life) and eventual cure time. All manufacturers will give recommendations on minimum application temperatures, if used below these temperatures the product will be extremely difficult to handle and apply.

A Simple Solution

Belzona Polymerics manufacture and design their materials specifically to overcome these issues and make application as easy as possible. These LEP materials cure without the requirement for external heat or UV, in some cases down to temperatures as low as 5ºC (41ºF) and the majority from 10ºC (50ºF). Table 1 shows Belzona materials compared with some established LEP systems and their minimum recommended application temperatures. Evidently, the majority of materials require the application environment to reach at least 15ºC (59ºF). However, lower temperature thresholds can increase the days of the year where maintenance can take place. As can be seen from *Figures 2 & 3*, on average the temperatures in the UK are pushing these materials to their limit.

Blade Maintenance Material	Minimum recommended application temperature (°C)
Coating A	15
Coating B	10
Coating C	15
Coating D	15
Coating E	15
Tape A	15
Belzona 1331	10
Belzona 1341	10
Belzona 1111	5

Breaking this down further, the benefits of using materials which can be applied at lower temperatures becomes more apparent. Let's take the upcoming Hornsea offshore wind project in the UK (set to be the world's largest offshore wind farm [9]) as an example. Figure 4 shows the average maximum monthly temperature at the nearest weather station in Bridlington. Using this data as an estimate of expected temperatures when conducting blade maintenance, Belzona materials can increase the maintenance window of 4-5 months of the year to approximately 9- an increase of 100%. Theoretically, in the case of Belzona 1111 (Super Metal), maintenance could be conducted all year round. This not only makes it easier to schedule O&M activities, but could also reduce costs as less equipment will be required to maintain climate controls during certain parts of the year.

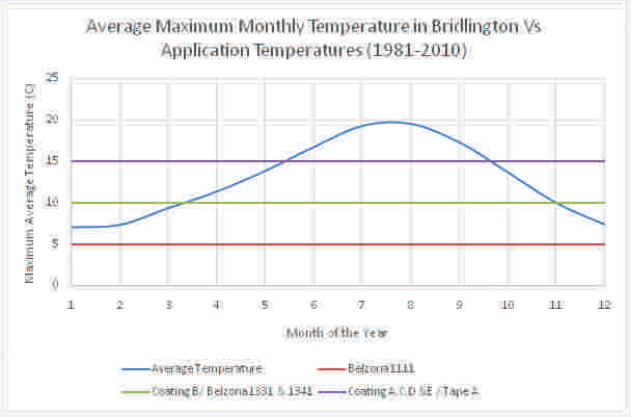


Figure 3: Plot of average monthly temperatures and application temperatures.

It is not only the climatic conditions and parameters of a material which make it easier to apply. There is also the physical aspect to consider. The easier it is for a technician to apply, the more likely the system will be effective. Belzona LEP materials all have simple mixing ratios, Belzona 1111, Belzona 1331 and Belzona 1341 have mixing ratios of 3:1, 2:1 and 1:1 respectively. These simple ratios make it easy for any applicator to ensure the correct mix is achieved. In addition to this, these materials also come in a variety of unit sizes, this means it is possible that part mixing may not even be required. Additionally, only a brush or roller is necessary for application – no need for injection cartridges or specialist equipment.

Ease of application is important however it needs to be backed up by material performance. ASTM G73 is the most commonly used test method to assess performance determine a materials ability to withstand rain erosion. This test involves samples of the coating being rotated at high velocity through a series of water droplets impacting the sample. Tip speeds in the region of 80 m/s are common in many current wind turbine designs [3]. Belzona 1341 has undergone testing to this standard and showed little no damage to the coating at tip speeds of up to 143 m/s. In comparison, coating B showed signs of significant degradation through the length of the sample.

A Stateside Solution

At a wind farm near Des Moines in Iowa, U.S, some of the turbines' blades were experiencing leading edge damage. The Project Manager in charge of the farm wanted a long-term LEP solution which could repair and preserve the blades. Downtime was a critical factor and

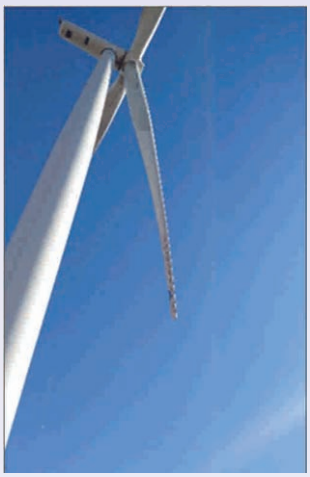


Figure 4:The damaged turbine before application

the unpredictable October weather meant that an easy-to-apply system was essential. Consequently, Belzona 1341 was chosen because of it's positive results in internal Belzona testing (ASTM G73 & G76).

Although originally Belzona 1341 was designed for fluid handling equipment, this material has since been used on different machinery and structures all around the world. As with many Belzona systems, its potential for many types of industries is limitless.

The application took place at the end of October 2017. To access the blades, a suspended platform system was used. Initially, the pitted substrate was resurfaced with a filler product to restore the correct dimensions of the blade. Then, upon curing, this surface was sanded and cleaned before a thick coat of Belzona 1341 was applied.

Figure 5: Platform on its way to the damaged blades

All in all, the Project Manager was highly impressed with how easy and user-friendly the Belzona application was. Another benefit of the solution was the fact that it came in 500 gram module packaging. This made measuring and mixing, while on a suspended platform, practical and easy. It was also the perfect amount for necessary coverage of the blades. As for the performance of the coating, to date it is performing perfectly, with official test data being collected over the next few months.

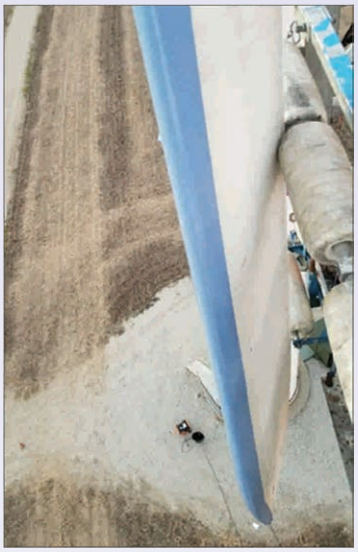


Figure 6: Completed application of Belzona 1341 to the leading edge

Dig Deeper than the Datasheets

In summary, wind power is an ever expanding and growing industry. One of the biggest drivers of cost is the operations and maintenance of the turbines once they are in the field generating electricity. Leading edge erosion, caused by impact from rain droplets is one of the key issues facing the sector. There are a variety of polymeric coatings available for leading edge protection, however the issue of temperature is often overlooked. All materials have a recommended minimum application temperature, which often does not account for the low temperatures experienced in many wind farm installations. Materials, such as those Belzona Polymerics provide, are designed for ease of application and effective curing at lower temperatures. This not only gives a larger window of application but also makes it easier for the technician to apply in the field ensuring the quoted performance is achieved. AEA

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By Energy 4 Impact

Access Key Solution to Many African Challenges

Access to end-use technologies key to catalyzing mini-grid and enterprise development in Africa

Productive use of energy holds the key to livelihood transformation in Africa's rural areas. Small industries could improve their production processes and efficiency if they had better access to electricity and technologies.

Without electricity, rural micro-enterprises make do with labor intensive and time-consuming manual tools, and often pass up many opportunities for value addition or product diversification.

Satisfying the need for power of commercial enterprises presents an opportunity for private sector players such as JUMEME Rural Power Supply Ltd, a Tanzanian company that develops solar-powered mini-grids to connect businesses and households in remote areas. Energy 4 Impact has partnered with JUMEME in an advisory role to help them stimulate demand for electricity among potential customers and to develop micro entrepreneurs' business capacity to use energy for economic transformation, resulting in greater productivity and power consumption.

Compared to households, commercial enterprises take up larger loads of power and provide the developer with a stable source of cash-flow with better profit margins. Building the capacity and the environment for businesses to acquire electric appliances can both improve their processes and productivity and contribute to the mini-grid's sustainability. In April 2016, JUMEME launched a solar mini-grid in Bwisya, the largest of eight villages on Ukara Island, on Lake Victoria, Tanzania. Since the mini-grid became operational, there has been a substantial increase in commercial activities.

About 49 pre-existing and new businesses are now connected to power. Some of the businesses that relied on manual labor or diesel generators for grain milling, carpentry, bicycle and motorcycle repair, have been able to automate and expand. New businesses dealing in egg incubation, laundry, bread baking, juice processing, ice block production, hair dressing, pop-corn production, and metal welding have emerged.

The data collected by JUMEME shows a direct correlation between increased uptake of appliances and power usage. "We have noticed improved efficiency and productivity in mills, woodworks, metal works and baking businesses that have connected to the mini-grid. We expect new businesses to come on stream, for example those purifying drinking water," says Robert Wang'oe, Head of Marketing at JUMEME.

However, despite the fact that power is now available, many micro-businesses cannot afford to buy appliances. This is because they are unable to access credit to buy them, as they are considered high risk borrowers, explains Diana Kollanyi, Energy 4 Impact Program Manager, Advisory.

"One of our strategies to advance financial inclusion to micro-enterprises for productive use was to offer non-cash credit guarantees to financial providers. However, there was limited interest by the providers due to the intricate administrative processes involved in the scheme. Another strategy was to invite financial providers to the villages on the island to map out the business potential and build the case for credit provision. Yet, due to the low loan amounts requested, the limited number of

A barber shop owner, shaves a client, thanks to mini-grid power provided by PowerGen on Kiwa island, Lake Victoria

Energy 4 Impact supported 30-year-old entrepreneur Hamisi Bujeje, who runs a carpentry business in Bwisya village, Ukara Island, Tanzania

All images are courtesy of Energy 4 Impact

businesses and the projected high administrative and transaction costs, this approach did not work either," Diana says.

As a result, JUMEME decided to adopt an in-house financing approach, which enables micro-entrepreneurs to acquire productive use appliances on credit directly from them. The company leverages its financial means to help customers acquire the equipment. Through this scheme customers can order appliances that are procured by JUMEME and pay for them over an agreed period, typically six months.

On behalf of JUMEME, Energy 4 Impact has conducted a number of demand assessment and stimulation activities, as well as productive use awareness raising campaigns.

"We held several discussions with JUMEME on how best to support businesses that wanted to acquire new equipment. We conducted an analysis to establish the viability of these businesses before obtaining the appliances and then worked with business owners to strengthen their business plan and skills. JUMEME wanted assurances that the entrepreneurs would be in a position to pay for the equipment over an agreed period, pay the electricity bills and still make a profit," Diana says.

So far, 12 businesses have been financed to acquire maize mills, rice huskers, cassava mills, welding and carpentry machines, a chicken incubator and ice block makers. All businesses have repaid or are about to finish repaying their loans.

Ten other entrepreneurs took additional equipment to expand or diversify their businesses. At least 82 employment opportunities have been created, as a result.

After being connected to the grid, 25-year old Elias Malima was able to extend his working hours. The motorcycle garage owner acquired an electric-powered air compressor for inflating motorbike tires. Since then, he has more than doubled the number of customers he serves from 15 or fewer to around 35 a day and his income has increased by 50 percent. He has employed three workers and plans to open another motorcycle garage in a nearby village once JUMEME launches another mini-grid later in the year.

"As I was inflating motorcycle tires manually, Energy 4 Impact's mentors suggested I could get an electric-powered air compressor. They helped me write a business plan, which demonstrated the potential cash flow and the repayment plan. That is how I acquired the appliance from JUMEME on credit," said Elias, who has fully repaid his air compressor.

JUMEME power meters for a mini-grid in Bwisya village, Ukara island, Tanzania

Constantine Mulangi, 67, received support to prepare a business plan to acquire a welding machine and two metal grinders from JUMEME on credit. The appliances eased the work of Mulangi, a specialist in making window and door frames, repairing motorcycles and assorted kitchen accessories such as pots, pans and knives.

"We also helped Constantine to develop a pay-back plan. This guided him on aspects, such as the initial costs of the equipment he acquired, the deposit made to obtain the appliances, the interest he would pay and the monthly deposits required to complete repayments within the agreed period," says Jesse Kyenkungu, Productive Use Field Officer at Energy 4 Impact in Tanzania.

JUMEME power lighting up Bwisya village in Ukara island

An artisan on Ukara island acquiring hands on skills during the Energy 4 Impact-sponsored training on the Island

Like most mini-grids operating in rural contexts, JUMEME is faced with the challenge of keeping tariff costs low to create enough demand, while remaining profitable. Energy 4 Impact has helped JUMEME develop a tariff structure tailored to different users' needs, which includes a domestic and a business tariff. It is also helping the company understand the customers' pricing perception and sensitizing customers on the need for varying tariff structures.

As a way of diversifying their income streams and enhancing its sustainability, JUMEME has started using the energy they produce to run their own fish freezing/chilling and delivery chain business to serve local markets. This provides the company with an additional cash-flow, while offering vital services to the community, creating local jobs and contributing to the village's economic development. AEA

An African First

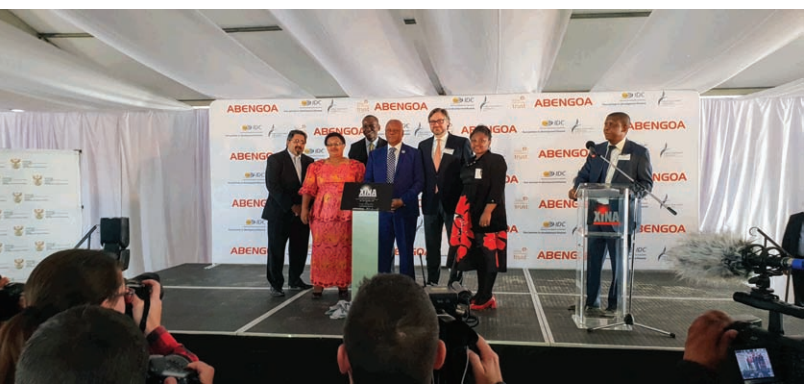
XiNa Solar One

All image's are courtesy of Abengoa Solar

Among much fanfare, the 100-MW XiNa Solar One concentrating solar power (CSP) plant in South Africa's Northern Cape province, online since last year, was officially inaugurated on May 18. Among the attendees was Minister of Energy, Jeff Radebe and members of the Pofadder community.

The plant, owned by a consortium made up of Abengoa Solar, IDC, PIC, and XiNa Community Trust, is located in the Northern Cape province close to Pofadder, and is spread out over a 300-hectare site. The project broke ground in December 2014 and began producing power in August of 2017.

The XiNa Solar One plant uses cylindrical parabolic trough technology and has a total installed capacity of 100 MW with a 5.5-hour thermal energy storage system using molten salts. It is also the first tower plant in operation in South Africa, and Abengoa's third solar thermal plant built in the country following the 100-MW KaXu Solar One and the 50-MW Khi Solar One facilities. These plants are already in commercial operation since 2015 and 2016 respectively. The latter was the first operational solar thermal plant that uses the technology of tower and heliostats in South Africa and on the African continent.



Alternative Energy Africa was fortunate in being able to speak with Dominic Goncalves, VP Business Development, Abengoa South Africa, on his thoughts and feelings about this major accomplishment for the company, the people of the local community, and South Africa's solar industry.

AEA: Congratulations on the official launch, it's quite an achievement! Can you tell me more about the XiNa One and its technology?

DG: XiNa Solar One is a solar thermal parabolic through plant with a capacity of 100 MW, which includes a molten salt energy storage system that can store the necessary energy for a further 5.5-hour supply and guarantee the dispatchability of the plant.

The technology involves mirrors which reflect the sunlight onto a tube receiver containing heat transfer fluid (HTF), which is heated to temperatures of up to 393ºC. The hot HTF is sent to a heat exchanger that heats water to produce steam. The steam generated is then used in conventional steam turbines for generating electricity.

The plant therefore, is both renewable and dispatachable, non-reliant on fuel risks, since the feedstock is the sun, and the plant provides electricity at night until 22h00, to add value in covering the evening peak when the power is needed the most.

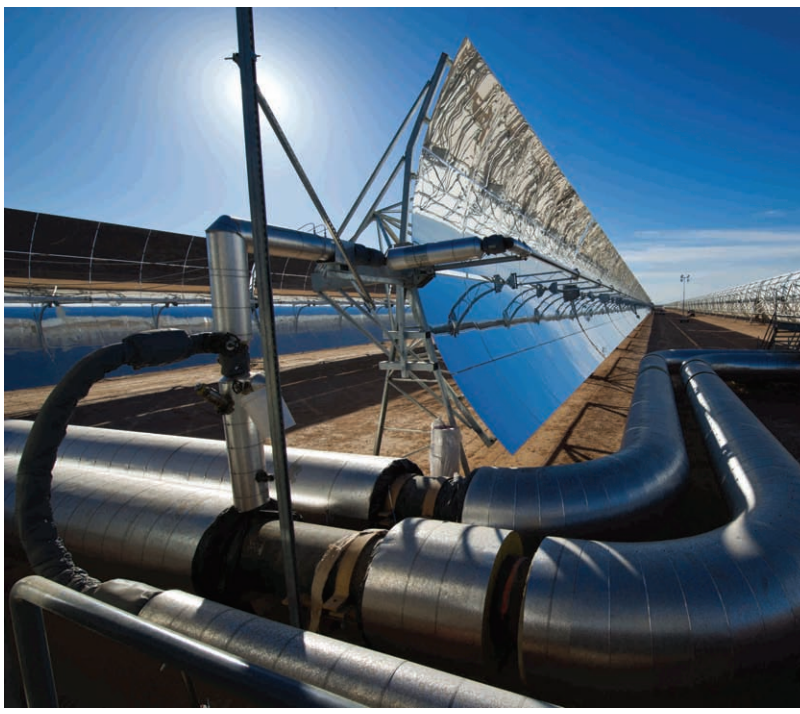
AEA: What is the feeling among the Abengoa team bringing on its third major solar facility in South Africa, XiNa Solar One, now that it is powering South African homes?

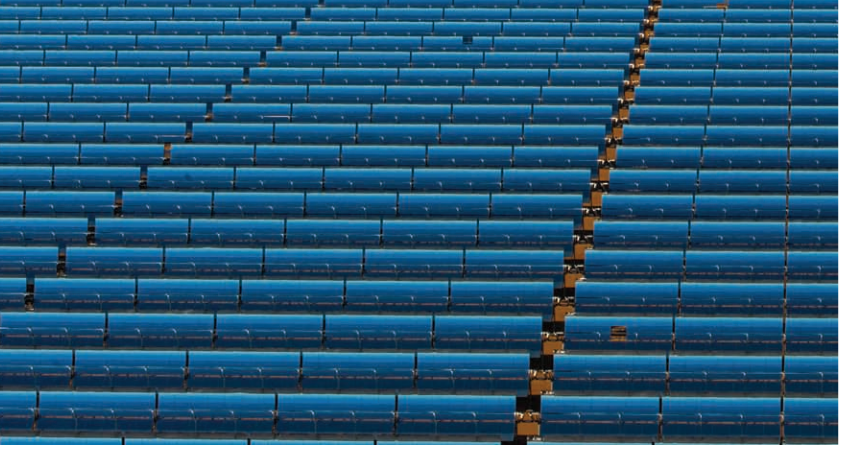
DG: The practical completion of XiNa Solar One was in fact achieved in August 2017, so the plant has been working at full capacity for the last nine months. This achievement represents – for the team working on site, as well as for the whole company – a firm step forward and it demonstrates the talent and commitment of

our people in addition to validating the trust that the market has placed on us. In addition, we feel very proud to be contributing to the sustainable development of a country that is still heavily dependent on fossil fuels.

AEA: Besides bringing clean, affordable energy to the region, how has the project benefitted the local communities?

DG: Thanks to this project Abengoa has helped to regenerate the economic, social, industrial and environmental fabric of this area in South Africa. During the construction phase, job creation peaked at over 1,300 positions, to which another 80 have been added during the operation phase, over the next 20 years. Now that the project is operational, the plant produces clean energy to serve more than 95,000 South African households and prevents the emission of 348,000 tons of CO_2 each year. Furthermore, XiNa Solar One is the country's first solar thermal plant designed to operate based on the so-called 'energy sale windows' that are detailed in an electricity calendar, in accordance with the agreement signed with Eskom, South Africa's power utility and final client of the plant, to which the production at the plant is aligned.





AEA: Any future facilities planned in South Africa, or in the African continent?

DG: Africa as a whole, including South Africa, is a key market for Abengoa where we find great business opportunities because of growing populations and the need to increase power generation. And particularly the excellent solar radiation in the Northern Cape of South Africa, which provides a great opportunity to deploy more solar energy – both solar thermal and photovoltaic – in this region.

The Renewable Energy Independent Power Producers Procurement (REIPPP) Program, of which XiNa Solar One is one of the major projects by both capacity and investment, was designed in response to the load-shedding and rolling black-outs of 2007/2008. XiNa, and projects like it under the program, have helped to solve South Africa's energy crisis, and we believe that many new projects, using renewable energy, as well as gas-to-power, will need to be developed and constructed in the future.

Just as South Africa experienced an energy crisis, which led to the development of projects like XiNa, the country is currently experiencing a massive water crisis, with 17 of the 19 river systems fully utilized. There are not many sources of water that can be effectively utilized to serve the country's growing population considering its aging and limited water infrastructure. We believe that South Africa will follow the route of many water-scarce regions, such as the Middle East, North Africa, Southern California, and Australia, among others, and will deploy large-scale desalination projects *en masse*, hopefully under similar programs such as the REIPPP, which will benefit local communities and provide positive economic impact. Abengoa's desalination plants globally are providing water for seven million people. We currently have plants under construction for 600MLD, which is more than the water consumption of the whole city of Cape Town. For these reasons, South Africa, and the African market, will remain a key strategic market for Abengoa. AEA

South Africa

President: Matamela Cyril Ramphosa (since February 2018)
Independence: May 1910 (UK)
Population:54,841,552 (2017)
GDP (purchasing power parity): $757.3 billion (2017 est.)
Real GDP Growth Rate: 0.7% (2017 est.)
Per Capita GDP: $13,400 (2017 est.)
Debt – external: $144.1 billion (31 December 2017 est.)
Industrial Production Growth Rate: 0.5% (2017 est.)
Electrification rate: 90% urban and 77% rural, combined 85%
Electricity – installed generation capacity: 48.27 GW (2017 est.)

Source: CIA Factbook May 2018, Climatescope

The country of South Africa was one of the continent's first nations to 'officially' receive its independence from the yoke of colonialism. This did not mean however that native South Africans were totally free and the transition to a free nation for the natives took quite some time to be complete. To say the country experienced racial strife from the outset of independence would be putting it mildly.

Europeans began migrating in the mid-1600s. Racial conflict between the white minority and the black majority led to apartheid being instituted in 1948 by the National Party and an enactment of apartheid laws made racial discrimination the main institution in the country. This gave birth to some of Africa's most known activists of the 20th century like Bishop Desmond Tutu and Nelson Mandela. It was these men, and many others, who led a bitter struggle to end apartheid. The apartheid laws began to be repealed or abolished in 1990, bringing about the inauguration of Nelson Mandela as South Africa's first black president in 1994. Today the country's politics are dominated by the African National Congress (ANC). Mandela was followed by fellow ANC party member Thabo Mbeki as president. Mbeki was one of the executive faces of the South African government from 1994 with his two terms as president lasting from 1999 to 2008.

Mbeki was followed by his former vice president Jacob Zuma who succeeded him in the presidential office, despite charges of corruption against him and his administration, as well as his personal life making the news on a regular basis. In August 2017 the South African president narrowly survived his sixth vote of no confidence from the country's parliament, although his luck eventually ran out. In February of this year Zuma resigned after days of defying orders from the ANC to leave office and on the eve of another no-confidence vote in parliament. Zuma said he was resigning so that his party would not be divided. Zuma's resignation paved the way for deputy president, Cyril Ramaphosa, to be elected by parliament as president.

Moving on to the economy, South Africa has the most developed, industrialized, and varied economy on the continent. It is a middle income emerging market with an abundant supply of natural resources; well-developed financial, legal, communications, energy, and transport sectors; and a stock exchange that is Africa's largest and among the top 20 in the world. Despite all these positives, the country's economy also has its struggles. Unemployment, poverty, and inequality are among the highest in the world and remain a challenge. Official unemployment is roughly 26% of the workforce and runs significantly higher among black youth.

The government's economic policy has focused on controlling inflation, but the country faces structural constraints that also limit economic growth, such as skills shortages, declining global competitiveness, and frequent work stoppages due to strike action. The government faces growing pressure from urban constituencies to improve the delivery of basic services to low-income areas, to increase job growth, and to provide university level-education at affordable prices.

Its economic growth decelerated to 0.3% last year, although it is expected to see a slight rebound in 2017. According to African Economic Outlook it should post a GDP for 2017 of about 1.1%, and higher numbers are expected in later years. National government revenue increased by 11.6% in fiscal year 2015/16, reaching R1.069 trillion, or 26.1% of GDP. The increase was driven by higher receipts in most major tax categories, particularly taxes on property, international trade and transactions, and non-tax revenue.

While South Africa's modern infrastructure supports a relatively efficient distribution of goods to major urban centers throughout the country, unstable electricity supplies retard growth. Eskom, the state-run utility firm, is in charge of bringing the country's power generating capabilities up to snuff but has been slow to bring new projects online.

REIPPP Status

South Africa is one of the continent's most aggressive renewable energy developers and there is no shortage of projects online, in planning or under construction in the country. The country did hit a few snags with its Renewable Energy Independent Power Producer Procurement (REIPPP) program in recent years, with project sign-offs being delayed. Two years ago Eskom halted the signing of agreements, bringing the until then successful program to almost a stop.

However, this has all changed for 2018. In February, South Africa's state-run utility Eskom received the go-ahead from the Minister of Public Enterprises, Lynne Brown, to sign outstanding power purchase agreements with independent power producers who form part of SA's independent power scheme. The national utility saw its application to purchase additional renewable energy from the producers involved in the last round of South Africa's REIPPP program approved by the Minister.

"The conclusion of the power purchase agreements to enable the implementation of the outstanding projects under bid windows 3.5, 4 and 4.5 of the Renewable Energy Independent Power Producers Program is critical to implementation of the national energy policy as articulated in the Integrated Resource Plan of 2010," Brown said in a statement.

By June it was announced that a new REIPPP round would launch, possibly by November. The round would be the country's fifth. "A new bid round – BW5 of the Renewable Energy IPP Program – will be launched this year and it is estimated [it will secure] 1,800 MW of similar technologies, as in the expedited bid window," South Africa's Minister of Energy Jeff Radebe announced on the Ministry's Twitter account.

"This could bring another ZAR40-50 billion [$3.16-3.95 billion] of investment to the country and ensure investment and economic growth as well as the opportunity to encourage opportunities for black industrialists and the development of black independent power producers," said Radebe.

Currently the country has approximately 1.47 GW of cumulative installed PV power, with another 813 MW expected to come online soon. The South African government believes the new procurement round may raise investment of more than $3.1 billion in the sector.

Key Upcoming Projects

Now that 27 REIPPP awards from previous rounds have been signed, the South African renewable sector will see an uptick in activity over the coming years. One such project, under Round 4, comes from Building Energy who has now signed PPAs with Eskom to build, own, and operate a 147-MW wind farm in Roggeveld and a 4.7-MW mini-hydroelectric plant in Free State. These agreements, signed on April 4, will be the official start for the construction of the wind farm and the small hydroelectric plant. The overall investment in the construction of the two plants amounts to €324 million.

The Roggeveld wind farm will generate around 613 GWh per year. Construction work is scheduled to begin in 2018 and the commercial operation date is foreseen to be in April 2021.The Kruisvallei small-hydroelectric plant will generate around 28 GWh of energy.

A consortium led by Solar Reserve and ACWA Power signed a 20-year PPA with Eskom for the Redstone Solar Thermal Power Project. The 100-MW power station with 12 hours of energy storage will be able to reliably deliver a stable supply of clean electricity to the equivalent of more than 200,000 South African homes each year.

The Redstone project will be located in the Northern Cape Province, adjacent to the 75-MW Lesedi and 96-MW Jasper photovoltaic (PV) solar power projects successfully developed and implemented by SolarReserve.

The first of its kind in Africa, the Redstone project will utilize SolarReserve's proprietary Therma Vault technology – the world's most advanced solar thermal technology with integrated molten salt energy storage, which solves the issues experienced with other renewable energy solutions and is dispatchable 24/7. This technology will enable the Redstone power station to deliver 100 MW of nonintermittent clean energy to the grid, especially during peak periods. As identified under the PPA, Redstone will deliver continuous electricity to the national grid for up to 17 hours a day in order to meet peak energy demands.

As a result ofthe technology's ability to store 1,200 MW-hours of energy daily, the project's electricity price is the lowest of any solar thermal project awarded in the country to date.

Renewable power generation company Lekela successfully reached financial close in early June on two further projects in South Africa. The Kangnas and Perdekraal East wind power projects together will add 250 MW of clean, reliable power to South Africa's grid. Construction will shortly begin on the wind farms, with the projects expected to be fully operational in under 28 months.

Source: Anastasia Palagutina

Situated in the Northern Cape close to the town of Springbok, Kangnas is a 140-MW project of 61 wind turbines. Perdekraal East will comprise 48 wind turbines and is a 110-MW project located in the Western Cape close to the town of Touwsrivier.

Both projects will use Siemens wind turbines of a 108-meter rotor diameter and a 115 MM hub height. The projects are part of the fourth round of the REIPPP program. The total cost for both projects is approximately $515 million.

Combined, the projects are expected to contribute over ZAR800 million to the local communities over the lives of the wind farms. Additionally, community trusts have been established for Kangnas and Perdekraal East projects, providing each community with a shareholding in their local wind farm.

During peak construction, around 400 employment opportunities will be created for each project, developing important skills and knowledge in the local communities and enabling improved employment prospects.

Newly Online

Since our last coverage in mid-2017, the Loeriesfontein and Khobab wind farms commenced their 20-year commercial operations in December, a milestone achieved on schedule, on budget and without a single lost-time incident. The facilities have a generation capacity of 140 MW each. The two neighboring wind farms combined make up the largest single expanse of wind turbines in the country.

Situated in the Northern Cape the wind farms comprise a total of 122 wind turbine generators, spanning 6,653 hectares. Collectively the wind farms will power circa 240,000 South African households, positively impacting the country's economy and its people.

The two wind farms were developed by Mainstream Renewable Power which also managed the construction process and will oversee the operations and maintenance of the plants. The Loeriesfontein and Khobabwind farms are owned by a consortium led by Lekela Power.

The 100-MW Kathu Solar Park began construction in 2016 and was originally scheduled to come online in October of this year. Kathu Solar Park is a Concentrated Solar Power (CSP) project that is being built by Spanish engineering and construction companies Acciona and Sener, after receiving the award from the developer, an Engie-led consortium. Kathu Solar Park was awarded preferred bidder in the third round of the REIPPP program.

The plant will feature parabolic trough technology specifically designed and patented by Sener, and is equipped with a molten salt storage system that allows 4.5 hours of thermal energy storage to extend the operational capacity of the plant after sunset. Kathu Solar Park will produce enough power to supply 150,000 homes. The Kathu project is employing approximately 800 persons on site each day with over 50% of these employees from the local community (JTG Municipality), far above the committed obligation of 21.13% local job creation. The solar plant has a targeted completion date of October 2018.

Future Outlook

With South Africa's REIPPP back in motion and plans for a future round supported by the new president, the outlook for a rebound of the country's renewable energy sector is quite positive. Already a highly developed country by African standards, with supporting infrastructure and governmental will to bring clean and sustainable forms of energy to the country, investors will be back and anxious to bring new projects online. Next year's coverage is sure to fill these pages with a number of projects completed and new ones on the drawing board. AEA

Source: Loeriesfontein Wind Farm

Loeriesfontein construction

Source: Kathu Solar Park

By Sofia Coelho Pereira
Miranda &Associados

CAPE VERDE
and its Bold Renewable Energy Target

Island chains that do not possess fossil fuel reserves, like the Cape Verde archipelago, are often faced with an excruciating dilemma: spend important foreign exchange reserves on importing fuel to generate power, thus negatively affecting their balance of trade statistics and becoming dependent and/or indebted to foreign suppliers; or leave their populations with limited electrical power, with all the negative consequences arising therefrom. Another option, which is often forgotten or ignored, is to adopt a renewable energy-based strategy. This has been Cape Verde's vision over the years.

> "Those who know Cape Verde well know that the wind is a constant. When compared to solar power, there is an immediate advantage in wind: it can blow 24 hours a day."

The Target

Cape Verde has set itself a very audacious renewable energy target. As part of its "sustainable energy for all" agenda, it has pledged to obtain 100% of all electricity produced in the country from renewable resources by 2020, either through the main grid, isolated micro-grids or privategrids.

Cape Verde is an archipelago made up of 10 islandswith almost all of the islands' 550,000 residents currently having access to electricity. Cape Verde's per capita electricity consumption of 727 kWh per person per year is substantially higher than the sub-Saharan Africa average of 488 kWh per person per year. Although most of its electricity is still produced by generators, which run on imported petroleum products, Cape Verde has in recent years started to diversify its energy portfolio and currently roughly a quarter is provided by renewable sources.

Considering the lack of large hydropower resources, the absence of non-renewable natural resources and because of the insularity, Cape Verde has no way of getting energy cheaply, with the cost of electricity production still strongly linked to fluctuations in the international oil market. The country may, however, aim to achieve 100% renewable energy with a diverse resource mix, with a system based on solar, wind and energy storage (such as batteries and pumped hydropower).

Wind Power – the Cape Verdean Experience

Wind power is a natural resource for Cape Verde, which lies in the path of the northeasterly trade winds and consistently experiences high-speed winds. Cape Verde has a strong and mono-directional wind, which is great for constant and reliable wind energy production. Those who know Cape Verde well know that the wind is a constant. When compared to solar power, there is an immediate advantage in wind: it can blow 24 hours a day. Wind is converted into energy through wind turbines, used either to drive electrical generators or to directly power pumps and other machinery.

Recent studies proved that: (i) wind projects are the most competitive compared to other technologies, with an average levelized cost (the net cost to install a renewable energy system divided by its expected life-time energy output) of about € 100/Mwh; (ii) the majority of wind projects are economically competitive compared to the production cost of electricity using heavy fuel.

The first grid-connected wind turbines were introduced in Cape Verde in 1994, but they produced no more than 2% of the country's energy needs. In 2009 more than 95% of electricity was still produced from fossil fuels. However, in 2010 a new player entered Cape Verde's energy chess board with view to changing the status quo: the company Cabeólica, S.A., currently owned by the State of Cape Verde, Electra (Cape Verde's national electric utility), Edison Energy Asset Company(held in equal parts by Africa Finance Corporation and Aldwych Holdings Limited) and the Finnish Fund for Industrial Cooperation. Cabeólica implemented four wind farms, totaling 25.5 megawatts of installed capacity, generated more than 20% of the electricity used on the four islands with the highest demand: Santiago, where the capital Praia and the main commercial areas are located, São Vicente, the second biggest city and with the main port, and Sal and Boa Vista, the main tourist destinations.

Construction of the first wind farm began in 2010 and the farm started generating electricity in 2011. The last farm was completed in mid-2012. According to the 2016 Annual Report (the 2017 report is still not publicly available), the four wind farms have produced 370,297 MWh in their first five years of operation, with an annual average of 74,000 MWh, which varied annually more as a function of the limitations imposed by the off-taker (Electra) than due to oscillations in wind speed or wind turbine availability, which remained over 98%. A slight decrease in production has been registered in the past two years, due essentially to these same limitations.

Regulatory Framework for Renewable Energy

The electricity regulatory framework in Cape Verde comprises several legal statutes as well as a number of policy instruments, being the most important related to production of electricity using renewable energy sources the following:

(a) Decree-Law No. 54/99, of 30 August 1999 (amended in 2006 and 2013), which established the framework of the Cape Verde Electric System;

(b) Decree-Law No. 26/2003, of 25 August 2003, which creates the Economic Regulatory Agency (ERA). ERA is an independent administrative authority that regulates the water, energy and transport sectors. Its mission is to provide economic efficiency and the financial balance of the regulated sectors under its supervision, to ensure that services of public interest and with benefits to society are offered. Its main responsibilities include regulating the access to the activities in the sectors in which it acts, notably the electricity sector, setting forth the prices at which electricity from renewable energy projects is acquired by the national grid, regulating electricity tariffs, and supervising and applying sanctions for breaches of the legal and regulatory framework;

Source: Cabeólica S.A.

Boa Vista

(c) Decree-Law No. 1/2011, of 3 January 2011 (as amended in 2013 and 2014) on promotion and incentives for the use of renewable energy, which establishes the rules concerning the promotion, incentives, access to licences, and independent production of electricity using renewable energy sources, with the aim of promoting and incentivising the use of renewable energy in Cape Verde;

(d) Resolution No. 33/2011, of 5 September 2011, which approved the first Strategy and Action Plan "Cape Verde 50% Renewable by 2020";

(e) Resolution No. 7/2012, of 3 February 2012, which approved the Strategic Plan for the Renewable Energy Sector (PESER) and the Renewable Energy Development Zones (ZDER); and

(f) Resolution No. 100/2015, of 15 October 2015, which approved the National Action Plan for Renewable Energy (PNAER)and the National Action Plan for Energy Efficiency for the term 2015-2020/2030.

The framework and action plans were all designed to attract new players to the renewable electricity production market.

The Key Statute

Decree-Law No. 1/2011 is the key statute providing the legal regime on independent production and self-production of electricity from renewable sources. In general terms, electricity production is subject to a license, while electricity transport and distribution requires the granting of a concession by the Ministry in charge of the energy sector.

There are three regimes of electricity production, all open to private initiative and to the accumulation of licenses:

(i) The general regime, including independent production and self-production: in which a license granted by the General Directorate of Energy is required, following ERA's opinion;
(ii) Micro generation(self-production with connection power up to 100kVA): although no license is required, the registration of the producer in the self-production Registry system is mandatory; and
(iii) The simplified regime for decentralized rural electrification: for which a license granted by the relevant Ministry is required.

As to the remuneration of power production, the general regime is as follows:

- The producer is entitled to receive a fixed amount set by ERA for each kWh injected in the grid, which is stabilized for a 15-year term, as of the date of connection to the grid;
- No inflation rate updates and no amendments apply during the 15-year period; and
- After the15-year period there is a reduction of the initial fixed amount, between 20% and 35% (set by ERA), depending on the applicable technology.

The payment is received by the producer in one of two ways: (i) a monthly payment made by the Concessionaire; or (ii) through credits of renewable production, always within 30 days of the issuance of the invoice by the producer. In turn, the renewable electricity producer must pay a fee to the relevant Municipality or to the State, as the case may be, in the amount corresponding to 0.5% of the received remuneration. If the renewable production plant covers the territory of several municipalities, the estimated fee is distributed proportionally to the area covered by each municipality. Finally, Projects within ZDERs do not require an environmental impact assessment procedure or studies.

Conclusion

Cape Verde has had significant success in integrating wind (and other renewable sources) into its energy mix. Although 100% could be a difficult goal to achieve by 2020, the political and social decision in this regard has been taken and appears to be irreversible. The implementation of the renewable energy program will require an important investment in the electric grid to ensure the security and operability of the system. By adopting cutting-edge technologies and innovative business practices, Cape Verde can achieve its 100% renewable energy goal in a way that is cost-effective and realistic. Considering the generalized political will, public support, and investment opportunities, we expect more international players to increasingly look to the "*green*" (in Portuguese, "*verde*") archipelago.

About the Author

Sofia Coelho Pereira is a Principal Associate at Miranda & Associados, being a member of the Energy and Natural Resources Practice Team and co-head of the Cape Verdean Jurisdiction Team.

Fenix Introduces 'Fenix Flames' Employee Benefit Program

Fenix International announced a pay-out to employees such as customer service associates, sales managers, chefs, and guards under their unique inclusive employee ownership program in Africa.

The 'Fenix Flames' program extends benefits to employees in lieu of traditional company stock options. As part of an employee benefits program, the scheme was designed to offer a pay-out in the event of an acquisition or public listing. Following Fenix's recent acquisition by global energy company ENGIE, 350 employees based in Africa will now benefit as a result of the program.

The unique ownership initiative was created to ensure all full-time Fenix employees, beyond those eligible for traditional stock options, benefit from the business' performance and value creation, including an acquisition or IPO event. African-based employees, including sales managers, call center staff, support teams, chefs, cleaners and guards, will each receive a pay-out, with longer-serving employees receiving up to two-five times their gross annual salary.

Images courtesy of Fenix International

Fenix Flames are a core part of Fenix's mission to create long-term impact in their African markets, where the average Ugandan earns as little as $1.50/£0.90 a day. In offering a long-term vested interest in the business, it helps Fenix to attract and retain the best talent and has proved a powerful performance driver for the team as Fenix has rapidly expanded. Alongside ownership, Fenix and ENGIE provide employees with professional development, comprehensive health insurance, parental leave and other benefits to empower and develop the team. Fenix held an all-hands meeting to let employees know the value of their Fenix Flames options.

Lyndsay Handler, CEO of Fenix International, said: "At Fenix, we believe that employee ownership is powerful. Fenix Flames drive the team to go above and beyond to achieve our long-term goals, to collaborate across traditional department lines, to operate with integrity and to achieve profitability. We spent over two years working with lawyers, investors and financial advisors to carefully craft the Fenix Flames program and all of this hard work has paid off today."

Denis Mutti, National Sales Manager at Fenix International said: "I must say it wasn't easy to leave a secure job in microfinance to join Fenix in its start-up stage, but today I celebrate taking that leap into the unknown. Alongside being a part of the company's growth and helping to change the lives of millions of people, I have also been able to earn Fenix Flames which are enabling me to acquire a property in Kampala – a dream come true. Only one in a million companies would do this in Africa. Now that the ENGIE acquisition is finalized we will all be working hard to take Fenix to the next level."

300+ Firms Blacklisted in Kenya

More than 300 firms in Kenya have been blacklisted from energy tenders. According to the East African country's energy minister, Charles Keter, 350 companies linked to corrupt deals at Kenya Power Lighting Company were blacklisted.

The action follows findings of an internal audit that revealed that 350 out of the 500 contractors did not meet the set criteria for pre-qualification. Reports allege that some employees of the Kenyan utility firm earned kickbacks from awarding tenders to questionable firms through nepotism.

"Any contractor out of those three hundred and something firms will never do any business with the Government of Kenya, not only the Ministry of Energy," said Keter.

"We need to circulate that list to other departments. If they are dealing with roads, if they are dealing with REA (Rural Electrification Authority) they have to be removed like yesterday," he added.

Kenya Power fired 18 employees following the audit that revealed that they jointly owned companies shortlisted for contracts with their children, spouses and relatives.

Siemens Wins Award for Microgrid Digital Solution

Siemens won the Digital Solutions of the year award for its Siemens South Africa Headquarters Microgrid Project at the Africa Utility Week Industry Awards which took place in Cape Town.

The traditional power grid provides reliable power most of the time. But when natural disasters or security breaches threaten the grid, the ensuing blackouts can be catastrophic and costly. It is for this reason that organizations and utilities are working together to build resilient, flexible power systems called microgrids. Operating either as part of traditional grid or independently (or both), mircogrids are revolutionizing the way we manage our energy resources.

A microgrid is a scaled-down version of the centralized power system. It can generate, distribute, and control power in a campus setting or small community. These grids are reliable and flexible; are more resilient, secure, and best of all save money. They also store and incorporate renewable energy.

Siemens provides a comprehensive portfolio of products, solutions, and services to help build and operate microgrids of any size. They provide generation and distribution of electrical energy as well as monitoring and controlling of microgrids.

AfDB Achieves Historic Disbursement of $7.81 Billion

The African Development Bank, under the leadership of its President, Akinwumi Adesina, has increased disbursements to support the structural transformation of countries in Africa, according to its *Annual Report*, released during the Annual Meetings in Busan, Korea.

Bank disbursements reached $7.81 billion in 2017, a 15% increase over 2016 and the highest on record for the Bank. This increase was driven, to a large extent, by the 42% increase in project loan and grant disbursements, which reflect in part, improved portfolio management. The Bank approved 249 operations amounting to $8.93 billion. This was reflected in its core financing, disbursements, operational strategies and portfolio management.

Adesina indicated that this "reflected a 56% increase in disbursements for non-sovereign operations. A clear sign of the Bank Group's increasing engagement with Africa's private sector, non-sovereign operations accounted for 38% of African Development Bank approvals, the highest on record."

While the Bank's net operating income declined between 2014 and 2015, it has turned around rapidly. "The Bank Group also continued to grow its income. Net operating income increased in 2017 to $817.69 million, up from $631.08 million in 2016, a 29.6% increase and the highest since 2009," Adesina said. He added that, "the Bank also consolidated its position as Africa's leading knowledge institution by taking full leadership responsibility for the publication of a key flagship – the *African Economic Outlook*."

The Bank is stepping up the pace by focusing on five priorities that are crucial for accelerating Africa's economic transformation: the "High 5s" which include Light up and power Africa, Feed Africa, Industrialize Africa, Integrate Africa, and Improve the quality of life for the people of Africa.

These High 5s guide the Bank's operations to deliver critical development impacts in Africa. For example, once completed, power generation projects approved in 2017 will install 1,400 MW of new renewable energy capacity. Light up and power Africa provided 4.4 million people with electricity. Feed Africa provided 8.5 million people with improved agricultural technologies.

World Bank Gets New VP for Infrastructure

Makhtar Diop, a Senegalese economist and politican, has been appointed the World Bank's Vice President for Infrastructure. For the past six years, Diop was the World Bank's Vice President for Africa where he oversaw the delivery of a record-breaking $70 billion to sub-Saharan Africa to help tackle key development challenges.

The newly created Infrastructure Vice Presidency comprises Transport & Digital Development, Energy & Extractives, Infrastructure Finance and Public Private Partnerships (PPPs). In this global role, Makhtar Diop will oversee the Bank's work on infrastructure and infrastructure finance and lead efforts to develop sustainable solutions and help close the infrastructure gap in developing and emerging economies.

BP Commits to a Low Carbon Future

BP published a new report setting out its commitment to a low carbon future and to helping meet the dual challenge of providing the increasing energy the world demands while at the same time working to reduce greenhouse gas emissions.

The report, "Advancing the Energy Transition", details BP's framework for delivering this commitment: reducing greenhouse gas emissions in its operations, improving its products to help customers reduce their emissions, and creating low carbon businesses. The report also sets out clear near-term targets for limiting greenhouse gas emissions from BP's operations, against which its progress can be measured. These targets are concrete, measurable and are intended to be met over 10 years.

Some of the goals include zero emissions growth, sustainable emissions reductions, limiting methane emission intensity, carbon offsetting, and advancing low carbon.

DHYBRID Partners with QOS Energy to Monitor PV Hybrid and Energy Storage Off-Grid Plants

DHYBRID, the leading German solution provider for PV hybrid, energy storage and smart-grid projects, has announced its partnership with QOS Energy, the data intelligence cloud specialist, to monitor PV hybrid and energy storage plants. DHYBRID will benefit from the versatility of QOS Energy's monitoring software, which is unique in its ability to aggregate data from all types of energy sources onto one single analytics platform.

Source: DHYBRID

DHYBRID designs, installs and operates commercial and utility-scale hybrid plants, offering cost-efficient energy solutions for remote islands and other off-grid sites that need independent, reliable and decentralized electricity. The company substitutes old, unreliable and polluting diesel-powered generators with clean and efficient PV hybrid and energy storage solutions all around the globe.

One of the key challenges associated with hybrid and off-grid plants is to successfully manage diverse power sources simultaneously, in order to guarantee the security of power supply. Through this partnership, the two companies will combine DHYBRID's in-house SCADA & control technology with QOS Energy's monitoring solution to successfully meet that challenge and ensure that each plant delivers energy as expected.

QOS Energy's cloud-based monitoring and analytics platform was selected for its unique ability to acquire data from any type of plant, data acquisition system or database, a key advantage for the effective and centralized management of large and complex PV projects. Thanks to this capability, DHYBRID will be able to increase power production, optimize maintenance processes and lower the downtime of the plants it manages.

"Thanks to the modular and scalable platform approach of our smart-grid and EMS technology, our customers are able to reduce the dependency of fossil fuel and greatly benefit from the financial and environmental impact of renewable energy solutions. Our manufacturer-independent and technology neutral technology platform ensures that their energy supply always stays extendable and future-proof,"says Tobias Reiner, CTO of DHYBRID.

QOS Energy's cloud-based Qantum® suite features a complete set of customizable charts, dashboards, KPIs and alerts helping to gain a deeper understanding of the assets' performance, thereby maximizing operational performance. The platform also offers a fully integrated maintenance management system to help reduce downtime by streamlining maintenance workflows for large and complex renewable energy portfolios.

"The exceptional flexibility of our renewable monitoring platform provides the highest levels of profitability for our clients, who transform raw data sets into actionable insights. This flexibility empowers our clients to take better and faster decisions using our comprehensive renewable analytics solutions. We are very proud to be partnering with an innovative plant expert such as DHYBRID," said Franck Le Breton, CEO at QOS Energy.

ABB and Heliospectra Team-Up for MEA Tech Collaboration

ABB, a pioneering technology leader in electrification, robotics and motion, industrial automation and renewables and Heliospectra, a leader in intelligent lighting technology for greenhouse and controlled plant growth environments, are joining forces to explore innovative solutions that will boost the productivity and the sustainability of greenhouse and controlled environment agriculture produce industry in the Middle East and Africa.

The collaboration propels exploration of new food production technologies and commercial infrastructure to address increasing demand for sustainably grown agricultural products. Creating value through integrating solutions across light control systems, refrigeration, renewables, robotics and Industry 4.0 digital technologies to increase flexibility, reduce costs while improving capital efficiency. Heliospectra's advanced light control systems and fully adjustable spectra LED technology, which accelerate food harvest cycles and time to market, will provide the technical foundation for the new partners' technology co-development. Additionally, the partners will create programs for educating growers in best practices for sustainable agriculture. The partnership was signed between ABB Industries LLC and Heliospectra AB and is valid for the next two years with a goal to extend the partnership to new markets across the region over time.

Siemens Gamesa Presents its Latest Innovation in Storage Technology

Hybrid projects combined of wind energy, solar PV and other energy sources are becoming a more and more attractive option to drive the energy transition to higher shares of renewable energy in the mix. Siemens Gamesa is one of the pioneers in this development with a long-term track record in hybridization and off-grid technology. Now the company has taken another important step and is testing a battery storage technology with large future potential. At SGRE's La Plana R&D site near Zaragoza, Spain, a redox flow energy storage system has been commissioned. The system is connected to the hybrid controller of the combined wind and PV generation system and supplements the lithium-ion batteries that have been in use here for around two years.

La Plana Hybrid

Redox Flow Battery

Source: SGRE

The La Plana test-site integrates the next-generation Vanadium redox energy storage system with a wind turbine, solar-PV modules and a diesel generator. The new redox flow battery offers a 120kW energy output with a storage capacity of 400kWh. Siemens Gamesa has been refining its knowledge in hybridization over years. A sophisticated flexible hybrid controller is the resulting product of this R&D effort. It is the digital core that coordinates the generation of all energy sources to meet the electrical load, in order to reduce the LCoE of the plant regardless of whether the grid is connected or disconnected. To reduce energy costs the controller is targeting to achieve the maximum integration of renewable energy.

To support the highly efficient dispatch strategy steered by intelligent control algorithms a large storage capacity helps to keep generators to their technical minimum load and to enhance the share of renewables – even when low wind periods and cloudy sky occur at the same time.

"With the Redox-Flow technology commissioned at our La Plana test site, we are now active in all relevant storage technologies including Power-to-Heat and also battery storage systems," says Antonio de la Torre, SGRE's chief technology officer. "Due to its scalable energy capacity the Vanadium redox battery is a highly promising option to support our advanced technology offers for isolated and grid connected systems."

SolarEdge Launching Grid Services and Virtual Power Plant Solution

SolarEdge Technologies, Inc. (SolarEdge) is launching an innovative solution for grid services and virtual power plants, to support a shared energy economy. SolarEdge's grid services offer aggregative control and data reporting enabling the pooling of PV and storage in the cloud for the creation of virtual power plants. Offering benefits to all stakeholders, the solution will provide utilities with the tools to leverage distributed energy generation systems to more efficiently meet demand. Energy retailers will enjoy protection from price peaks and PV system owners can increase their revenue from joining this new energy economy.

With the increasing proliferation of PV and storage around the world, the energy production industry is transitioning from a centralized system to a distributed network in which energy is produced closer to the location it is stored and consumed. This provides PV and storage system owners with a new revenue stream opportunity by selling their self-produced and stored energy. However, the new complex network of distributed generation requires sophisticated management platforms to provide real-time, aggregated control of the demand and supply of energy.

Source: SolarEdge

"With the continued evolution in PV and storage, renewable energy can be affordable and abundant. We are moving closer to the day when everyone will produce, store, and sell their own energy," stated Guy Sella, CEO of SolarEdge, Founder. "Our grid services aim to accelerate the transition to a more stable and cost-effective grid in which people have more control over their energy."

"Implementing a new model of energy generation requires simultaneous advancements at the hardware, system, and network levels. Our HD-Wave inverter made PV more energy-efficient and cost effective. At the system level, our inverters synchronize energy production, usage, and storage to create a seamless user experience with our monitoring platform," stated Lior Handelsman, Marketing and Product Strategy VP of SolarEdge, Founder. "Now at the network level, our grid services enable the aggregation and synchronization of multiple PV systems to create a distributed network. This is an important milestone in making solar energy ubiquitous."

The solution helps to resolve a variety of complex energy issues such as, generation shortages, transmission bottlenecks, energy arbitrage, and frequency imbalances, thus reducing the need to invest in additional and expensive infrastructure. It will also provide energy retailers with protection against price peaks by facilitating access to stored energy. As PV markets evolve from feed-in tariffs to net-metering and finally to self-consumption, the grid services will provide homeowners with the opportunity to maximize self-consumption and take advantage of time-of-use tariffs as a revenue stream.

Deby Could Hold Office through 2033

Chad's parliament approved a new constitution that expands President Idriss Deby's powers. The new constitution could allow Deby to remain in office for another 15 years, until 2033.

Source: Amanda Lucidon

Idriss Deby

The new constitution, whose vote was boycotted by opposition members, reimposes a two-term limit; however, it will not be applied retroactively, meaning Deby could serve two terms after the next election in 2021.

The constitution eliminates the post of prime minister which, according to Deby's opponents, installs a *de facto* monarchy in Chad.

The constitution now heads to Deby for his signature. There is a chance Deby will decline to sign however. Ok, there isn't, just a little humor there.

UNSMIL Reports on Casualties in Libya

From April 1-30, the United Nations Support Mission in Libya (UNSMIL) documented 31 civilian casualties – four deaths and 27 injuries – during the conduct of hostilities across Libya. Victims included three men and one boy killed and 19 men, five women, two boys and one girl injured.

The majority of civilian casualties were caused by shelling (one death and 13 injuries), followed by gunfire (one death and 8 injuries), explosive remnants of war (ERW) (one death and three injuries), and vehicle-borne improvised explosive devices (VBIED) (one death and three injuries).

UNSMIL documented, one death and 18 injuries in Sabha and three deaths and nine injuries in Benghazi.

UNSMIL also documented 21 additional casualties (10 deaths, 11 injuries) from other possible violations of international humanitarian law and violations or abuses of international human rights law in Ajdabiya, al-Zawiya, Benghazi, Kufra, Misrata, Tripoli, Sabha and Surman.

Protests Erupt in South Africa

South African President Cyril Ramaphosa is seeing the largest civil disturbances in his country since he took office on February 15. In late April, protests broke out in Mahikeng, a region in the North West province.

Protestors are largely disenchanted with the *status quo* they say persists from former president Jacob Zuma's administration. They have demanded the resignation of the provincial Premier, Supra Mahumapelo, who is a member of the African National Congress (ANC), the ruling party.

Residents in the region want Mahumapelo, who they accuse of corruption, to resign but the senior official has no intention of doing so. They are now calling for his removal, but the president will need backing by top ANC officials before taking such an action should he decide to do so.

Local media reports had police firing tear gas into the crowds and arresting a number of protestors following acts of vandalism, including setting fire to a bus. President Ramaphosa deployed troops to look after patients at a hospital in its troubled North West province after staff went on strike over corruption and a collapsing health care system that they blame on the provincial premier.

Bangui Clashes Resume, Many Dead and Injured

Dozens of people were killed and injured in Bangui, capital of the Central African Republic, as sectarian violence broke out in late April.

According to an AP report, anger has been high since the U.N. peacekeeping mission and local security forces launched a joint operation in the largely Muslim neighborhood of PK5 in early April to arrest members of armed criminal groups after their leaders refused to disarm. The dead bodies of 17 civilians were laid in front of the U.N. peacekeeping offices shortly afterward.

On May 4, *Medecins Sans Frontieres* (MSF) reported that about 60 wounded people were treated in its clinics and hospitals in the PK5 and Fatima neighborhoods, as fighting resumed once again in Bangui.

MSF's SICA hospital received more than 50 people with gunshot wounds sustained during the May 4 outbreak of violence. Al least six died as a result of their injuries.

As an ambulance referring wounded people arrived at SICA hospital, a group of people gathered in front of the hospital doors to demonstrate their anger, directly threatening the facility and blocking access to other ambulances.

UNMISS Urges South Sudan to End Fighting

The surge of violence in South Sudan's Unity region "looks set to continue despite the Cessation of Hostilities Agreement that was signed last year," according to the Special Representative of the Secretary-General and head of the United Nations mission in the country (UNMISS), David Shearer.

He made his comments during a visit to Leer and Dublual in the Unity region to see first-hand the impact of the deteriorating security situation on communities.

"The Cessation of Hostilities Agreement needs to be fully implemented. All sides need to abide by what they agreed to and their actions on the ground carefully monitored and scrutinized," he said.

"The intensification of the conflict is having a serious human impact. Hundreds of people are sheltering next to the UN base. We saw tukuls (huts) burnt to the ground. We were told that elderly people and children had been killed and medical clinics ransacked," said the Head of UNMISS.

Conferences

May 2018			
2-4	ICCI Powered by POWER-GEN	Istanbul, Turkey	www.icci.com.tr
9-10	North Africa Renewable Energy Summit 2018	Casablanca, Morocco	www.moroccorenewable.org
29-31	5th Kenya Solar Africa 2018	Nairobi, Kenya	www.solarexpo.expogr.com
June 2018			
19-22	Africa Energy Forum	Le Morne, Mauritius	www.africa-energy-forum.com
21-22	8th Zambia International Mining and Energy Conference & Exhibition	Lusaka, Zambia	www.ametrade.org
26-27	Manufacturing Indaba	Ekurhuleni, South Africa	www.manufacturingindaba.co.za
July 2018			
17-19	POWER-GEN & DistribuTECH Africa	Johannesburg, South Africa	www.powergenafrica.com
August 2018			
16-18	Asia (Guangzhou) Battery Sourcing Fair	Guangzhou, China	www.battery-expo.com
16-18	10th Guangzhou International Solar Photovoltaic Exhibition 2018	Guangzhou, China	www.pvguangzhou.com
September 2018			
12-13	Future Energy East Africa	Nairobi, Kenya	www.future-energy-eastafrica.com
24-27	Solar Power International	Anaheim, California	www.solarpowerinternational.com
October 2018			
1-3	Future Energy Africa Exhibition and Conference	Cape Town, South Africa	www.futureenergyafrica.com
10-11	Biofuels International Conference & Expo and International Biogas Congress & Expo	Berlin, Germany	www.biofuels-news.com
11-13	Solar Energy Expo 2018 Tanzania	Dar es Salaam, Tanzania	www.expogr.com
23-24	Offshore Energy Exhibition & Conference	Amsterdam, The Netherlands	www.offshore-energy.biz
November 2018			
6-8	5th Senegal International Mining Conference & Exhibition (SIM SENEGAL 2018)	Dakar, Senegal	www.ametrade.org
13-14	Future Energy Nigeria	Lagos, Nigeria	www.future-energy-nigeria.com
15-16	Africa Renewable Energy Forum	Casablanca, Morocco	www.africa-renewable-energy-forum.com
December 2018			
6-8	Solar Energy Expo 2018 Rwanda	Kigali, Rwanda	www.expogr.com

Please check with organizers directly to confirm information as dates and venues are subject to change.

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